BOWLES's *NEW FOUR-SHEET* MAP OF

laid down *from the BEST OBSERVATIONS and NEWEST DISCOVERIES; particularly those of other celebrated* CIRCUMNAVIGATORS: *Illustrated* with a variety of useful PROJECTIONS and *GEOGRAPHICAL DEFINITIONS, TABLES, and PROBLEMS; With an easy and familiar Explanation*

Printed for the Proprietors BOWLES and CARVER.

The SOLAR SYSTEM.

The SUN and his Maculæ as Seen thro' a Telescope.

COMETS or Blazing Stars are Probably of equal Consistence and Duration with the Planets. They are generally much less than the Planets but with much deeper Atmospheres which when above those Bodies produce near the Sun a shining Tail opposite to the Sun.

Because from Observations of a great Number of these Maculæ or Spots on the Face of the Sun they all move in a Parallelism with the Sun's Equator in the same Periods & Time, therefore it is concluded that they are Prominences on the Solar Orbs, and move round the Sun with the Sun.

The Comet of 1680, according to Sr Isaac Newton in its near approach to the Sun was 2000 times hotter than a red hot Iron, and had it been a Globe of Iron so heated quite thro' would not have been cold in 50000 Years. The Velocity of this Comet near its Perihelion was 12500 Miles in a Minute, and the Length of its Tail 80 Million Miles.

The Ring of Saturn is a Phenomenon which has baffled the most celebrated Astronomers in accounting for its Existence by Other Laws of the Solar System.

Saturn and his Ring as seen thro' a Telescope.

Mercury as seen thro' a Telescope.

The Cause of an Eclipse of the Sun and of the Moon.

The Diameter of the Penumbra of Shadow of our Earth at the Moon is about 1900 Miles. The Diameter of the true Shadow of the Moon at our Earth is 180 Miles.

The Dimensions of the SOLAR SYSTEM.

	SUN	Moon	Mercury	Venus	Earth	Mars	Jupiter	Saturn
Mean Distances from the Sun in Millions of Miles			31½	58½	81	123¾	421¼	777½
Diameters in Thousands of Miles	76⅔	2⅓	2⅓	8	8	4½	81	68
Surfaces compared with the Surface of our Earth	9Thou	1/13	1/10	1	1	1/3	104	73
Magnitude or Greatness	888Th	1/50	1/23	1	1	1/6	1065	215
Quantity of Matter	300Th	1/40	1/30	1/5	1	1/18	214	76
Weights of equal Quantities of Matter at each Planet	25	1/3	1/25	1/5	1	1/3	2	1/3
Densities	¼	1 2/3	1 1/10	1/5	1	7/10	1/4	1/6
Proportion of Light & Heat	45Th	1	7	2	1	4/10	1/27	1/90
Motions per Hour in Thousands of Miles		2⅓	90	65¾	58	44¾	24½	18
Daily Motions in Degrees and Minutes		13°.9′	4°.5′	1°.36′	59′	32′	5′	2′
Time in which they move round the Sun in Days &c.			88	224⅔	365¼	687	4332	10759
Time in which they move round their own Axis in Days &c.	25¼	¾	¾	1	1	1	9/10	29 5/12
Inclination of their Orbits to the Ecliptic in Degrees		5°⅔	7°	3°⅔	0	2°	1°⅓	2½
Apparent mean Diameters in Minutes or Seconds	32¼	31½	8″	38″		11″	19″	

The SUN is placed near the Centre of the Solar System and the Planets and Comets move round him in Elliptical Orbits at mean Distances whose Cubes are as the Squares of the periodic Times. The Spaces thro' which the Planets move is void of Matter not having any sensible Resistance and the General Law which keeps them in their Orbits is their Gravitation toward each other and the Sun, with Forces proportional to their respective Quantities of Matter, and the Squares of their Distances respectively.

Sun — Spring, Summer, Autumn, Winter

The Sun enlightening the Earth and forming a conical Shadow. Also the Earth's Atmosphere forming a Penumbra.

The Length of the Earth's Shadow is from 215 to 227 times the Semi-diameter of the Earth.

The NORTHERN HEMISPHERE.

ASTRONOMICAL DEFINITIONS.

The Poles of the World are two Points in the Heavens opposite to each other. The Axis of the World is a Strait Line drawn from Pole to Pole. The Equator is a great Circle all of its Parts being equally distant from the two Poles and dividing the Heavens into two Parts called the Northern and Southern Hemisphere. The Ecliptic is a great circle passing thro' the Equator in two opposite Points and inclined thereto by an Angle of 23½. The Ecliptic contains 12 Signs Viz. Aries Taurus Gemini Cancer Leo Virgo Libra Scorpio Sagittary Capricorn Aquarius Pisces. A Meridian is a Great Circle passing thro' the Equator and the Poles. The Colures are two Meridians one of which passing thro' the Point where the Ecliptic cuts the Equator is called the Equinoctial Colure the other at 90 of the Equator therefrom is called the Solsticial Colure. The Poles of the Ecliptic are two Points 90 from the Poles of the World.

The Latitude of a Star is the nearest Distance of the Star from the Ecliptic. The Longitude of a Star is counted upon the Ecliptic according to the Orders of the Signs & terminates where a great Circle from the Pole of the Ecliptic cuts the Ecliptic itself. The Tropic of Cancer is a lesser circle at the Distance of 23½ from the Equator and 66½ from the North Pole of the World. And the Tropic of Capricorn is a lesser Circle at the Distance of 23½ from the Equator & 66½ from the South Pole. The Arctic Circle is 23½ from the North Pole of the World. And the Antarctic Circle is 23½ from the South Pole of the World. The Zenith is the Point over our Heads. The Nadir is the Point under our Feet. The Amplitude of a Star is the Number of Degrees from the East or West where it rises or sets. The Azimuth of the Sun or a Star is the Number of Degrees from the North or South to the Point directly under the Sun or Star. Circles of Altitude are parallel to each other from the Zenith to the Horizon. Circles or Azimuth or Vertical Circles are great Circles drawn from the Zenith to the Horizon. The Altitude of the Sun or a Star is the Number of Degrees it is above the Horizon. The Declination of the Sun or a Star is the Nearest Distance from the Sun or Star to the Equator. Right Ascension is that Point of the Equator which is on the Meridian with the Sun or a Star. Ascensional Difference is the Time from Six o' Clock when the Sun or a Star rises. Parallax is the Difference between the true & apparent Place in the Heavens.

The Law of Cometary System.

A Diagram explaining the Motions of the Earth.

THE CAUSE OF THE TIDES.

The Cause of the Tides or Ebbing and Flowing of the Sea was first Discovered by Sr Isaac Newton, and is accounted for as follows. 1st To whatever Part of the Earths Globe the Moon is vertical the Waters of the Ocean near that Place rise upward above their usual Surface by their Gravitation toward the Moon, which the Lands near the same Place would also do in like manner were they not firmly held together by the Force of Cohesion. 2d The Gravitation of a Mass of Matter equal in magnitude to the Earth and coincident with the Gravitation of the Earths Globe. 3d The Gravitation of the Waters in the opposite Hemisphere to where the Moon is vertical is less than that of the Earth itself. And therefore those Waters of the opposite Hemisphere will recede from the Earths Centre. 4th Hence it naturally follows that wherever the Moon is vertical the Ocean will rise and form Tides in Rivers, and that it will be nearly the same in that Place of the Earth diametrically opposite to, or there on the other side of the Earths Globe. 5th This Theory is confirmed by Observations for there is a double Tide every 25 Hours at all Places where the Tides are on the Face of our Globe. The

GEOGRAPHICAL DEFINITIONS.

The Poles of the Earth are two Points in the Surface of the Earth or Sea, and diametrically opposite to each other. One of which is called the North Pole & the other the South Pole. The Axis of the Earth is a Strait Line drawn from Pole to Pole, and about which the Diurnal Motion is performed from West to East in 24 Hours, whereby the Sun and Stars appear to move from East to West in the same Time. The Equinoctial Line is a great Circle all of its Parts being 90 Degrees distant from either of the Poles. Meridians are great Circles passing round the Earth and thro' the Poles. The Sensible Horizon is that which separates between the upper and lower Parts of the Sky or Firmament. The Rational Horizon is a great Circle parallel thereto. The Tropic of Cancer and the Tropic of Capricorn are two lesser Circles. The one 23½ Degrees North, and the other 23½ South of the Equinoctial. The Arctic Circle and Antarctic Circle are two lesser Circles the one 23½ Degrees from the North Pole, the other 23½ from the South Pole. The Torrid or Burning Zone is the Space of Earth and Sea between the Tropics. The Frigid or Frozen Zones are those Spaces of Earth and Sea between the Arctic and Antarctic Circles and their Poles. The North Temperate Zone is bounded by the Tropic of Cancer and the Arctic Circle. The South Temperate Zone is bounded by the Tropic of Capricorn and the Antarctic Circle. The Latitude of any Place is the Nearest Distance of the Place from the Equinoctial. The Longitude of any Place is the Distance from the Meridian of the Place to the Meridian of another Place where Longitude is supposed to begin reckoning on the Equator. Climates are Spaces of the Earth whose Breadths from North to South are such as to have their Longest Days half an Hour different from each other. Amphiscii are those which inhabit the Burning Zone. Heteroscii are those which inhabit the Temperate Zones. Antœcii are those which inhabit the Places under the same Meridian. Periœcii are those who live in Places of the same Latitude but on opposite Sides of the Meridian. Antipodes are those which inhabit Places of the Earth opposite to each other.

WESTERN HEMISPHERE OF THE WORLD.

ARCTIC or NORTH POLE

ARCTIC LANDS — GREENLAND — BAFFINS BAY — Davis's Straits — Hudson's Bay — Labrador — New Britain — Canada — Louisiana — Mexico — Florida — Gulf of Mexico — Caribbean Sea — Hispaniola — Cuba — Jamaica — Terra Firma — Guiana — Brazil — Paraguay — Patagonia — Tierra del Fuego — Falkland Islands — Tierra Magellanica — Chile — Peru — Bolivia — Mexico — Guatemala — Yucatan — Mosquito Shore — Terra Firma — Amazon — Orinoco — Plata — Magellan's Straits — Cape Horn — Cape Verd Islands — Azores or Western Islands — Canary Islands — Madeira — Cape Verd — Cape of Good Hope — Madagascar — Mauritius — Bermudas — Bahamas — Antilles — Falkland Islands — Tierra del Fuego — Kamtschatka — Aleutian Islands — Northern Archipelago — Sandwich Islands — Pacific Ocean — Atlantic Ocean — Western Ocean — Tropic of Cancer — Equinoctial Line — Track of the Spanish Galleon — Cook's track to America in 1778 — Anson's track from Acapulco to China — Baxo de Manuel Rodriguez — Chipperone I. by conjecture — Track of the Spanish Galleon Sr Carlos from Manila to Acapulco 1769

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2010 Ministerio de Cultura

THE WORLD, OR TERRESTRIAL GLOBE,

lately made in the SOUTH SEAS, by ANSON, BYRON, WALLIS, BOUGANVILLE, COOK, *and* REPRESENTATIONS of the HEAVENLY BODIES; *the most approved* ASTRONOMICAL and *of the most curious and interesting* Phœnomena *in the* UNIVERSAL SYSTEM.

N°69 in St Pauls Church Yard, LONDON.

TIDES, EXPLAINED.

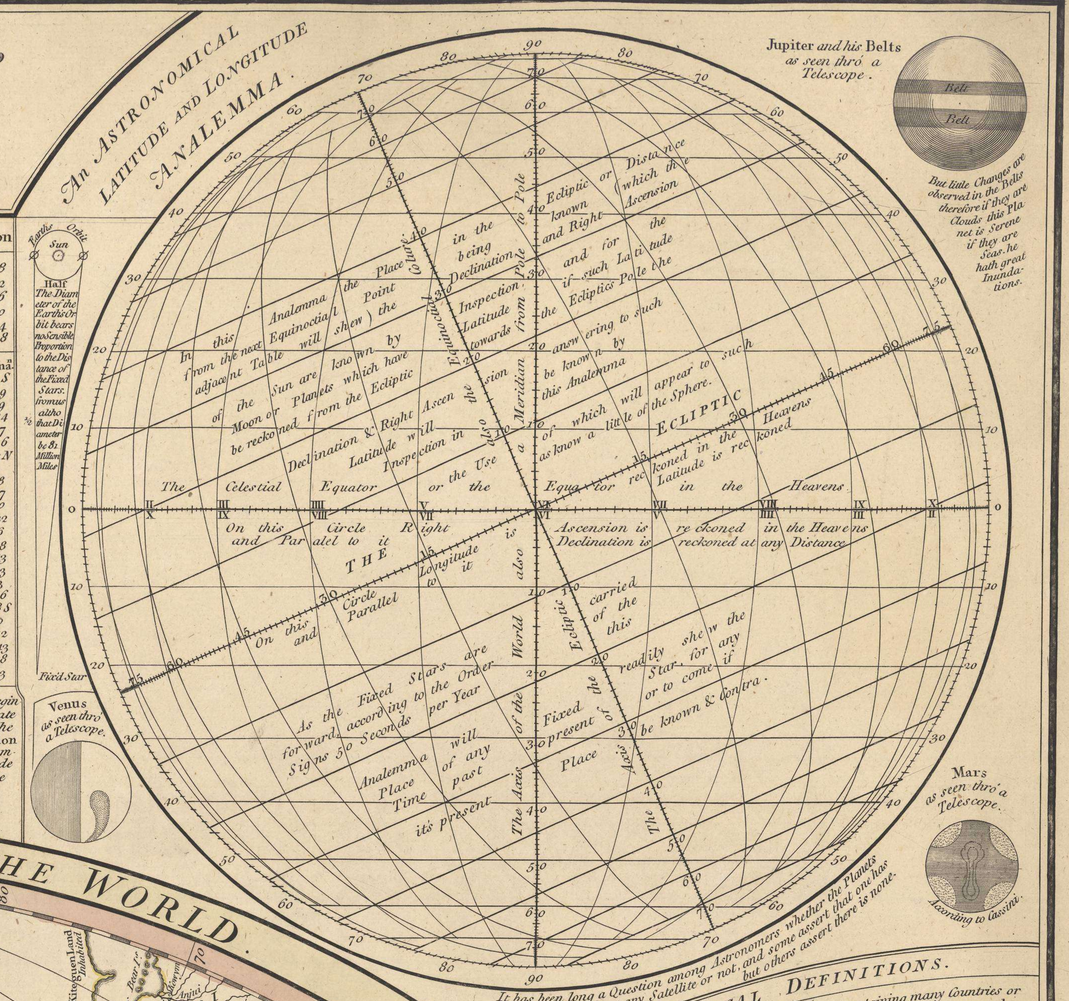
mutual attraction of the Earth and Moon would soon bring them together, were it not for the Centrifugal force which they acquire by moving round their common center of Gravity G once in every Month. Let M be the Moon, T a Nb the Earth, C its Center, and G the common Center of Gravity between the Earth and Moon. Z is the place where the Moon is in the Zenith, and N the place where she is in the Nadir. As the points Z, C and N revolve about G all in the same periodical time, their Centrifugal forces (or tendencies to fly off from G) are directly as their distances from G. The Moon attracts strongest at Z being nearest to it, weakest at N being farthest from it; and at C a mean between both at the Center C. But the Moons attraction just balances the centrifugal force at C and therefore it is greater than the centrifugal force at Z, and less than the centrifugal force at N. consequently the water at Z will rise towards the Moon by the excess of her attraction and will recede the contrary way at N by the excess of its centrifugal force, so that the Tides will be equally high both at Z and N, and as the Earth turns on its Axis, the different places thereof will come successively to the high water at Z and N, & to low water at A and B.

A TABLE of the Place of the SUN in the Ecliptic & Declination

Every fourth Year the Suns Place in the Ecliptic and Declination return nearly the same.	1761	1785	1762	1786	1763	1787	1764	1788
	1765	1789	1766	1790	1767	1791	1768	1792
	1769	1793	1770	1794	1771	1795	1772	1796
	1773	1797	1774	1798	1775	1799	1776	1800
	1777	1801	1778	1802	1779	1803	1780	1804
	1781	1805	1782	1806	1783	1807	1784	1808

	Longitude	Declin.n	Longit.	Declin.n	Longit.	Declin.n	Longit.	Declin.n
Jan. 1	♑ 11°. 25	22°. 59 S	11°. 10	23°. 0 S	10°. 55	23°. 1 S	10°. 40	23°. 3 S
10	26. 42	22. 51	26. 27	22. 53	26. 13	22. 56	25. 58	22. 59
Feb. 1	♒ 12. 58	16. 57	12. 43	17. 1	12. 28	17. 5	12. 14	17. 9
15	27. 7	12. 29	26. 52	12. 34	26. 38	12. 39	26. 23	12. 44
March 1	♓ 11. 11	7. 23	10. 57	7. 28	10. 42	7. 34	11. 28	7. 17
16	26. 9	1. 32	25. 54	1. 38	25. 40	1. 43	26. 25	1. 26
April 1	♈ 11. 58	4. 44 N	11. 44	4. 39 N	11. 29	4. 31 N	12. 14	4. 51 N
15	25. 41	9. 56	25. 27	9. 51	25. 13	9. 46	25. 57	10. 2
May 1	♉ 11. 14	15. 31	11. 0	15. 9	10. 46	15. 5	11. 30	15. 18
16	25. 43	19. 13	25. 29	19. 10	25. 15	19. 6	25. 59	19. 17
June 1	♊ 12. 4	22. 2	10. 50	22. 0	10. 36	22. 4	11. 20	22. 10
15	24. 27	23. 21	24. 23	23. 22	23. 59	23. 20	24. 42	23. 22
July 1	♋ 9. 42	23. 7	9. 28	23. 8	9. 14	23. 9	9. 58	23. 6
16	24. 0	21. 20	23. 46	21. 23	23. 33	21. 25	24. 16	21. 18
Aug. 1	♌ 9. 28	17. 57	9. 4	18. 1	8. 50	18. 5	9. 34	17. 53
16	23. 42	13. 38	23. 28	13. 43	23. 14	13. 48	23. 58	13. 33
Sept. 1	♍ 9. 9	8. 9	8. 55	8. 14	8. 41	8. 20	9. 25	8. 3
15	22. 46	2. 52	22. 32	2. 58	22. 18	3. 4	23. 2	2. 46
Oct. 1	♎ 8. 28	3. 22 S	8. 14	3. 16 S	7. 59	3. 10 S	8. 44	3. 28 S
16	23. 29	9. 4	23. 5	8. 59	22. 50	8. 53	23. 35	9. 10
Nov. 1	♏ 9. 18	14. 37	9. 3	14. 32	8. 49	14. 27	9. 34	14. 42
15	23. 23	18. 39	23. 9	18. 35	22. 54	18. 31	23. 40	18. 43
Dec. 1	♐ 9. 30	21. 52	9. 22	21. 53	9. 0	21. 51	9. 52	21. 58
16	24. 51	23. 22	24. 36	23. 21	24. 22	23. 21	25. 8	23. 23

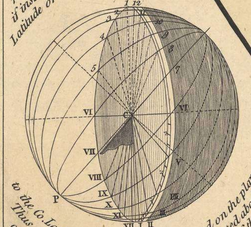
In the above Table the Suns Place in the Ecliptic is shewn for the Beginning and Middle of each Month in the Year, that for the intermediate Time may be found by proportioning the Difference or Degree to the Difference of the Suns Longitude. In like manner may the Declination for intermediate Days be found altho it will be more exact to compute the same by this Proportion. As Radius : to Sine of Suns Longitude :: so is Sine of 23°. 28'. the present Obliquity of the Ecliptic : to the Sine of the Suns Declination for that Longitude given.


An ASTRONOMICAL LATITUDE AND LONGITUDE ANALEMMA.
Jupiter and his Belts as seen thro' a Telescope.
Belt
Belt
But little Changes are observed in the Belts therefore if they are Clouds this Planet is Serene if they are Seas he hath great Inundations.
Arctic Circle
Sun
Half The Diameter of the Earth's Orbit bears insensible Proportion to the Distance of the Fixed Stars, from us altho that Distance be 81 Million Miles
Fixed Star
Venus as seen thro' a Telescope.
Mars as seen thro' a Telescope.
According to Galeide.
ECLIPTIC
Equinoctial
Meridian
Ecliptic
World
The Axis of the
The Equator
THE Equinoctial Circle or the Equator
Parallel Circle
Ascension is reckoned in the Heavens
Declination is reckoned at any Distance
Longitude is reckoned in the Heavens
Latitude is reckoned in the Heavens
Inspection
Declination
Latitude
Place
Time
Analemma
Equinoctial Point
Fixed Stars
Signs
Seconds
Year
Eclipse
Moon
Sun
Planets
Ecliptic
Equinoctial
Pole
Ascension
Distance
Latitude
Longitude
Right
Ascen
Use
Also
Equator
Heavens
Sphere
Place
Time
Star
Place
Axis
Equator
Equinoctial
Ecliptic
Pole
Ecliptic
Equinoctial
Pole
Ecliptic
Equinoctial
Pole
Ecliptic
Equinoctial

THE NEW WORLD, OR NORTH AND SOUTH AMERICA.

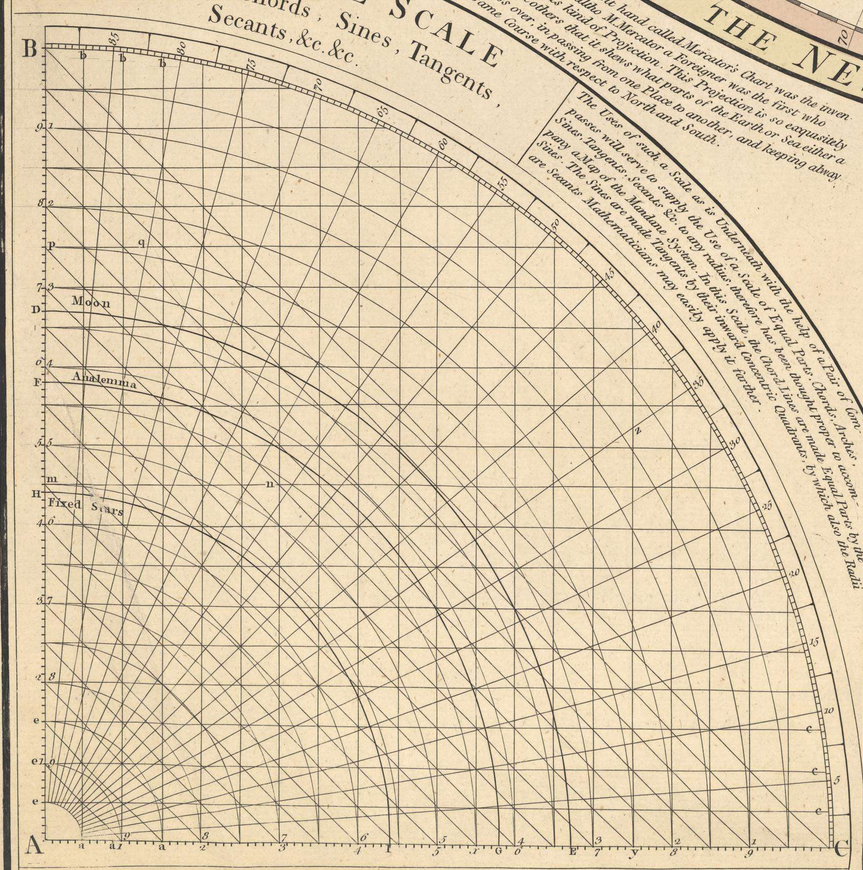
The ART of DIALING by a common GLOBE.

On the Opposite part of the Map we have shewn how to make a Horizontal Dial for any given Latitude. The same rule holds for an erect South Dial; instead of elevating the Pole to the Latitude of the Place, it be elevated.



to the C. Latitude, and the hours reversed on the plane of the Dial. Thus suppose the North Pole P, to be elevated above the North Point of the Horizon at XII equal to the Co-Latitude of the Place, and if the Globe be supposed to be cut Flat and close by the Horizon, and right Lines be drawn from the Center C, to those points in Horizon where the Meridians cut it, they will be the true Hour lines of a Dial fronting the true South, and if the Plane be erected as in the above Figure, it will be a true South Dial.

An UNIVERSAL SCALE of Equal Parts, Chords, Sines, Tangents, Secants, &c. &c.



This Chart or Map of the World on the Right hand called Mercator's Chart was the invention of Edward Wright an English Man, altho' Mercator a Foreiner was the first who constructed Maps of the World on this kind of Projection. This Projection is so exquisitely curious that it shews what parts of the Earth or Sea either a Traveller or a Ship must pass over, in passing from one Place to another, and keeping always the same course with respect to North and South.

The Uses of such a Scale as is Underneath with the help of a Pair of Compasses will serve to supply the Use of a Scale of Equal Parts, Chords, Arches, Sines, Tangents, Secants, &c. to any radius, therefore has been thought proper to accompany a Map of the Mundane System, In this scale, the Chord, Sines are made Equal Parts by the Sines. The Sines are made Tangents by their Broad Concentric Quadrants, by which also the Radii are Secants. Mathematicians may easily apply it further.

A CHART OF THE WORLD, according to MERCATOR'S PROJECTION, with the Rhumb Lines.

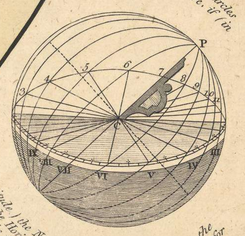
SELENO OR A MAP OF REGIO HYPER

SICCITATIS
OCEANUS PROCELLARUM
MARE IMBRIUM
MARE FRIGORIS
MARE HUMORUM
TERRA STERILITATIS
Palus Putredinis
Palus Nebularum
Palus Paludum
Palus Fulgoris
Palus Somnii
Palus Epidemiarum
Palus Gelidum
Palus Roris
Palus Cadaverum
Palus Putredinis
Palus Fulgoris
Palus Somnii
Palus Epidemiarum
Palus Gelidum
Palus Roris
Palus Cadaverum
Mare Vaporum
Mare Serenitatis
Mare Tranquillitatis
Mare Fecunditatis
Mare Nectaris
Mare Nubium
Mare Crisium
Mare Marginis
Mare Humorum
Mare Frigoris
Mare Imbrium

THE OLD WORLD, OR EUROPE, ASIA AND AFRICA.

The ART of DIALING by a common GLOBE.

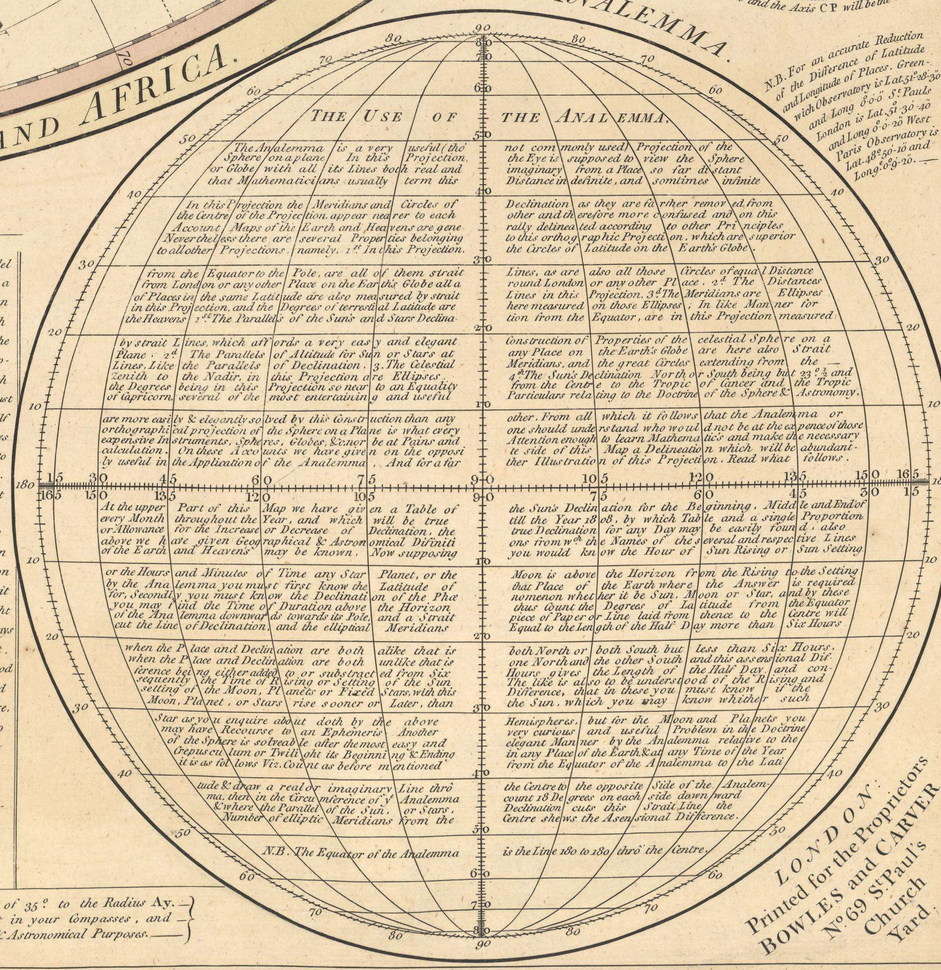
For as Meridian Lines are delineated on a Globe, as that is generally the Number on Nine Inch Globes) at 15 degrees from each other they will be four circles for all Latitudes. Therefore, if an



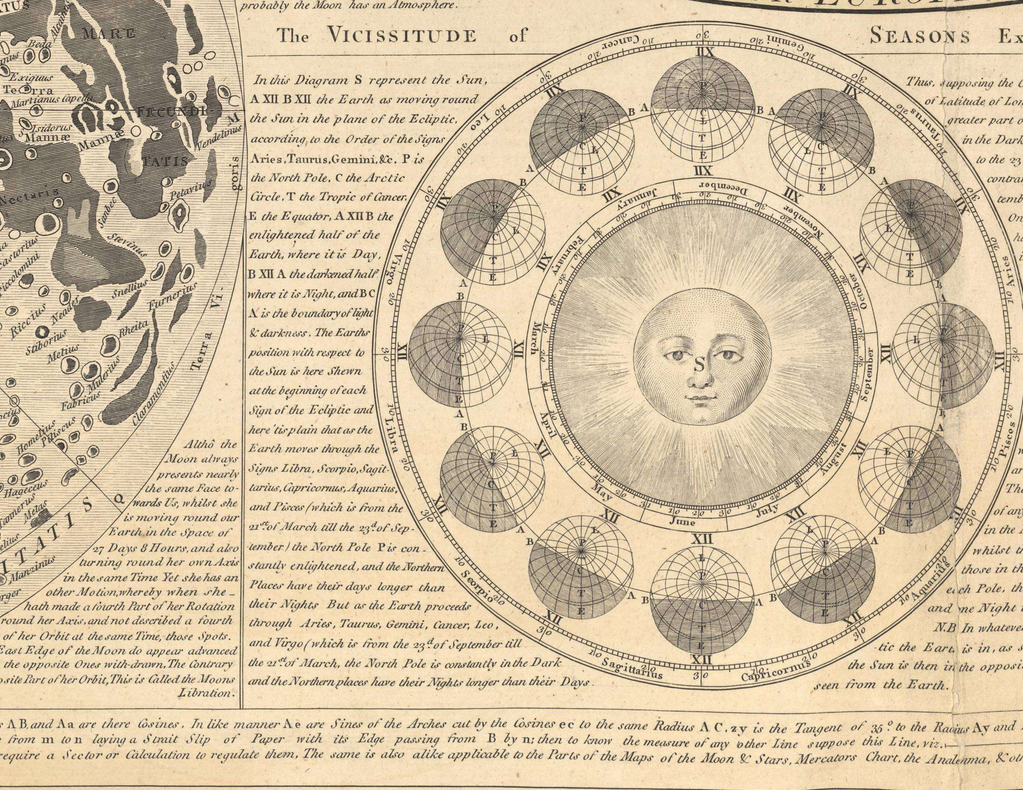
Northern Latitude (the North Pole P be elevated above the North Point of the Horizon equal to the Latitude of the Place for which the Dial is intended to serve, and one of the Meridians be brought to the North Point of the Horizon XII VI 12 6 at XII. All the other Meridians will cut the Horizon at the proper distances of the Hour Points from XII, as it will be equal to the elevation of the Axis of the Horizon, and the elevation of the Still above the Horizon, and drawing straight lines from the Hour Points to the Centre C, where the Meridians cut it they will be the Gnomon.

THE ANALEMMA.

N.B. For an accurate Reduction of the Difference of Latitude and Longitude of Places. Greenwich Observatory is Lat. 51° 28′ 30″ and Long 0° 0′ 0″ St Pauls London is Lat. 51° 30′ 40″ and Long 0° 0′ 20″ West Paris Observatory is Lat. 48° 50′ 10″ and Long. 0° 9′ 20″.



The VICISSITUDE of SEASONS Explained.



In this Diagram S represent the Sun, A XII B XII the Earth as moving round the Sun in the plane of the Ecliptic. according, to the Order of the Signs Aries, Taurus, Gemini, &c. P is the North Pole, C the Arctic Circle, T the Tropic of Cancer E the Equator, A XII B the enlightened half of the Earth, where it is Day. B XII A the darkened half where it is Night, and B C X is the boundary of light & darkness. The Earths position with respect to the Sun is here Shewn at the beginning of each Sign of the Ecliptic and here 'tis plain that as the Earth moves through the Signs Libra, Scorpio, Sagittarius, Capricornus, Aquarius, and Pisces (which is from the 21st of March till the 23rd of September) the North Pole P is constantly enlightened, and the Northern Places have their days longer than their Nights But as the Earth proceeds through Aries, Taurus, Gemini, Cancer, Leo, and Virgo (which is from the 23rd of September till the 21st of March, the North Pole is constantly in the Dark and the Northern places have their Nights longer than their Days.

Thus, supposing the Circle, L to be the parallel of Latitude of London, we perceive that a greater part of it is in the Light than in the Dark from the 21st of March to the 23rd of September and the contrary from the 23rd of September till the 21st of March On these two days it is just half in the light and half in the dark which shews the Days and Nights to be then equally long. On the 21st of June it is most of all in the light, which shews that its days are then at the longest, and on the 21st of December it is least of all in the light which shews that its days are then at the shortest. The like is to be understood of any other place Situated in the Northern Hemisphere, whilst the reverse happens to those in the Southern. But at each Pole, there is only one Day and one Night in the whole Year. N.B. In whatever part of the Ecliptic the Earth is in, as seen from the Sun, the Sun is then in the opposite part thereof as seen from the Earth.

GRAPHY, THE MOON.

The Axis of the Earth keeps always the same Parallel Position, & the Earth turns round the same every 24 Hours.

The most material Arguments in Favour of a Lunar Atmosphere seem to be those of the not instantaneous Loss or Gain of Light in the Occultation of Fixed Stars by the Moon, and according to several Observations in England as well as Abroad on the 6th of June 1761 whilst the Planet Venus was on the Disc of the Sun, she appeared to have an Atmosphere, of which a full Account may be seen in the Philos. Trans. So that for these and some other Reasons probably the Moon has an Atmosphere.

Altho the Moon always presents nearly the same Face towards Us, whilst she is moving round our Earth, in the Space of 27 Days 8 Hours, and also turning round her own Axis in the same Time Yet she has an other Motion, whereby when she hath made a fourth Part of her Rotation round her Axis, and not described a fourth Part of her Orbit at the same Time, those Spots near the East Edge of the Moon do appear advanced on her Face and the opposite Ones withdrawn. The Contrary also happens in an opposite Part of her Orbit, This is Called the Moons Libration.

of those Degrees cut in the Limb, to the Radius A B, and A a are there Sines. In like manner A e are Sines of the Arches cut by the Sines e c to the same Radius A C. a y is the Tangent of 35° to the Radius A y and A Z is the Secant of 35° to the Radius A y. — Count from B to m 55, and set the given Line from m to n laying a Strait Slip of Paper with its Edge passing from B by n; then to know the measure of any other Line suppose this Line, viz. — take it in your Compasses, and — Oblique short Distances, would otherwise require a Sector or Calculation to regulate them. The same is also alike applicable to the Parts of the Maps of the Moon & Stars, Mercators Chart, the Analemma, & other Geographical & Astronomical Purposes.

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