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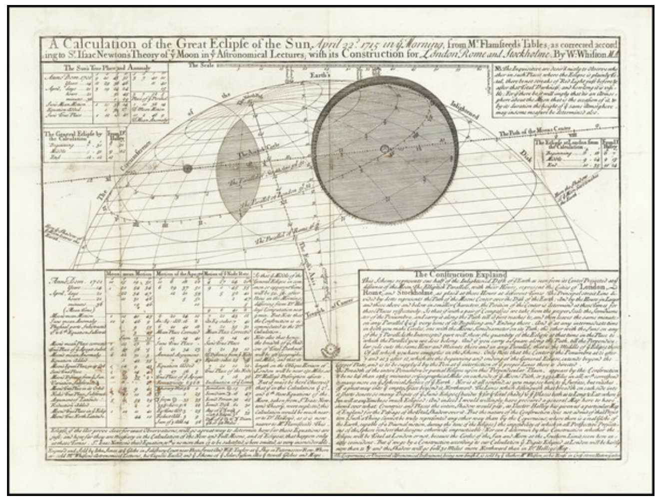
A Calculation of the Great Eclipse of the Sun, April 22d 1715, in ye Morning, from Mr. Flamsteed's Tables; as corrected according to Sr. Isaac Newton's Theory of ye Moon in ye Astronomical Lectures; with its Construction for London Rome and Stockholme. By W: Whiston MA

Stock#: 67440
Map Maker: Senex / Whiston

Date: 1715
Place: London
Color: Uncolored
Condition: VG
Size: 12 x 9 inches

Price: $ 4,500.00



Description:

Rare Eclipse Map of the 1715 Solar Eclipse by Polymath William Whiston

Important early astronomical broadside, prepared by William Whiston (1667-1752), a prominent and prolific English theologian and mathematician, of the first solar eclipse to be predicted using Newton's theories.

Whiston's broadside illustrates his predictions concerning the course of an eclipse which crossed the skies of Europe on April 22, 1715. In much of England, the eclipse totally blotted out the sun, causing a brief period of darkness during broad daylight and attracting considerable scientific and public attention.

The broadside, published by John Senex, one of the only mapmakers to be named a Fellow of the Royal Society, shows a diagram of the earth (or the hemisphere of the earth with the sun's light upon it) with only the lines of latitude and longitude shown. The earth's axis, correctly tilted, runs down the middle, while the path of the moon's center is marked with a dotted line. The diagram is drawn so that a viewer could calculate the time of the beginning and ending of the eclipse for Stockholm, London, Rome, or other European locations.

The broadside is filled with text boxes showing and explaining Whiston's calculations, which are corrections of those of Edmond Halley, who would become the second Astronomer Royal in 1720. This

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particular eclipse is commonly known as Halley's Eclipse, due to his widely-publicized (and very accurate) prediction. By also referring to Flamsteed's lunar tables and using Newton's theory of the moon, with which Whiston was very familiar as one of the first lecturers to popularize Newton's ideas, Whiston was able to also predict the time of the eclipse on the morning of April 22, 1715.

As compared to another predictive eclipse map by Edmond Halley, and also published by Senex in March 1715, Whiston's work is quite technical. This must also have been the verdict from consumers, as Whiston offered another broadside that offered "an easier observation" explanation.

The text reads as follows:

> ***[right column] The Construction Explaind***
>
> *This Scheme represents one half of the Inlightened Disk of the Earth as seen from its Center Projected at the distance of the Moon. The Elliptick Parallels, with their Hours, represent the Cities of London, Rome, and Stockholme, as plac'd at those Hours at different Times. The Principal strait Line divided by dotts represents the Path of the Moons Center over the Disk of the Earth: And by the Hours in Larger and those above and below in smaller Characters, the Position of the Center is determined at those Times for those Places respectively. So that if with a pair of Compassees we take from the proper Scale the Semediameter of the Penumbra, and carry it along the Path till it first reaches to, and then leaves the same minute on any Parallel that is the very time of its Begiñing and Ending there. And if at any intermediate time in both you make Circles, one with the Moons Semidiameter on its Path; the other with the Suns on any of the 3 Parallel the Intercepted part will shew the quantity of the Eclipse at that time in the Place to • which the Parallel you we does belong. And if you carry a Square along the Path, till the Perpendicular side cuts the same Hour and Minute there and in any Parallel, that is the Middle of the Eclipse there. Of all which you have examples in the Scheme. Only Note that the Center of the Penumbra at 21 after 7 and at 3 after 12 which are the beginning and ending of the General Eclipse, extends beyond the Copper Plate, and is to be supply'd by the Pen at the intersection of the proper Lines there to directed.*
>
> *The Breadth of the intire Penumbra or partial Eclipse upon this Perpendicular Plain, appears by the Construction to be no less than 1965 minutes or Geographical Miles on each side of the Moons Path, or 3930 Miles in all; wch. correspond to many more on the Spherical Surface of the Earth: Nor is it all confind, as you may see here, to that Surface, but reaches off a greatway into the empty Space*

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> *beyond it Northward. The Lines which distinguish that breadth on each side into 12 parts denote so many Digits of the Suns Eclipses besides ⅓ for the Total shade) & the places both as to Long: 8 Lat: where the sun will at any Time be so much Eclipsed: And indeed I would willingly have procured a general Map here to have shewd over what Countries and Places the intire Shadow would pass, as Doctor Halley has given us a particular Map of England for the Passage of the Total Shadow over it. But the nature of the Construction does not admit of that Projection (Such a Thing cannot be truly represented any other way than by the Copernicus; where there is a real Globe of the Earth, capable of a Diurnal motion, during the time of the Eclipse) the impossibility of which in all Perspective Projections of the Sphere renders that designs otherwise impracticable: Nor can I determin by this Construction whether the Eclipse will be Total at London or not, because the Circles of the Sun and Moon at the Southern Limit seem here exactly coincident. But if we go by a Construction according to our Calculation the Digits Eclipsed at London will be hardly more than 11 ⅘ and the Shadow will go full 30 Miles more Northward than in Dr. Halleys Map.*
>
> *[left column] So that ye Middle of the General Eclipse in common or apparent Time will be 50. 56. after Nine in the Morning differing from Dr. Halley's Computation near 9 min. But Note that the Construction is accommodated to the Drs. Calculation.*
>
> *Note also that hence the breadth of the Shadow of Total Darkness will be 98 Geographical Miles; and that its length on the Oblique Horizon of London will be near 150 Miles, as Dr. Halley's Description asserts.*
>
> *But it must be here Observed that if in this Calculationye 2nd and 6th New Equations of the Moon, taken from S. Isaac Newton's Theory, were neglected, this Calculation would be much nearer to Dr. Halley's, as it is now nearer to Mr. Flamsteed's. This Eclipse, if the Air prove clear for exact Observations, will go a great way to determin how far those Equations are just; and how far they are necessary in the Calculation of the New and Full Moons, and of Eclipses, that happen only at those Times. St. Isaac Newton's third Equation, wch is no more than 13” to be substracted, is here omitted, as very inconsiderable.*

At the bottom, the map notes:

> *[left] 'Engrav'd and Sold by Iohn Senex at ye Globe in Salisbury Court near Fleet Street. And Will: Taylor at y.e Ship in Paternoster Row. Where are Sold M.r Whiston's Astronomical Lectures, his*

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> *Taquet's Euclid, and ye Scheme of ye Solar System. Also ye Newest Globes and Maps.*
>
> *[right] The Copernicus, or Universal Astronomical Instrument, being now finish'd, is sold by ye Author Mr. Whiston, at his House in Cross street Hatton Garden*

Whiston's map was first advertised for sale at the bottom of a Senex advertisement for Halley's first eclipse map, in the *London Gazette* for April 2 - 5 1715, followed by a more detailed announcement in the *Post Man* of April 7-9 1715:

> *This Day is published, Mr. Whiston's second Account of the great Eclipse; containing, 1. Directions for its easier Observation. 2. The principal Things to be observed 3. A Cælestial Map of the principal Stars and Planets, and of the Sun's milky way, which may then be visible. 4. An exact Calculation of the Eclipse, from Sir Isaac Newton's last Improvement to his Theory of the Moon; with several curious Remarks. Sold by the Author in Crosstreet Hatton Garden, and by Mr Senex in Salisbury Court near Fleetstreet, price 1s. Note, Mr Whiston intends to have one of his Balls of Fire thrown up from Hampstead Heath, just at the middle of the Eclipse, for a Signal to all the remote Observers, and a Specimen how far that Light may be seen at a time of so great Observation.*

The map was unquestionably circulated among England's most important astronomers. For example, it was transmitted almost immediately by John Flamsteed, first Astronomer Royal, to Abraham Sharp, a mathematician and astronomer, who acknowledged receipt in a letter of May 3, 1715. Sharp had had the image in hand on the date of the eclipse, lamenting in the same correspondence that clouds impaired his ability to make observations for much of the period of the eclipse.

Astronomy, eclipses, and astronomical broadsides in eighteenth-century Britain

The movement of the sun, moon, and stars (and eventually of the earth itself) has long fascinated humans, dating from ancient times. Astronomy is also a useful subject with practical applications, including in navigation, cartography, and timekeeping.

In England, the utility to navigation was of the utmost importance in the seventeenth century. In the interest of furthering imperial claims and maritime commerce, King Charles II (r. 1661-1685) ordered the creation of a Royal Commission to investigate investment in astronomy. The Commission eventually recommended the creation of an observatory to be headed by an “astronomical observer”. They, at the suggestion of architect and astronomer Christopher Wren, chose Greenwich as the site of the

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observatory—Britain's first state-funded scientific institution—and named John Flamsteed as the first Astronomer Royal.

Flamsteed is well known for plotting the visible stars in the northern and southern hemispheres, a project shared with the second Astronomer Royal, Edmond Halley. He also derived lunar tables, which helped in the prediction of the dates and times of future eclipses, one of the most popular and culturally salient astronomical events.

A lunar eclipse occurs when the earth passes between the sun and the moon, blocking the sun's light while the moon is in the earth's shadow. A rarer phenomenon, a solar eclipse occurs when the moon passes between the earth and the sun; this can totally block the sun's light (total eclipse), nearly totally block the sun (annular eclipse), or partially block the sun (partial eclipse), depending on one's location on earth and the path of the shadow cast on the earth by the moon.

For many centuries and across many cultures, eclipses have been interpreted as significant events with serious consequences. For the Ancient Greeks, for example, eclipses were thought to be bad omens, signs of an angry god. In eighteenth-century Britain, they were understood as both scientific phenomena to be studied, as well as possible warnings to be heeded. A newspaper in 1748, citing an upcoming solar eclipse, linked the solar eclipse of 1715 to the rebellion at Preston, while a 1745 solar eclipse supposedly foretold the Jacobite rising.

Others saw eclipses as an economic opportunity. As literacy rates rose in the eighteenth century, and as the intellectual waves of the Enlightenment spread more broadly, more and more people clambered to not only view, but also understand, eclipses. In previous centuries, astrological broadsides had advertised doom and gloom when a comet or eclipse was predicted. Cartographic publishers such as John Senex updated this genre by selling astronomical broadsides that included explanations of what eclipses were, how the solar system worked, and how to view an eclipse.

Senex published at least twelve such broadsides during his career. Of these, nine focused on eclipses of the sun or moon, two on general astronomical information, and one on the transits of Venus and Mercury. Four were written by William Whiston, four by Edmond Halley, and two by Thomas Wright. Senex used the prints to advertise his other wares; the broadsides sold for 6 pence to 2 shillings 6 pence, making them available to a wide swath of the reading public. Additionally, there were ephemeral objects, making them rare on the market and in institutional collections today.

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The solar eclipse of 1715

This broadside discusses a particularly important solar eclipse, that of May 3, 1715. As Britain did not adopt the Gregorian calendar until 1752, the date advertised for this eclipse was April 22, 1715. The totality of the eclipse was visible across England, from Cornwall to Norfolk, allowing many observations of the phenomenon by skilled astronomers and the general public.

The 1715 solar eclipse was the first to be predicted using Newton's theory of universal gravitation. Newton had in turn utilized the lunar tables of John Flamsteed to develop his ideas. Flamsteed felt that both Newton and Edmond Halley did not give him proper credit for his work. However, Flamsteed got to record his predication of the 1715 eclipse in a unique way. The Painted Hall of the Greenwich Hospital was being completed at this time; it was commissioned in 1707 and finished in 1714. In one corner, Flamsteed appears with his assistant, Thomas Weston. They stand over an eclipse map with a date triumphantly stamped at the bottom, "April 22, 1715."

The eclipse was most accurately predicted by Halley, who produced a map of the shadow's path. William Whiston's broadside (both were published by Senex in March 1715) offered a more technical explanation and diagram of the eclipse (too technical, it would seem, as he also published a second broadside for "ye easier observation"). Halley predicted the eclipse to within four minutes of accuracy, while Whiston's predictions over-corrected Halley's by several minutes. Halley produced a second map of the eclipse after the event, with correction to his original predictions.

Both Halley and Whiston requested the reading public's help in their broadsides, asking them to measure the sun's image (in projection) and to watch for an atmosphere around the moon respectively. They saw the eclipse as a chance to gain money, fame, and to promote Newtonianism.

Rarity

Geoff Armitage, in *The Shadow of the Moon: British Solar Eclipse Mapping in the Eighteenth Century*, records the following known examples: British Library; Cambridge University, Institute of Astronomy Library; Harvard University, Houghton Library; and the Marquess of Bute's copy.

Detailed Condition:
Evidence of old folds. Minor restoration at 3 fold intersections.