



THE SIGN BEFORE THE BIRTH OF CHRIST

AS WITNESSED IN NEWARK, OHIO
6:29 P.M., TUESDAY, APRIL 6TH, 1 B.C.

THE 5-YEAR PROPHECY OF
SAMUEL, THE LAMANITE

THE SUN AND THE MOON KEEPING ANCIENT TIME
AT THE NEWARK EARTHWORKS

by

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Bethlehem, Pennsylvania
December 25, 2017

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Introduction

Forty years ago I began a lifelong interest in how the ancient world kept time. My first efforts resulted in 1980 with the publication of *April Sixth* by Deseret Book. This book examined how the chronological accounts of the New Testament for the death of Christ are in harmony with the chronology which the Book of Mormon gives for the birth and death of Christ. In writing this book I became familiar with the calendars of the Jews and then with the intense interest which ancient Americans had in the keeping of time. Every true story must have a time line and every time line fixes an interrelation of events. This means that a true story is the subject of rigorous numerical analysis. My approach today, as it was when I wrote my first book, is to concentrate on the counting of days in the time line. I am looking for numerical harmony in that time line which relates to the birth of Christ.

I have used my approach in the study of time to analyze hundreds of fragments from the Dead Sea Scrolls and to determine the exact day for the First Vision. Some results of these studies can be found online at Meridian Magazine.

Earlier this year I found several references to work which scholars in the last two decades have done with respect to the astronomical alignments of the earthen mounds in Newark, Ohio. These earthworks are large and they are carefully designed to keep track of time. The operation of these earthworks gives an insight into the time line and setting of the Book of Mormon. I started this analysis with the thought that a detailed examination of how the earthen mounds worked in the first century would make a connection to the chronology which the Book of Mormon gives relating to the birth of Christ.

This connection is the focus of the study. How do the Newark Earthworks connect to the prophecy of Samuel, the Lamanite, concerning the birth of Christ? My study has a time line. The time line requires a listing of days. These days begin five years before the birth of Christ. They are expressed within the framework of the Julian Calendar and each day has a Julian Day Number. This means that each day in the time line is easily connected to the present. The cycles of the moon play an important role in the timing of Christ's birth. The cycles of the moon were critical for the operation of the Newark Earthworks. There are hundreds of lunar events in this time line. The tying together of lunar events in the early spring of 6 BC and 1 BC are found in the last two tables. The volume of data in these tables may seem overwhelming but the rigor of the time line as it relates to the exact movements of the moon allows for the important connection of time and place to those people in America who were looking for the sign of the birth of Christ. My study is completely dependent on the correctness of the time line. It is tied to the exactness of the moon's movements and to the precision of the alignments found in the large earthen monuments of Newark, Ohio.

Newark Earthworks Ohio

The Virginia University Press published in April 2016 a collection of essays dealing with the earthen mounds in Newark. The essays are entitled *The Newark Earthworks: Enduring Monuments, Contested Meanings*. I have selected 16 quotes from that book to let the reader get a sense of what contemporary scholarship has to say about this remarkable site. I offer these quotes with full accreditations to their authors and sources. My purpose in doing this is to let the authority of modern scholars set the stage for this little study -- a study which tries to find connections between the moon and the keeping of time at the Newark Earthworks to the detailed accounts from Samuel, the Lamanite, and from Nephi, the Son of Nephi -- a study of the events which the Book of Mormon gives concerning the knowledge which the ancient

people of America had with regard to the exactness of Christ's birth. These quotes are from experts who have carefully studied the Newark Earthworks. I suppose that none of these experts have any interest or desire to connect the Newark Earthworks to the accounts found in the Book of Mormon. That is a job which I am happy to try to do.

Citations from Leading Experts

I Had No Idea! Competing Claims to Distinction at the Newark Earthworks (pp. 1-20), LINDSAY JONES

Renowned by historians and archaeologists as one of the wonders of the ancient world, the Earthworks of Newark, Ohio, nonetheless remain, for the broader public, lamentably little known. Among the largest, most geometrically precise and best-preserved earthen architecture ever constructed, these built forms have, as we'll learn in this volume, astronomical alignments no less sophisticated than those at Stonehenge and a scale no less enormous than the Peruvian geoglyphs at Nazca. And yet obscurity is also among their foremost attributes ... Indeed, incongruities abound. A two-thousand-year-old testament to another era, another civilization, and another set of socio-religious priorities, this pre-Columbian complex,...

The Newark Earthworks Past and Present (pp. 23-38), RICHARD D. SHIELS

The largest and most precise complex of geometric earthworks in the world was built in what are today the adjoining cities of Newark and Heath, Ohio, roughly two thousand years ago. Two huge features remain. The Newark Earthworks are today among a small number of sites that the US Department of the Interior is considering nominating for inscription on the UNESCO World Heritage List. Built by ancestors of today's American Indians, the site has been preserved by several generations of Newark residents... The original complex covered four and a half square miles and included four huge geometric enclosures...

The Newark Earthworks: A Monumental Engine of World Renewal (pp. 41-61), BRADLEY T. LEPPER

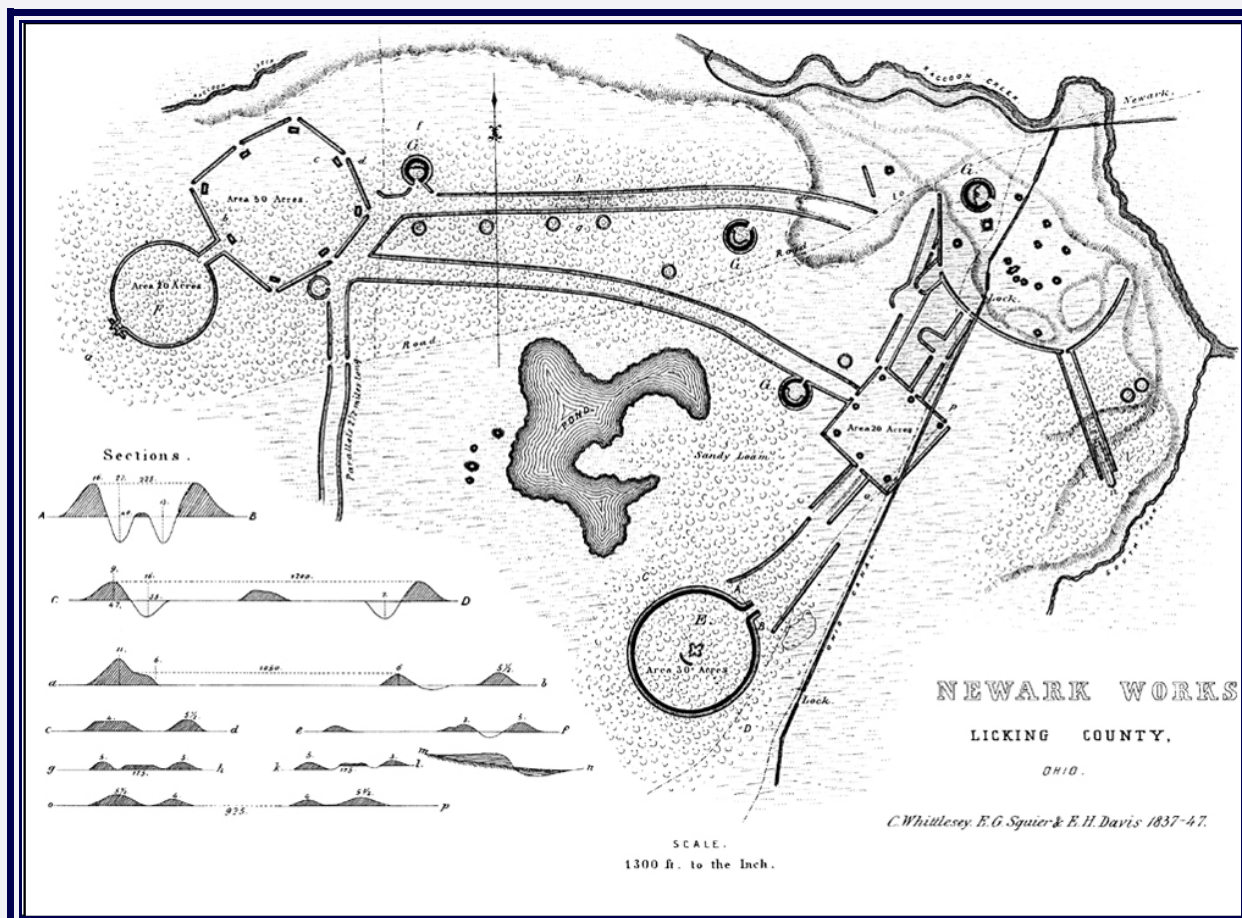
The Newark Earthworks represent the pièce de résistance of the florescence of monumental architecture that is an important part of what archaeologists have referred to as the Hopewell culture. I make this claim not simply because it is the largest complex of geometric earthworks in the Hopewellian world but because it is an integrated combination of functionally discrete architectural elements incorporating astronomical and geometrical knowledge with uncanny precision and on a scale that is overwhelming to on-the-ground observers. Elsewhere I have compared the Newark Earthworks to "a North American Kaaba, Sistine Chapel, and Principiaall rolled into one," but in...

The Newark Earthworks: A Grand Unification of Earth, Sky, and Mind (pp. 62-94), RAY HIVELY and ROBERT HORN

Romeo invokes "yonder blessed moon" to seal his pledge of love for Juliet, and Juliet reminds him that the blessed moon is also fickle, a poor sponsor for a constant love. Today it is difficult to fathom either Romeo's awe or Juliet's doubt ... The famous NASA image of the Apollo 11 moon landing that depicts a half-Earth visible in the background as the lunar module lifts off from the moon to rendezvous with the Apollo command module on July 21, 1969, is an appropriate place to begin thinking about the blessed but inconstant moon and its place in the story...

An Andeanist's Perspective on the Newark Earthworks (pp. 97-110), HELAINE SILVERMAN
 From the proverbial time immemorial humans have marked their physical environments, imbuing them with stories, subjecting them to particular cosmologies of understanding and ideologies of use, and altering them with visible signs from cave paintings to towering skyscrapers. In so doing, landscapes of meaning are created. Some of these landscapes are of such a monumental nature that their importance in their ancient societies is obvious. Other landscapes may be more elusive for identification in the absence of ethnohistoric records or ethnographic fieldwork among communities retaining some memory of their significance or actual cultural continuity. Recovery of meaning may be so...

Hopewell and Chaco: The Consequences of Rituality (pp. 111-128), STEPHEN H. LEKSON
 Interpretations and understandings of Hopewell culture invariably focus on ceremony, religion, and ritual. There seems to be no political or economic model that “explains” Hopewell’s astonishing monuments, built by hunter-gatherers who may or may not have had fixed villages. This is disturbing; states, not hunter-gatherers, build big monuments. Is Hopewell impossible? No, there is another example of just such an entity in the southwestern United States: Chaco Canyon, the great eleventh-century Pueblo Indian regional center, was arituality... The idea of a Chacoan “rituality” was first applied to Chaco by Norman Yoffee. Yoffee insisted on the primacy of ritual...



Beyond Newark: Prehistoric Ceremonial Centers and Their Cosmologies (pp. 129-150), TIMOTHY DARVILL

Ceremonies and ritual observance connected to concerns about life, fecundity, well-being, and death are fundamental elements of the human condition and everyday experiences; they are axiomatic to what Martin Heidegger referred to as “dwelling” on the earth and fit within his four-fold concept of “oneness”: earth and sky, divinities and mortals. Many aspects of these emotional attachments lie in the domain of intangible heritage — language, music, dance, sacred knowledge, beliefs, representations, cosmologies, and worldviews that peoples and societies hold dear and transmit through oral traditions, participation, pupilage, and performance. But such things also find formal expression in the tangible material...

The Newark Earthworks as “Works” of Architecture (pp. 153-163), JOHN E. HANCOCK

The cultural tradition responsible for building ancient Newark mastered three major types of earthworks (as opposed to “mounds,” which for me as an architect is an important distinction): first, geometric enclosures, of which there are many variations, and of which Newark is probably the greatest; second, hilltop enclosures, most spectacularly Fort Ancient and Fort Hill, though there are also many of these, generally a bit better preserved today; and third, complex or figural earthworks, including those at Tremper, Stubbs, Turner, Newark’s Eagle, the Tarlton Cross, and certain crescents as at Fort Ancient. Although this volume is about the Newark Earthworks,...

The Newark Earthworks as a Liminal Place: A Comparative Analysis of Hopewell-Period Burial Rituals and Mounds with a Particular Emphasis on House Symbolism (pp. 164-179), THOMAS BARRIE

This essay discusses house symbolism in Hopewell funerary practices with the goal of providing broadened perspectives regarding the Newark Earthworks and Hopewell culture burial mounds. Even though much has been written about the Hopewells’ social structures, ritual practices, and material artifacts, relatively little attention has been directed to their domestic architecture and, in particular, its appropriation and application in the funerary practices that were central to their culture. This essay argues that even though Hopewell sacred sites such as Newark materialized a range of symbolic agendas, they were primarily positioned as liminal places believed to provide physical and metaphysical connections...

The Cartographic Legacy of the Newark Earthworks (pp. 180-197), MARGARET WICKENS PEARCE

Before the town surveyor platted the city of Newark, Ohio, before the public land surveyors, before the surveyors of the Western Reserve, an ancient team of surveyors assembled at the confluence of Raccoon Creek and the Licking River to measure and mark the landscape. The time was somewhere between 100 and 400ce. They were not the first to shape this landscape; already the valley was a place of mounds, habitations, agricultural fields, and roads and pathways built by previous generations, to which the surveyors’ work seems closely tied. Yet the design they planned and initiated was far larger and more...

The Modern Religiosity of the Newark Earthworks (pp. 198-212), THOMAS S. BREMER

Fascination with ancient earthworks in Ohio goes back at least to the time that Euro-American explorers and settlers first entered the Ohio valley. English colonists in America knew of Indian burial mounds, and the cultural elites of the new American nation following the Revolution found evidence in these mysterious structures of a glorious antiquity and premonitions of future greatness for their civic ambitions. Indeed, fantasies

of cultural greatness danced atop these silent mounds. But Ohio's ancient earthworks also recall a history of loss and longing. Disappeared and entirely forgotten were not only the people and cultures who had produced these...

Native (Re)Investments in Ohio: Evictions, Earthworks Preservation, and Tribal Stewardship (pp. 215-229), MARTI L. CHAATSMITH

Two thousand years ago, ancestors of contemporary American Indians created the Newark Earthworks amid bountiful woodlands surrounded by rushing creeks and wetlands. The natural landscape provided the inspiration for people to plan and build a massive complex on the scale of the physical world around them. From this act of community and ritual emerged a map reflecting their spiritual and social world. When completed, maintained, and landscaped as the architects envisioned, the Newark Earthworks complex was surely experienced as a wonderful place: a place of anticipation, mystery, medicine, magic, and grandeur, perhaps especially during the three years around lunar standstills....

Whose Earthworks? Newark and Indigenous Peoples (pp. 230-242), MARY N. Mac DONALD
Monuments erected long ago in Ohio, including earthworks located in Newark and Heath in Licking County, claim the attention of a worldwide audience and at the same time have particular significance for indigenous communities. While we all recognize the earthworks as monuments of a culture that flourished prior to European incursion into the Americas, they may well have greater significance for contemporary Native American cultures than for settlers and the descendants of settlers who now make their homes in Ohio. Since there is considerable interest in having the earthworks at Newark (along with a couple others in Ohio), designated as...

The Peoples Belong to the Land: Contemporary Stewards for the Newark Earthworks (pp. 245-261), DUANE CHAMPAGNE and CAROLE GOLDBERG

How do indigenous peoples understand, relate to, and interpret ancient places such as the Earthworks at Newark? While it is difficult to survey the views of hundreds of tribal communities, many tribal nations have taken actions and expressed their viewpoints on the physical remains of ancestors, funerary materials, and specific places that are significant in their tribal teachings and traditions. Tribal efforts to protect sacred places are found in the movements to gain legislative and federal administrative protections in the American Indian Religious Freedom Act, the Native American Graves Protection and Repatriation Act, the National Historic Preservation Act, presidential executive...

Caring for Depressed Cultural Sites, Hawaiian Style (pp. 262-276), GREG JOHNSON

My first clue that the Newark sites are depressed was the amount of care being shown them by a handful of dedicated locals from several walks of life and professions. A healthy site might occasion admiration, celebration, and even adulation. Newark is worthy of all of these, but what I perceived most directly was concern. These local individuals, including Richard Shiels, Marti Chaatsmith, and Brad Lepper, and their efforts, including the work required to host the symposium out of which this volume springs, express and manifest what Native Hawaiians would call malama (care). Malama is usually regarded as a manifestation...

Imagining “Law-Stuff” at the Newark Earthworks (pp. 279-288), WINNIFRED FALLERS SULLIVAN

For those who primarily study the earthbound works of people living today or in the relatively recent past through their written words, the Newark Earthworks initially presents an undeniably awesome but frustratingly silent landscape. Who were these workers of the earth who looked to the skies? How might we conjure their lives? How might we, like our nineteenth-century spiritualist ancestors, make the dead speak and tell us their secrets? What does it mean for our work when all of the words are supplied by us, not by them? Who can speak for them?

Truth shall spring out of the earth;
and righteousness shall look down from heaven.

Psalms 8:11

Ancient people in North America built hundreds of large earth mounds. No other place in the world has as many ancient mounds as the river valleys of Ohio and Illinois. Indeed the world's largest earthen geometric complex is in Newark, Ohio, where large mounds cover an area of around 3,000 acres – about the same size as the area that is occupied by the pyramid complex in Giza. The Newark Earthworks span an area which is 50 times larger than Stonehenge.

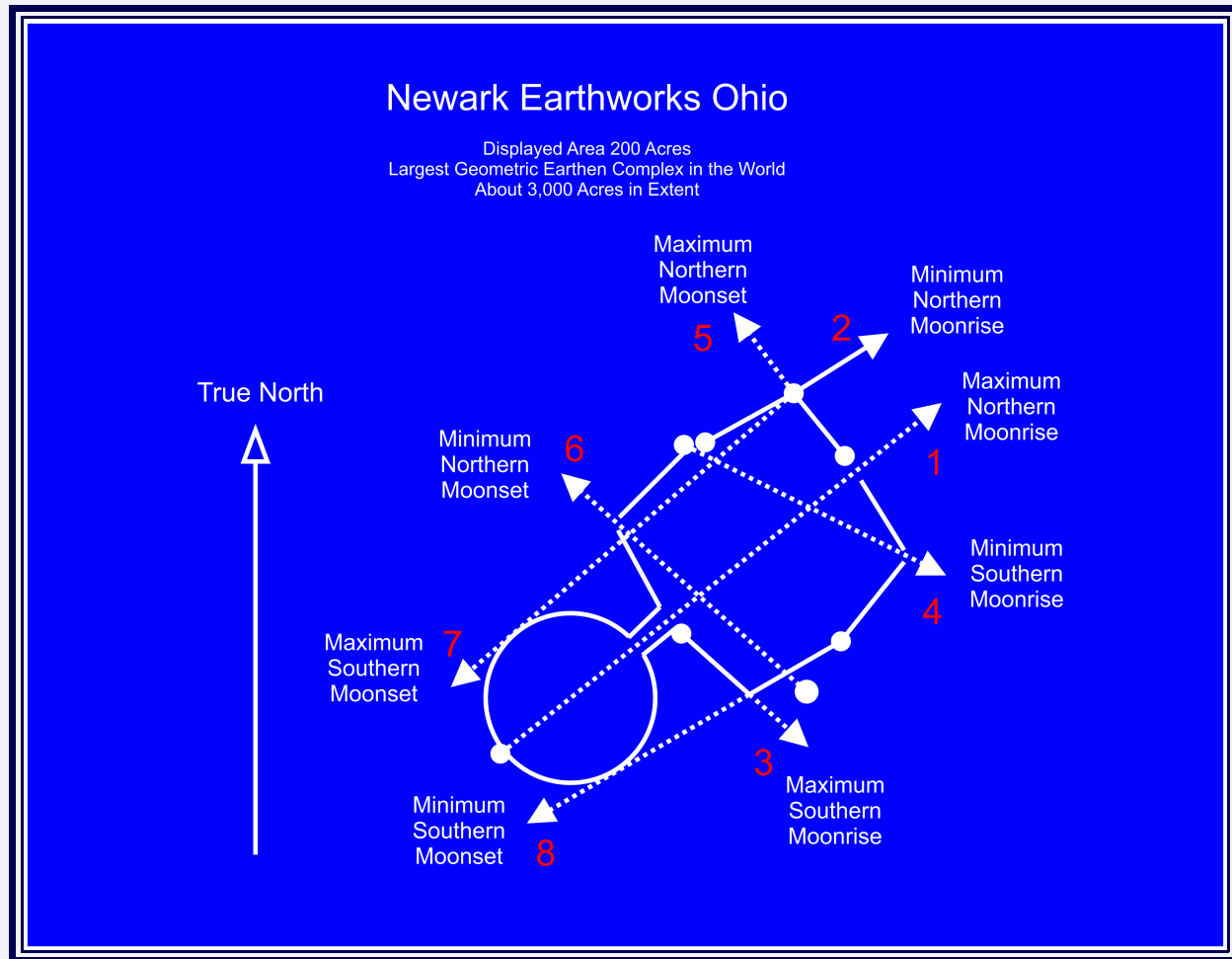
In 1848 Ephraim George Squier and Edwin Hamilton Davis wrote the first scientific report ever published under the auspices of the Smithsonian Institute. The book was entitled *Ancient Monuments of the Mississippi Valley: Comprising the Results of Extensive Original Surveys and Explorations*. Surveys and drawings of the Newark Earthworks were included in this book. It became a best seller and was an important landmark for research on the ancient people of America. The publishing of the book also made an important contribution to the early development of archaeology as a separate scholarly discipline.¹

Since the early 19th century the site at the Newark Earthworks has attracted the attention of hundreds of scientists. In recent decades with the aid of computer tools and modern astronomical analysis scholars have finally discovered that the main structures at the Newark Earthworks were designed to delineate the "standstill" azimuths for moonrises and moonsets of lunar cycles over 18.6 solar years. The most important mounds are in an area of 200 acres where the ancient people carefully observed and accurately measured the movements of the moon around the earth. Many cultures have shown an interest in the phases of the moon within the familiar cycles of 29 or 30 days. Some cultures have determined that these phases of the moon have regular patterns over cycles of 5 or 19 solar years. Only a few cultures have noticed that the moon every 18.6 years seems to stand still when the range of the azimuths for moonrises and moonsets reach a maximum. As a result, viewed from middle latitudes, the moon's altitude appears to change in just two weeks – from high in the sky to low over the horizon. Similarly, its azimuth at moonrise changes from northeast to southeast and at moonset from northwest to southwest. This time had special significance for some Bronze Age societies who built megalithic monuments in Britain and Ireland. The alignments to the moonrise or moonset on the days of lunar standstills are found in other ancient American sites such as in

¹This was the first publication of the Smithsonian Institute and the first volume in the series which was called *Contributions to Knowledge*. The book had 306 pages, 48 lithographed maps and plates, and 207 wood engravings.

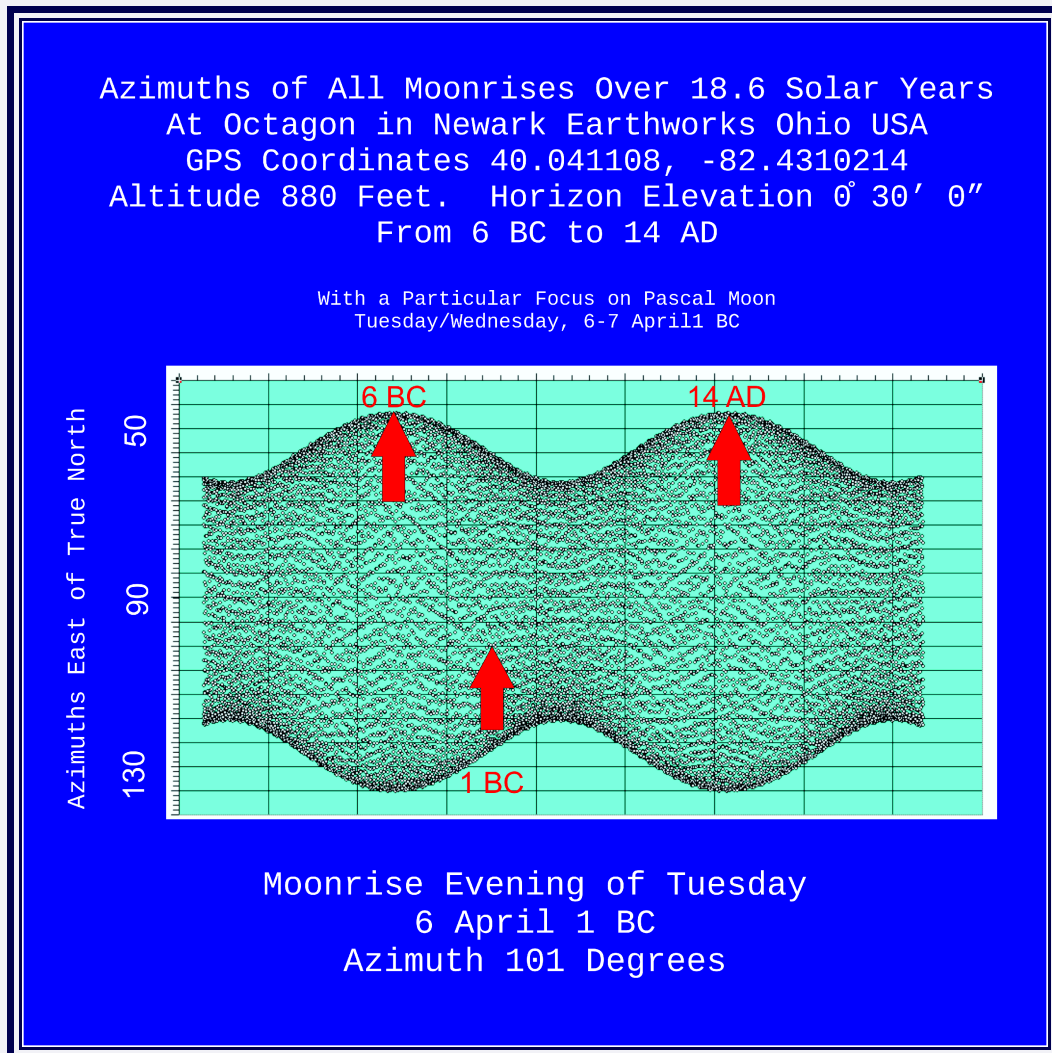
Chimney Rock, Colorado. But when it comes to the measuring of lunar standstills no other site in the world comes close to the size and significance of the Newark Earthworks in Ohio. The construction and maintenance of this monument required an advanced understanding of the patterns of the movements of the moon around the earth and of the movements of the earth around the sun.

After years of study Joseph M. Knapp offered an account of how the Newark Earthworks measured the standstill phases of the moon. He wrote.²

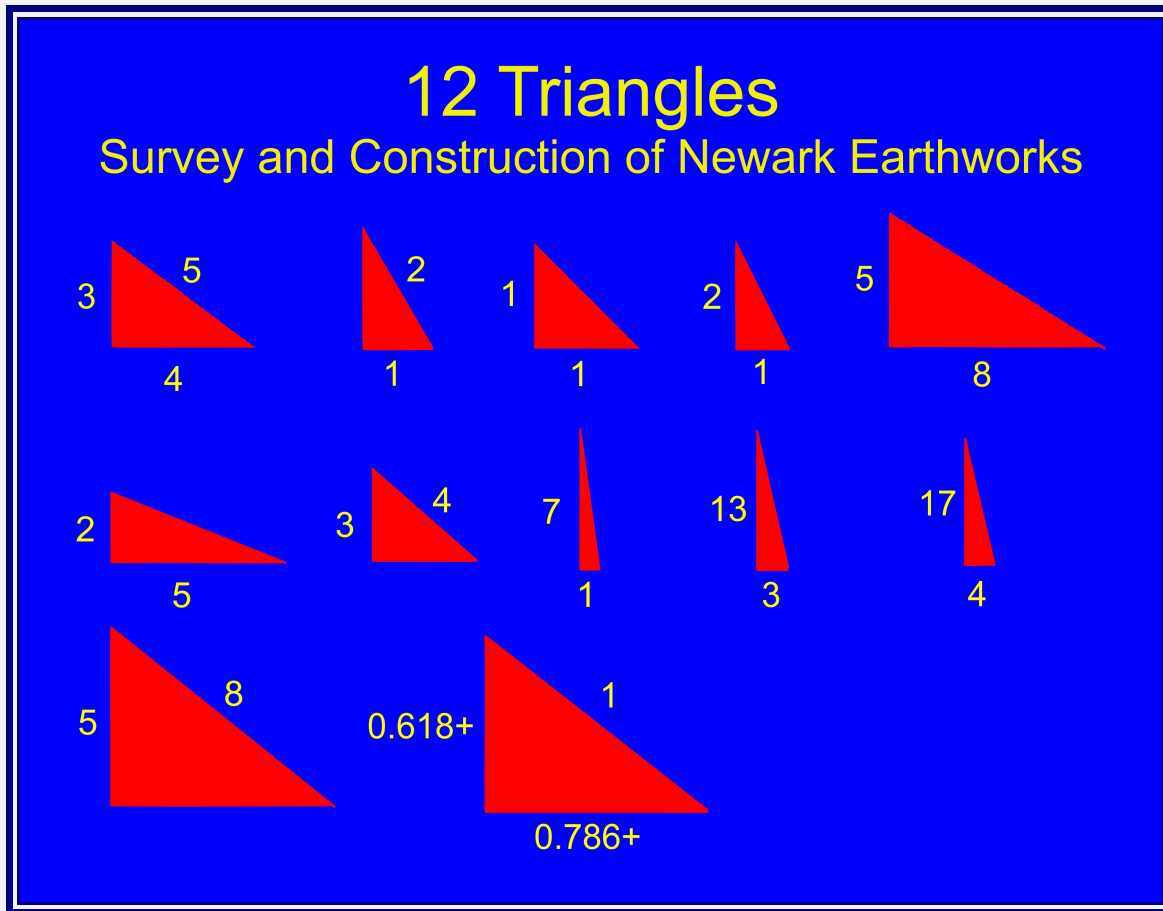


²See <http://www.copperas.com/octagon/oindex.html>; Hively R. and R. Horn, 1982: Geometry and Astronomy in Prehistoric Ohio, *Archaeoastronomy* 4:S1-S20; 1984: Hopewellian Geometry and Astronomy at High Bank, *Archaeoastronomy* 7:S85-S100; Lepper, B. T. 1994: *The Great Hopewell Road: a Middle Woodland Sacred Via Across Central Ohio*, Paper presented at the joint meeting of the Midwest Archaeological Conference and the Southeast Archaeological Conference, Lexington, Kentucky; Lepper, B. T., "The Newark Earthworks and the Geometrical Enclosures of the Scioto Valley: Connections and Conjectures", printed in *A View from the Core: A Synthesis of Ohio Hopewell Archaeology*, edited by Paul J. Pacheco (Ohio Archaeological Council, 1996); and *The Ley Hunter Journal*, No. 130, Summer 1998, p. 6.

Sinusoidal functions by their nature exhibit "standstill" behavior near their extremes, where the function changes slowly. Since the variation of the moon's rising point is a combination of two near sinusoidal functions, there will be two types of "standstills" – one associated with the lunar draconitic month of 27.21222 days, where the moon at its extremes will tend to rise in nearly the same direction for two or three successive nights, contrasting to successive rises in between the extremes, where the rising azimuth changes by up to 5° each day. Thus, the moon cooperates with observers trying to pinpoint the monthly extremes, by conveniently lingering in the area of the maxima for a few days. The other "standstill" is associated with the 18.6-year variation, where the extreme rising points will change very little from month to month in the years where the azimuth range is greatest. In fact, moonrises in "lunar maximum" years, those we are concerned with in the main Octagon alignment, may be observed over a span of two years before the moon is again carried sufficiently away from the alignment. Typically moonrises will reoccur along the axis in the 18th year after the last one, followed by several more in the 19th year, befitting an 18.6-year cycle.



Survey and Construction of Newark Earthworks



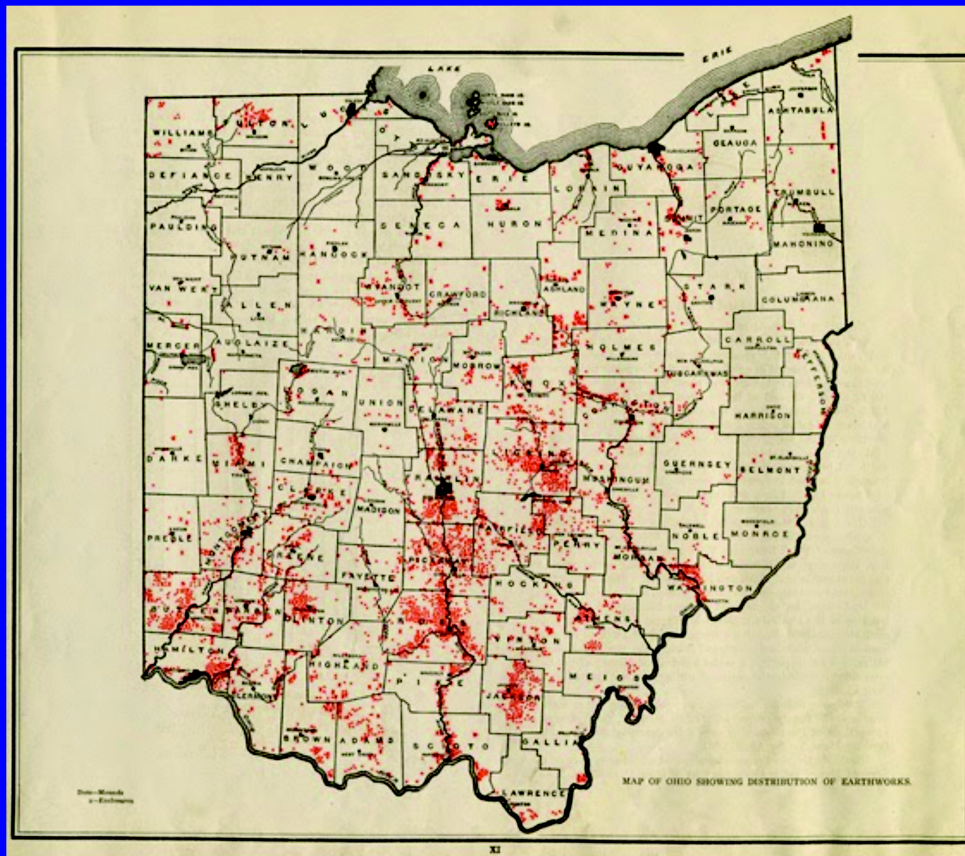
James A. Marshall was a civil engineer who spent a lifetime studying more than 200 earthworks in Ohio. He found that there were 12 right triangles which ancient people used in surveying and constructing their earthen monuments. These triangles are illustrated in the above figure. To demonstrate the exactness of these designs, Marshall impressively showed, based on his surveys, that the centers of the Newark Octagon, Square and Great Circle were laid out with the simplest triangles, being the 3-4-5, 1-2, and 1-1. Moreover, the orientation and size of the Octagon was found to follow from a standard golden triangle construction based on the 1-2 triangle.

Writing about the ancient structures in Newark Marshall said³

... that they were able to determine true north by the North Star. They also attained a precision and regularity in measuring angles and lengths and extending straight lines over distances of a mile or more that is impossible to attain by pacing and approximating right angles or other angles in the field. Such precision and regularity is indicated by the

³ Marshall, James A., *An Atlas of American Indian Geometry*, appearing in *Ohio Archaeologist*, 37(2), 1987.

octagons and circles they built... They could not have laid out this or other works in the field unless they also had a unit of measure and a considerable knowledge of land surveying and geometry. We should note that geometry in its ancient Old World Greek origin meant earth-measure.



William C. Mills in 1914 published the *Archaeological Atlas of Ohio*. In this comprehensive work, the culmination of two decades of archaeological survey by the Ohio State Museum, Mills documented the location of 5,396 prehistoric sites including hundreds of earthen monuments.

As the earth orbits around the sun a shadow from a perpendicular stick on the surface of the earth creates a pattern from which it is possible to count the number of days for the length of a solar year. By observing the shadows from a stick and with two rocks to mark the outer limits of the shadow's movements it is relatively easy for any culture to count the number of days in a solar year. On the other hand, the moon moves around the earth in its own orbit and quickly becomes a very complicated pattern of cycles. Nevertheless, the earth's movement around the sun and the moon's movement around the earth give us cycles by which we exactly define the meaning of time. The sun rules the day. The moon rules the night. In our day with proper mathematical equations and with the power of modern computers it is possible to know the positions of the sun and the moon for all points in time and in space. Given this background, let's examine the 5-year prophecy of Samuel, the Lamanite, concerning the birth of Christ and how that prophecy related to the intense energy which the ancient people put into constructing and maintaining the Newark Earthworks.

Samuel, the Lamanite, and His 5-Year Prophecy

What is known about Samuel, the Lamanite? When it comes to the keeping of time there are five statements which relate to this man. (1) He was active in his role as an ancient American prophet before the start of the first century. (2) He strictly kept the law of Moses and observed all the feasts which Moses had given to the Children of Israel. Samuel's observance of holy days required a careful following of the phases of the moon. He was particularly careful to observe the time of the full moon after the spring equinox. Samuel needed to know this so he could keep the Passover at the exact time given by the Lord to Moses. (3) He was a member of a society which had an incredible knowledge of the movements of the moon around the earth and the movements of the earth around the sun. The astronomical knowledge of Samuel's people was clearly reflected in the construction and in the operation of history's largest geometric earthen complex. (4) At the time of Samuel his people spent time and energy to measure with exactness the azimuths of moonrises and of moonsets in a cycle of 18.6 solar years to determine lunar standstills.⁴ (5) Samuel, the Lamanite, prophesied on the day of the lunar feast of Passover and gave the framework of five years for the coming of Christ.⁵

Time and Place Book of Mormon Text

The Nephites and Lamanites kept the law of Moses. The keeping of the law included the timing of feasts which were determined by the exact movements of the sun and the moon as observed in the skies of America. This included the celebration of Passover, "a type of his coming", which was observed on the

⁴These same standstills were also important for Bronze Age societies in Britain and Ireland. They built their megalithic monuments according to the same astronomical events and alignments as the people of America. Again, the same measurements of moonrises and moonsets on the days of lunar standstills were important for people living in Chimney Rock, Colorado. Evidence suggests that the Great House Pueblo was first built there in AD 1076 during a lunar standstill and then expanded and finished in AD 1093 during another lunar standstill.

⁵Before the Roman Empire and before the Christian era the Celts in Continental Europe used a 5-year calendar count. The counting of days within the framework of 5 solar years and 62 lunar months seemed common in the first century to the Celts and to the ancient people of America.

night of the first full moon after the spring equinox. After all, Moses in the Law commanded --

Let the children of Israel also keep the passover at his appointed season. In the fourteenth day of this month, at even, ye shall keep it in his appointed season: according to all the rites of it, and according to all the ceremonies thereof, shall ye keep it. And Moses spake unto the children of Israel, that they should keep the passover. – Numbers 9:2-4

There are 35 verses in the Book of Mormon where the keeping of the law of Moses is emphasized. Here are some examples.

Yea, and they did keep the law of Moses; for it was expedient that they should keep the law of Moses as yet, for it was not all fulfilled. But notwithstanding the law of Moses, they did look forward to the coming of Christ, considering that the law of Moses was a type of his coming, and believing that they must keep those outward performances until the time that he should be revealed unto them. – Alma 25:15

Yea, and the people did observe to keep the commandments of the Lord; and they were strict in observing the ordinances of God, according to the law of Moses; for they were taught to keep the law of Moses until it should be fulfilled. – Alma 30:3

And they also took of the firstlings of their flocks, that they might offer sacrifice and burnt offerings according to the law of Moses; – Mosiah 2:3

Samuel, the Lamanite, gave his prophecy about the coming of Christ in 6 BC. The period was significant for the people of ancient America because of lunar standstills which had already marked the beginning of a major cycle for the next 18.6 years.⁶

There was a partial lunar eclipse at mid-night on Sunday, 4 April 6 BC, which was seen across America.⁷

⁶ For the years between 500 BC and AD 500 Joseph M. Knapp identified 54 lunar standstill periods at the Newark Earthworks. It is interesting to observe that periods of lunar standstills occurred one season before Passover of 6 BC and one season before Passover of AD 33, the time of Christ's crucifixion. See details on this website at <http://www.copperas.com/octagon/oindex.html>.

⁷ Technical description for this astronomical event as seen from the Newark Earthworks, GPS Coordinates 40.041108, -82.4310214, is as follows: Lunar eclipse begins Saturday, 3 April 6 BC, at 22h38m31s ET-UT1 = 177.13m, angle = 162.5°, vertex = 190.5°, altitude = 38.5°, azimuth = 142.3° SE, sun altitude = -38.2° 23h56m07s ET-UT1=177.13m. At greatest eclipse Saros-Number: 51, magnitude

A lunar eclipse can only occur on the night of a full moon. Lunar eclipses are certainly more common than solar eclipses. Each year the shadow of the earth passes over the surface of the moon from two to four times. Only a person who is under a night sky can see the lunar eclipse when it occurs. This means that from one place on the earth's surface it is possible for one person to see one or two lunar eclipses in a year. The eclipse of the Paschal moon in 6 BC is noteworthy. The fact that Nephites were in the middle of their Passover celebrations was more important for the account of Samuel's 5-year prophecy. Crowds had gathered together in Zarahemla for the feast. When Samuel climbed onto the city's wall to give the message which he had received from the angel there were many people who were there to hear what he had to say. Samuel's sign was indeed an important part of his prophecy. I do not have any thoughts of what could have caused the lights in the heavens during the night between the two days. That event was certainly not ordinary. I think that this was the only time in history when it occurred.

We are getting ahead of the story. Here then is the text from the Book of Mormon for Samuel's prophecy concerning the timing of Christ's birth.

Helaman 14:

1 And now it came to pass that Samuel, the Lamanite, did prophesy a great many more things which cannot be written.

2 And behold, he said unto them: Behold, I give unto you a sign; for five years more cometh, and behold, then cometh the Son of God to redeem all those who shall believe on his name.

3 And behold, this will I give unto you for a sign at the time of his coming; for behold, there shall be great lights in heaven, insomuch that in the night before he cometh there shall be no darkness, insomuch that it shall appear unto man as if it was day.

4 Therefore, there shall be one day and a night and a day, as if it were one day and there were no night; and this shall be unto you for a sign; for ye shall know of the rising of the sun and also of its setting; therefore they shall know of a surety that there shall be two days and a night; nevertheless the night shall not be darkened; and it shall be the night before he is born.

5 And behold, there shall a new star arise, such an one as ye never have beheld; and this also shall be a sign unto you.

6 And behold this is not all, there shall be many signs and wonders in heaven.

7 And it shall come to pass that ye shall all be amazed, and wonder, insomuch that ye shall fall to the earth.

= 0.586, position angle = 208.9°, vertex = 218.9°, brightness = -9.7 mag, diameter = 33.45', duration partial phase = 155.3 minutes, duration penumbral phase = 290.1 minutes, ET-UT = 10627.9 sec, altitude = 44.5°, azimuth = 166.4° SSE, sun altitude = -44.6°. Lunar eclipse ends on Sunday, 4 April 6 BC, 1h13m48s ET-UT1 = 177.13m angle = 255.4°, vertex = 244.4°, altitude = 44.1°, azimuth = 192.9° SSW, Sun altitude = -44.4°.

8 And it shall come to pass that whosoever shall believe on the Son of God, the same shall have everlasting life.

9 And behold, thus hath the Lord commanded me, by his angel, that I should come and tell this thing unto you; yea, he hath commanded that I should prophesy these things unto you; yea, he hath said unto me: Cry unto this people, repent and prepare the way of the Lord.

10 And now, because I am a Lamanite, and have spoken unto you the words which the Lord hath commanded me, and because it was hard against you, ye are angry with me and do seek to destroy me, and have cast me out from among you.

11 And ye shall hear my words, for, for this intent have I come up upon the walls of this city, that ye might hear and know of the judgments of God which do await you because of your iniquities, and also that ye might know the conditions of repentance;

12 And also that ye might know of the coming of Jesus Christ, the Son of God, the Father of heaven and of earth, the Creator of all things from the beginning; and that ye might know of the signs of his coming, to the intent that ye might believe on his name.

13 And if ye believe on his name ye will repent of all your sins, that thereby ye may have a remission of them through his merits.

Counting the Days for the 5-Year Prophecy

Because Samuel's prophecy was given on Passover both believers and unbelievers had a common point from which to count days. There seems to have been two ways for them to count the days for measuring 5 years. One was after the manner of the Celts within a known lunar structure of 5-years and another was after the manner of the Egyptians with a straight 365-day count for each year. In the Book of Mormon the exact day for the fulfillment of Samuel's 5-year prophecy became a point of contention. The measuring of time for these people was serious. So serious that it became a matter of life and death for the believers. It was not a question of their inability to count days. It was a question of how to count the days for 5 years. It seems that it became a question of whether the fulfillment of the prophecy would be with a simple count of 365-days x 5 years or a complex count of 62 lunar cycles for 5 years. If someone were to say on Easter Sunday that after 5 years something important would happen we could measure the passage of the 5 years in two ways – one with the calendar which the Romans introduced before Christ or another with the calendar which the Christian fathers introduced after Christ. Even though Easter Sunday is not a fixed day in the modern calendar -- it is dependent on the cycles of the sun, the moon and the week -- it is still possible to determine when Easter will occur after 5 years.

The Fulfillment of Samuel's 5-Year Prophecy

The fulfillment of Samuel's 5-year prophecy is an important event in the time line of the Book of Mormon. On the very day of its fulfillment the ancient people of America started a new calendar count. In early spring 1 BC Nephi, the Son of Nephi, witnessed and recorded these very events. In his account the conflict between the unbelievers and the believers over the exact day for the prophecy's fulfillment was a matter of life and death. Nothing could have been more serious. The conflict underscores how important these people considered the keeping of time. This conflict in the first century validates the fact why the people in ancient Ohio were willing to expend so much time and material for the construction and maintenance of the Newark Earthworks. The measurement of time was an important part of their faith and religion.

The account of the Book of Mormon allows us to reconstruct from the astronomical cycles of the moon and the sun those events which occurred at this precious moment in the sky above the earthworks of Newark, Ohio. At 6:29 p.m., Tuesday, April 6th, 1 BC the full moon was rising on the horizon in the east and the sun was setting on the horizon in the west. There was a perfect balance in nature. At the very next moment, after the setting of the sun, Samuel's prophecy was fulfilled. Lights appeared in the sky saving the believers from certain death and "the people began to be astonished because there was no darkness when the night came ..."

The details of this wonderful account as witnessed by Nephi, the son of Nephi, are as follows.

3 Nephi 1:

4 And it came to pass that in the commencement of the ninety and second year, behold, the prophecies of the prophets began to be fulfilled more fully; for there began to be greater signs and greater miracles wrought among the people.

5 But there were some who began to say that the time was past for the words to be fulfilled, which were spoken by Samuel, the Lamanite.

6 And they began to rejoice over their brethren, saying: Behold the time is past, and the words of Samuel are not fulfilled; therefore, your joy and your faith concerning this thing hath been vain.⁸

7 And it came to pass that they did make a great uproar throughout the land; and the people who believed began to be very sorrowful, lest by any means those things which had been spoken might not come to pass.

⁸These people were counting after the manner of the Egyptians with a straight 365-day count for each year. The 5-year count was $5 \times 365 = 1825$ days. The counting of days in this manner was used by the people of the Book of Mormon for the measuring of time from the day of the birth of Christ to the day of the death of Christ. See 3 Nephi 8:5 which states that "it came to pass in the thirty and fourth year, in the first month, on the fourth day of the month, there arose a great storm, such an one as never had been known in all the land". From birth to death there are $33 \text{ years} \times 365 \text{ days} + 4 \text{ days} = 12049$ days or $12049 / 29.5306 \text{ days} = 408.0176$ lunar cycles or from full moon of Passover 1 BC (Birth of Christ) to full moon of Passover AD 33 (Death of Christ).

8 But behold, they did watch steadfastly for that day and that night and that day which should be as one day as if there were no night, that they might know that their faith had not been vain.

9 Now it came to pass that there was a day set apart by the unbelievers⁹, that all those who believed in those traditions should be put to death except the sign should come to pass, which had been given by Samuel the prophet.

10 Now it came to pass that when Nephi, the son of Nephi, saw this wickedness of his people, his heart was exceedingly sorrowful.

11 And it came to pass that he went out and bowed himself down upon the earth, and cried mightily to his God in behalf of his people, yea, those who were about to be destroyed because of their faith in the tradition of their fathers.

12 And it came to pass that he cried mightily unto the Lord all that day; and behold, the voice of the Lord came unto him, saying:

13 Lift up your head and be of good cheer; for behold, the time is at hand, and on this night shall the sign be given, and on the morrow come I into the world, to show unto the world that I will fulfil all that which I have caused to be spoken by the mouth of my holy prophets.

14 Behold, I come unto my own, to fulfil all things which I have made known unto the children of men from the foundation of the world, and to do the will, both of the Father and of the Son—of the Father because of me, and of the Son because of my flesh. And behold, the time is at hand, and this night shall the sign be given.

15 And it came to pass that the words which came unto Nephi were fulfilled, according as they had been spoken; for behold, at the going down of the sun there was no darkness; and the people began to be astonished because there was no darkness when the night came.

16 And there were many, who had not believed the words of the prophets, who fell to the earth and became as if they were dead, for they knew that the great plan of destruction which they had laid for those who believed in the words of the prophets had been frustrated; for the sign which had been given was already at hand.

⁹In setting this day apart the unbelievers used the 5-year lunar calendar count after the manner of the Celts. This 5-year count was 62 lunar months or 1,829 days. It was also a calendar count which would have gone from the Passover of 6 BC to the Passover of 1 BC. There is more about this calendar in the next section. Note the difference of 4 days between these two calendar counts. This explains why some thought one day and others thought another day.

17 And they began to know that the Son of God must shortly appear; yea, in fine, all the people upon the face of the whole earth from the west to the east, both in the land north and in the land south, were so exceedingly astonished that they fell to the earth.

18 For they knew that the prophets had testified of these things for many years, and that the sign which had been given was already at hand; and they began to fear because of their iniquity and their unbelief.

19 And it came to pass that there was no darkness in all that night, but it was as light as though it was mid-day. And it came to pass that the sun did rise in the morning again, according to its proper order; and they knew that it was the day that the Lord should be born, because of the sign which had been given.

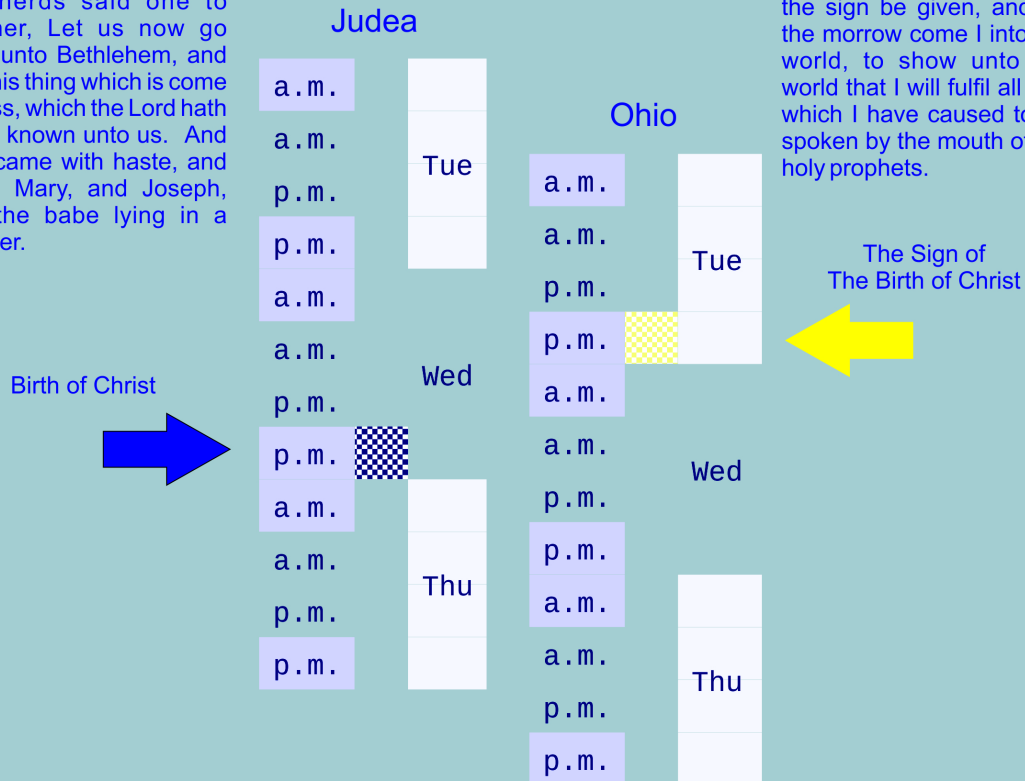
20 And it had come to pass, yea, all things, every whit, according to the words of the prophets.

21 And it came to pass also that a new star did appear, according to the word.

Time Difference Between Judea and Ohio

And it came to pass, as the angels were gone away from them into heaven, the shepherds said one to another, Let us now go even unto Bethlehem, and see this thing which is come to pass, which the Lord hath made known unto us. And they came with haste, and found Mary, and Joseph, and the babe lying in a manger.

Lift up your head and be of good cheer; for behold, the time is at hand, and on this night shall the sign be given, and on the morrow come I into the world, to show unto the world that I will fulfil all that which I have caused to be spoken by the mouth of my holy prophets.



Time Difference Between Judea and Ohio

The Bible and the Book of Mormon are in perfect harmony with respect to the timing of the birth of Christ. Luke wrote that the birth of Christ in Judea was during the night when shepherds were “keeping watch over their flocks”. The sign was seen in America at the setting of the sun when Christ told Nephi, the Son of Nephi, that “on the morrow come I into the world”. There is a time difference of seven hours between Judea and Ohio. The above chart shows the difference between these times in these two places. The sign was given when the sun was setting in the new world on Tuesday night. Christ was born in the old world during Wednesday night. There was a difference of as many as twenty-four hours from the time when the sign was given in America to the time of His birth in Judea.

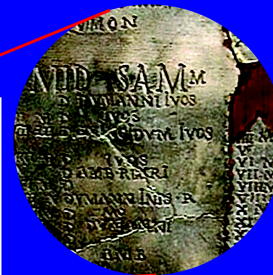
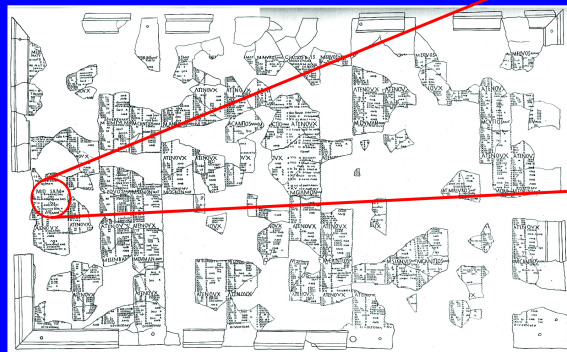
Celtic / Coligny Calendar 5-Year Count

Before the introduction of the Roman calendar by Julius Caesar and before the calendar reforms of the Christian church there were many calendars which counted time by observing the movements of the sun and the moon. One of these calendar systems was developed by the Celts. This system of time keeping is interesting because of its 5-year structure with 62 lunar cycles. The structure of this calendar system seems to fit perfectly into the 5-year prophecy of Samuel, the Lamanite.

5-Year Lunar/Solar Celtic or Coligny Calendar					
Month Name	Year 1	Year 2	Year 3	Year 4	Year 5
Quimonios	30	-	-	-	-
1 Samonios	30	30	30	30	30
2 Dumannios	29	29	29	29	29
3 Riuros	30	30	30	30	30
4 Anagantio	29	29	29	29	29
5 Ogronnios	30	30	30	30	30
6 Qutios	30	30	30	30	30
Rantaranos	-	-	30	-	-
7 Giamonios	29	29	29	29	29
8 Semiuisonns	30	30	30	30	30
9 Equos	30	28	30	28/29	30
10 Elembiuos	29	29	29	29	29
11 Aedrinios	30	30	30	30	30
12 Cantlos	29	29	29	29	29
Year Length	385	353	385	353 or 354	355

After decades of study scholars have reconstructed this continental Celtic calendar from broken pieces of metal which were discovered in the late 19th century. The reconstruction of the calendar was possible because of the exactness by which the sun and the moon move making it possible to synchronize solar years with lunar months. In many essential ways the Celtic / Coligny Calendar compares to the Jewish calendar. The common lunar year contains 12 months with a total of 354 or 355 days. There are two intercalations of a 13th lunar month in two of the years of the 5-year count. The above table illustrates how the days and months fit into a 5-year count. The ancient calendar was found in 1897 in France¹⁰, in Coligny, Ain (46°23'N 5°21'E, near Lyon), along with the head of a bronze statue of a youthful male figure. It is now held at the Gallo-Roman Museum of Lyon-Fourvière. It was engraved on a bronze tablet, preserved in 73 fragments, that was originally 1.48 metres (4 ft 10 in) wide by 0.9 metres (2 ft 11 in) tall. Based on the style of lettering and the accompanying objects, it probably dates to the end of

2nd Century Celtic / Coligny Calendar 5-Year Lunisolar Calendar 62 Lunar Cycles

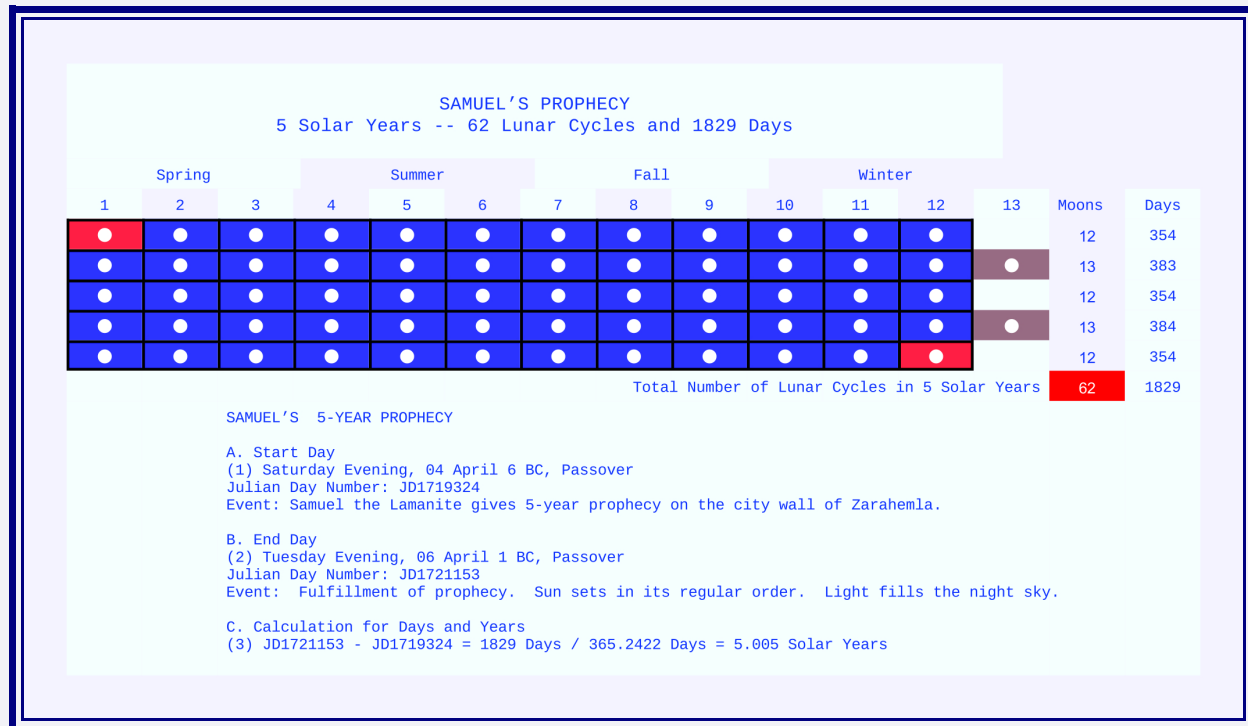


Magnified Image
of Text

Reconstructed Table Size 4' 10" x 2' 11"
73 Broken Fragments of Copper Alloy
Discovered in 1897 and Drawing by Seymour de Ricci in 1926

¹⁰<http://www.ancient-origins.net/artifacts-other-artifacts/coligny-calendar-1800-year-old-lunisolar-calendar-banned-romans-002429>

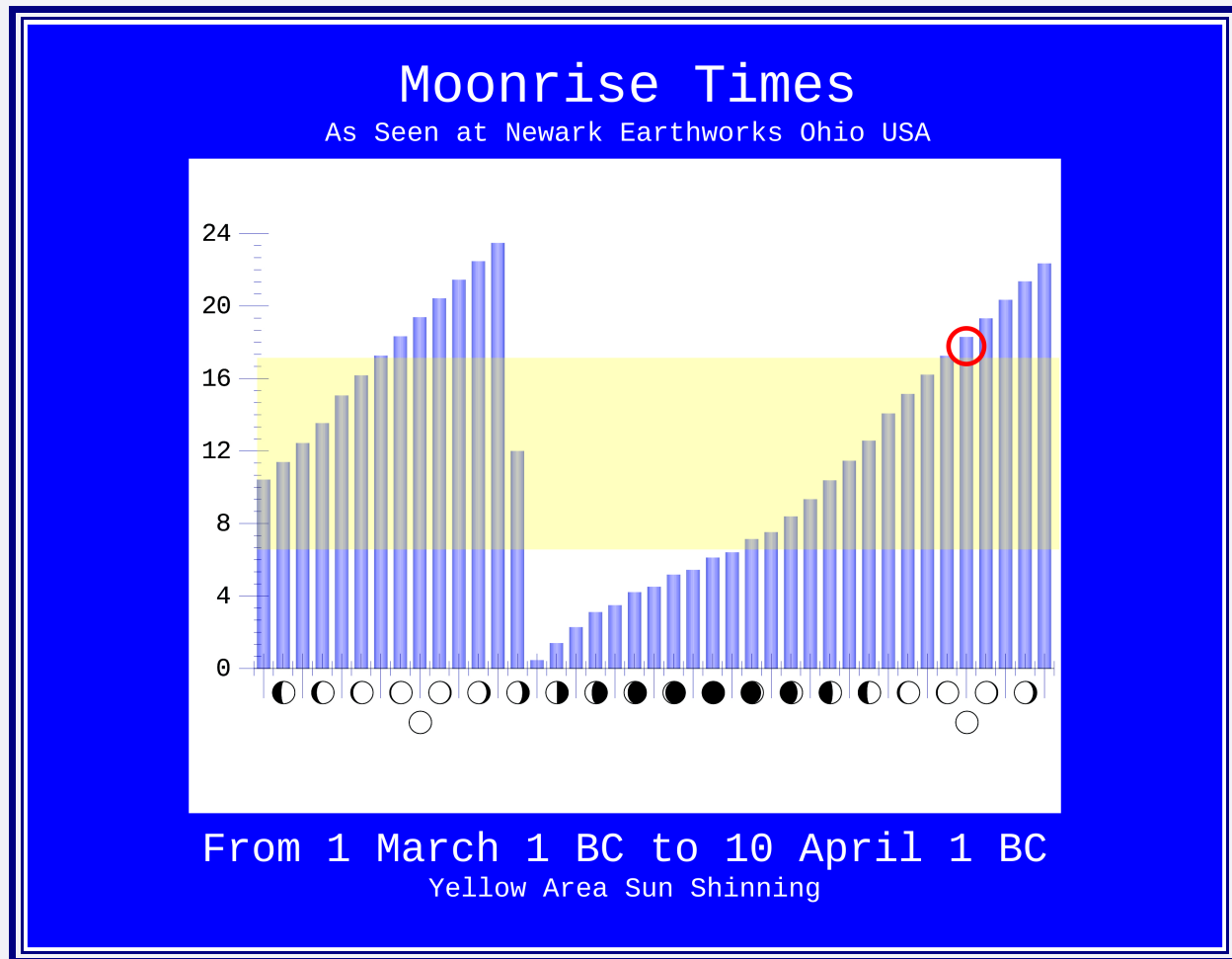
the second century.¹¹ A similar calendar found nearby at Villards d'Heria (46°25'N 5°44'E) is preserved in only eight small fragments. It is now found in the Musée d'Archéologie du Jura at Lons-le-Saunier.¹²



This illustration shows the lunar cycles of Samuel's 5-year prophecy. Three years have 12 lunar cycles with 354 days each. Two years have 13 lunar cycles with 383 and 384 days. The object of the lunisolar calendar count is to use full lunar cycles for marking the movement of time in solar years. There is a calculation which shows that there are five solar years from the eve of Passover of 4 April 6 B.C. to the eve of Passover of 6 April 1 BC for a total of 1829 days. This illustration shows the exactness of Samuel's prophecy. In the words of scripture, the sign given for the birth of Christ was "every whit, according to the words of the prophets". The sign was given in the right place and at the right time.

¹¹ Duval, P.M. and Pinault, G., Recueil des inscriptions gauloises, Tome 3: Les Calendriers (Coligny, Villards d'Heria), CNRS, Paris, 1986, pp. 35-37 and Lambert, Pierre-Yves, La langue gauloise, Editions Errance, 2nd edition, Paris, 2003, p.111

¹²<http://www.musees-franchemonte.com/index.php?p=208>

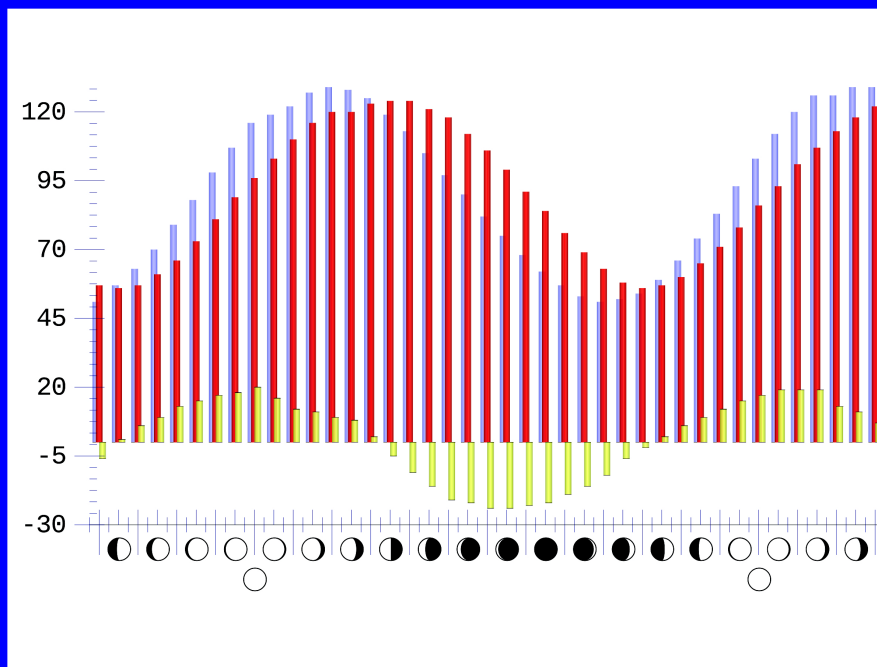


This chart shows the times at which the moon is rising above the eastern horizon from 1 March 1 B.C. to 10 April 1 B.C. Many of these moonrises were at a time when the sun was shining. This, of course, would have meant that the moon was not visible at its rising. There is one day which stands out. That day is marked with a red circle. The day is 6 April 1 B.C. The moon was rising in the east exactly at the same time as the sun is setting in the west. From the x-axis we see that on that day the moon was full. Beauty, grace and truth are always present when God is doing His work. At this moment in time the whole world is in balance. The full faces of the sun and of the moon in the sky overhead in central Ohio are turned towards each other. There is a moment of transition as the day is ending and the night is beginning. In this moment the sign for the coming of Christ is given as promised to the people of America in the Heartland of America and “at the going down of the sun there was no darkness; and the people began to be astonished because there was no darkness when the night came”¹³.

¹³Nephi 1:15.

Moonrise Azimuths

As Seen at Newark Earthworks Ohio in 6 BC and 1 BC



Red Bars: Daily Moonrise Azimuths From 1 March 6 BC to 10 April 6 BC
Blue Bars: Daily Moonrise Azimuths From 1 March 1 BC to 10 April 1 BC
Yellow Bars: Differences Between Blue and Red Bars

This chart shows three sets of data over similar days in the calendars of 6 BC and 1 BC. The chart shows how the azimuths of the rising moon vary over the course of the lunar cycle. The azimuths of moonrises in one month have as much of a fluctuation on the horizon as the azimuths of sunrises have in one year. The variation of these azimuths over time expresses itself in a beautiful sine curve. The differences of the daily moonrise azimuths from 6 BC as compared to moonrise azimuths of 1 BC also express themselves as a beautiful sine curve.

Summary

Words like "before", "now", and "after" are common for everyone's language. People live their lives within the limits of time and space. A time "before" mortal life began. The flitting moment of "now". A time "after" mortal life ends. It is within these limits that mortal life has its meaning. Then, of course, there is the dimension of space. To understand the significance of any record one must have the coordinates of time and space. The definition of time across cultures is a matter of movements. How long is a day? It is exactly one full spin of the earth on its axis. How long is a week? It is exactly seven spins of the earth on its axis. How long is a year? It is generally accepted as one revolution of the earth in its orbit around the sun. How long is the month? Well, that depends on what calendar a society is using. Since ancient times the moon has had an important role in defining the meaning of a month. Indeed, the English word "month" comes from an older English word "moon". Calendar and calculator come from the same origin. Anyone organizing the days of calendars into sequences of months and years must make serious calculations. Exact time only has significance as measured by the movements of the earth around its axis, the movements of the earth around the sun and the movements of the moon around the earth. Because these are precise movements, it is possible to have as much confidence in the definition of a point in time two thousand years ago as it is in defining the time for 12 noon today.

Let's now put this story into a summary. Ancient Americans built large earthworks in Newark, Ohio. Archaeologists and astronomers confirm that the earthworks were fully operational in the first century. The earthworks tracked the complicated movements of the moon's cycles. The earth monuments were designed to measure exact time and this exactness gave great meaning to the ancient people who spent so much time and energy in the construction and maintenance of the place.

The Book of Mormon has much to say about time and place. The people of the Book of Mormon were living at the same time as when these large structures were measuring time. In the Book of Mormon we read that Samuel, the Lamanite, in 6 BC came to the people of Nephi and gave a very specific prophecy concerning the coming of Christ. He said that in five years Christ would come into the world and that the people in America "from the west to the east, both in the land north and in the land south"¹⁴ would know of His coming because on that night before His birth there would be light in the night sky as though it were mid-day. The account of this event is a central message of the Book of Mormon. The event has two specific elements which can be measured. There is time -- five years after the day of the prophecy. That is measurable. There is place -- ancient America. That too is measurable.

The following tables offer hundreds of lunar events which are calculated for the specific GPS Coordinates of the Newark Earthworks for the early spring of 6 BC and of 1 BC. The first set of data relates to the time when Samuel, the Lamanite, gave his 5-year prophecy. The second set of data relates to the time when the prophecy was fulfilled.

I can say with absolute confidence that the full moon of Passover was rising on the eastern horizon and that the sun of the meridian of time was setting on the western horizon in Newark, Ohio at 6:29 p.m., Tuesday, April 6th, 1 BC. That is the moment when the sign was given. On the next day the Lord, Jesus Christ, was born of Mary in Bethlehem of Judea. On the day of His birth the people of ancient America started a new

¹⁴3 Nephi 1:17.

calendar count. On that day the world would never again be the same. It was the day long foretold by ancient prophets. It was a day chosen by God before the foundations of the world. It is a day for us to remember and to celebrate.

Lunar Events for Early Spring 6 BC Newark Earthworks Ohio GPS Coordinates 40.041108, -82.4310214 United States Eastern Standard Time -5 Hours Universal Time						
	Date	Day	JD	Moon Rise	Moon Set	Transit
●	1 Mar 6 BC	Sun	1719291	12h40m (az= 51°)	3h57m (az=309°)	20h46m (h=78.2° k= 75.6% waxing Cnc colon= 37°)
●	2 Mar 6 BC	Mon	1719292	14h48m (az= 57°)	5h36m (az=305°)	22h36m (h=73.5° k= 91.2% waxing Leo colon= 62°)
●	3 Mar 6 BC	Tue	1719293	16h00m (az= 63°)	6h14m (az=300°)	23h29m (h=68.8° k= 96.5% waxing Leo colon= 75°)
●	4 Mar 6 BC	Wed	1719294	17h14m (az= 70°)	6h46m (az=293°)	--h--m (h=--.-° k= 96.6% waxing Leo colon= 75°)
●	5 Mar 6 BC	Thu	1719295	18h28m (az= 79°)	7h13m (az=285°)	0h20m (h=62.9° k= 99.4% waxing Vir colon= 87°)
●	6 Mar 6 BC	Fri	1719296	19h42m (az= 88°)	7h38m (az=276°)	1h10m (h=56.2° k= 99.7% waning Vir colon=100°)
●	7 Mar 6 BC	Sat	1719297	20h57m (az= 98°)	8h03m (az=267°)	1h59m (h=48.9° k= 97.0% waning Vir colon=112°)
●	8 Mar 6 BC	Sun	1719298	22h13m (az=107°)	8h27m (az=258°)	2h48m (h=41.7° k= 91.5% waning Lib colon=125°)
●	9 Mar 6 BC	Mon	1719299	23h31m (az=116°)	8h55m (az=249°)	3h39m (h=34.8° k= 83.5% waning Sco colon=138°)
●	10 Mar 6 BC	Tue	1719300	--h--m (az=---°)	9h27m (az=242°)	4h33m (h=28.9° k= 73.5% waning Oph colon=150°)
●	11 Mar 6 BC	Wed	1719301	0h49m (az=122°)	10h06m (az=236°)	5h30m (h=24.3° k= 62.3% waning Sgr colon=163°)
◐	12 Mar 6 BC	Thu	1719302	2h04m (az=127°)	10h54m (az=232°)	6h31m (h=21.4° k= 50.5% waning Sgr colon=176°)
◐	13 Mar 6 BC	Fri	1719303	3h12m (az=129°)	11h52m (az=231°)	7h32m (h=20.4° k= 38.9% waning Cap colon=188°)
◐	14 Mar 6 BC	Sat	1719304	4h09m (az=128°)	12h59m (az=233°)	8h32m (h=21.4° k= 28.1% waning Cap colon=201°)
◐	15 Mar 6 BC	Sun	1719305	4h55m (az=125°)	14h09m (az=237°)	9h29m (h=24.1° k= 18.6% waning Aqr colon=214°)
◐	16 Mar 6 BC	Mon	1719306	5h31m (az=119°)	15h19m (az=243°)	10h21m (h=28.2° k= 10.9% waning Aqr colon=226°)
◐	17 Mar 6 BC	Tue	1719307	6h00m (az=113°)	16h27m (az=251°)	11h09m (h=33.3° k= 5.1% waning Aqr colon=239°)
◐	18 Mar 6 BC	Wed	1719308	6h24m (az=105°)	17h33m (az=258°)	11h54m (h=39.0° k= 1.5% waning Cet colon=252°)
◐	19 Mar 6 BC	Thu	1719309	6h46m (az= 97°)	18h36m (az=266°)	12h36m (h=45.1° k= 0.1% waning Psc colon=264°)

)	20 Mar 6 BC	Fri	1719310	7h05m (az= 90°)	19h37m (az=274°)	13h16m (h=51.3° k= 0.7% waxing Ari colon=277°)
)	21 Mar 6 BC	Sat	1719311	7h25m (az= 82°)	20h38m (az=282°)	13h56m (h=57.3° k= 3.4% waxing Ari colon=289°)
)	22 Mar 6 BC	Sun	1719312	7h46m (az= 75°)	21h40m (az=289°)	14h37m (h=62.9° k= 7.9% waxing Tau colon=302°)
)	23 Mar 6 BC	Mon	1719313	8h08m (az= 68°)	22h42m (az=296°)	15h19m (h=68.0° k= 13.9% waxing Tau colon=314°)
)	24 Mar 6 BC	Tue	1719314	8h34m (az= 62°)	23h45m (az=302°)	16h04m (h=72.3° k= 21.3% waxing Tau colon=327°)
)	25 Mar 6 BC	Wed	1719315	9h05m (az= 57°)	--h--m (az=---°)	16h52m (h=75.6° k= 29.9% waxing Gem colon=340°)
)	26 Mar 6 BC	Thu	1719316	9h43m (az= 53°)	0h47m (az=306°)	17h42m (h=77.8° k= 39.3% waxing Gem colon=352°)
)	27 Mar 6 BC	Fri	1719317	10h29m (az= 51°)	1h47m (az=308°)	18h35m (h=78.5° k= 49.2% waxing Cnc colon= 5°)
)	28 Mar 6 BC	Sat	1719318	11h24m (az= 52°)	2h41m (az=309°)	19h29m (h=77.7° k= 59.5% waxing Cnc colon= 18°)
)	29 Mar 6 BC	Sun	1719319	12h28m (az= 54°)	3h29m (az=307°)	20h23m (h=75.3° k= 69.6% waxing Leo colon= 30°)
)	30 Mar 6 BC	Mon	1719320	13h37m (az= 59°)	4h09m (az=303°)	21h16m (h=71.3° k= 79.1% waxing Leo colon= 43°)
)	31 Mar 6 BC	Tue	1719321	14h49m (az= 66°)	4h43m (az=297°)	22h07m (h=66.1° k= 87.5% waxing Vir colon= 56°)
)	1 Apr 6 BC	Wed	1719322	16h03m (az= 74°)	5h12m (az=289°)	22h57m (h=59.7° k= 94.2% waxing Vir colon= 68°)
)	2 Apr 6 BC	Thu	1719323	17h17m (az= 83°)	5h38m (az=281°)	23h46m (h=52.6° k= 98.5% waxing Vir colon= 81°)
)	3 Apr 6 BC	Fri	1719324	18h32m (az= 93°)	6h02m (az=272°)	--h--m (h=---° k= 98.6% waxing Vir colon= 81°)
)	4 Apr 6 BC	Sat	1719325	19h50m (az=103°)	6h27m (az=262°)	0h36m (h=45.1° k=100.0% waning Lib colon= 93°)
)	5 Apr 6 BC	Sun	1719326	21h09m (az=112°)	6h54m (az=253°)	1h27m (h=37.8° k= 98.3% waning Lib colon=106°)
)	6 Apr 6 BC	Mon	1719327	22h30m (az=120°)	7h25m (az=245°)	2h22m (h=31.2° k= 93.5% waning Sco colon=119°)
)	7 Apr 6 BC	Tue	1719328	23h50m (az=126°)	8h02m (az=238°)	3h20m (h=25.8° k= 86.0% waning Sgr colon=131°)
)	8 Apr 6 BC	Wed	1719329	--h--m (az=---°)	8h48m (az=233°)	4h21m (h=22.1° k= 76.4% waning Sgr colon=144°)
)	9 Apr 6 BC	Thu	1719330	1h03m (az=129°)	9h44m (az=231°)	5h24m (h=20.4° k= 65.4% waning Sgr colon=157°)
)	10 Apr 6 BC	Fri	1719331	2h05m (az=129°)	10h50m (az=232°)	6h26m (h=20.8° k= 53.9% waning Cap colon=169°)

Lunar Events for Early Spring 1 BC
 Newark Earthworks Ohio
 GPS Coordinates 40.041108, -82.4310214
 United States Eastern Standard Time
 -5 Hours Universal Time

	Date	Day	JD	Moon Rise	Moon Set	Transit
☽	1 Mar 1 BC	Mon	1721118	10h42m (az= 57°)	1h16m (az=302°)	18h31m (h=74.9° k= 50.3% waxing Gem colon= 0°)
☽	2 Mar 1 BC	Tue	1721119	11h39m (az= 56°)	2h23m (az=304°)	19h32m (h=75.1° k= 62.2% waxing Gem colon= 13°)
☾	3 Mar 1 BC	Wed	1721120	12h44m (az= 57°)	3h23m (az=304°)	20h32m (h=73.6° k= 73.2% waxing Cnc colon= 26°)
☾	4 Mar 1 BC	Thu	1721121	13h54m (az= 61°)	4h13m (az=301°)	21h30m (h=70.5° k= 82.9% waxing Leo colon= 38°)
☾	5 Mar 1 BC	Fri	1721122	15h06m (az= 66°)	4h55m (az=296°)	22h24m (h=66.1° k= 90.7% waxing Leo colon= 51°)
☾	6 Mar 1 BC	Sat	1721123	16h17m (az= 73°)	5h30m (az=290°)	23h14m (h=60.8° k= 96.2% waxing Leo colon= 64°)
☾	7 Mar 1 BC	Sun	1721124	17h26m (az= 81°)	6h00m (az=283°)	--h--m (h=--.-° k= 96.3% waxing Leo colon= 64°)
☾	8 Mar 1 BC	Mon	1721125	18h33m (az= 89°)	6h27m (az=275°)	0h02m (h=55.0° k= 99.2% waxing Vir colon= 76°)
☾	9 Mar 1 BC	Tue	1721126	19h38m (az= 96°)	6h52m (az=268°)	0h47m (h=49.1° k= 99.8% waning Vir colon= 89°)
☾	10 Mar 1 BC	Wed	1721127	20h42m (az=103°)	7h17m (az=260°)	1h32m (h=43.3° k= 98.0% waning Vir colon=101°)
☾	11 Mar 1 BC	Thu	1721128	21h45m (az=110°)	7h43m (az=254°)	2h16m (h=37.9° k= 94.0% waning Lib colon=114°)
☾	12 Mar 1 BC	Fri	1721129	22h47m (az=116°)	8h11m (az=248°)	3h01m (h=33.2° k= 88.3% waning Lib colon=126°)
☾	13 Mar 1 BC	Sat	1721130	23h48m (az=120°)	8h43m (az=243°)	3h48m (h=29.2° k= 81.2% waning Sco colon=139°)
☾	14 Mar 1 BC	Sun	1721131	--h--m (az=---°)	9h19m (az=239°)	4h35m (h=26.3° k= 72.9% waning Oph colon=151°)
☾	15 Mar 1 BC	Mon	1721132	0h46m (az=123°)	10h01m (az=236°)	5h24m (h=24.4° k= 63.8% waning Sgr colon=164°)
☾	16 Mar 1 BC	Tue	1721133	1h40m (az=124°)	10h49m (az=236°)	6h14m (h=23.7° k= 54.2% waning Sgr colon=177°)
☾	17 Mar 1 BC	Wed	1721134	2h28m (az=124°)	11h43m (az=237°)	7h05m (h=24.3° k= 44.4% waning Cap colon=189°)
☾	18 Mar 1 BC	Thu	1721135	3h11m (az=121°)	12h42m (az=240°)	7h55m (h=26.2° k= 34.7% waning Cap colon=202°)
☾	19 Mar 1 BC	Fri	1721136	3h49m (az=118°)	13h44m (az=244°)	8h43m (h=29.1° k= 25.4% waning Cap colon=215°)
☾	20 Mar 1 BC	Sat	1721137	4h21m (az=112°)	14h49m (az=250°)	9h31m (h=33.2° k= 17.0% waning Aqr colon=227°)
☾	21 Mar 1 BC	Sun	1721138	4h51m (az=106°)	15h55m (az=257°)	10h18m (h=38.1° k= 9.8% waning Psc colon=240°)
☾	22 Mar 1 BC	Mon	1721139	5h18m (az= 99°)	17h02m (az=265°)	11h05m (h=43.8° k= 4.3% waning Psc colon=252°)
☾	23 Mar 1 BC	Tue	1721140	5h44m (az= 91°)	18h11m (az=273°)	11h52m (h=49.8° k= 1.0% waning Psc colon=265°)

)	24 Mar 1 BC	Wed	1721141	6h12m (az= 84°)	19h21m (az=281°)	12h41m (h=56.1° k= 0.3% waxing Ari colon=278°)
)	25 Mar 1 BC	Thu	1721142	6h41m (az= 76°)	20h35m (az=288°)	13h32m (h=62.0° k= 2.4% waxing Ari colon=290°)
)	26 Mar 1 BC	Fri	1721143	7h14m (az= 69°)	21h50m (az=295°)	14h26m (h=67.3° k= 7.4% waxing Tau colon=303°)
)	27 Mar 1 BC	Sat	1721144	7h52m (az= 63°)	23h04m (az=300°)	15h24m (h=71.5° k= 14.9% waxing Tau colon=316°)
)	28 Mar 1 BC	Sun	1721145	8h39m (az= 58°)	--h--m (az=---°)	16h24m (h=74.2° k= 24.6% waxing Gem colon=329°)
)	29 Mar 1 BC	Mon	1721146	9h34m (az= 56°)	0h14m (az=303°)	17h26m (h=75.0° k= 35.7% waxing Gem colon=341°)
)	30 Mar 1 BC	Tue	1721147	10h38m (az= 57°)	1h17m (az=304°)	18h27m (h=74.0° k= 47.4% waxing Cnc colon=354°)
)	31 Mar 1 BC	Wed	1721148	11h46m (az= 60°)	2h11m (az=301°)	19h25m (h=71.4° k= 59.2% waxing Cnc colon= 7°)
○	1 Apr 1 BC	Thu	1721149	12h57m (az= 65°)	2h55m (az=297°)	20h19m (h=67.4° k= 70.2% waxing Leo colon= 19°)
○	2 Apr 1 BC	Fri	1721150	14h07m (az= 71°)	3h31m (az=292°)	21h10m (h=62.5° k= 79.9% waxing Leo colon= 32°)
○	3 Apr 1 BC	Sat	1721151	15h15m (az= 78°)	4h02m (az=285°)	21h57m (h=57.0° k= 88.0% waxing Vir colon= 45°)
○	4 Apr 1 BC	Sun	1721152	16h21m (az= 86°)	4h29m (az=278°)	22h43m (h=51.2° k= 94.1% waxing Vir colon= 57°)
○	5 Apr 1 BC	Mon	1721153	17h25m (az= 93°)	4h55m (az=270°)	23h27m (h=45.5° k= 98.0% waxing Vir colon= 70°)
○	6 Apr 1 BC	Tue	1721154	18h29m (az=101°)	5h20m (az=263°)	--h--m (h=---° k= 98.1% waxing Vir colon= 70°)
○	7 Apr 1 BC	Wed	1721155	19h32m (az=107°)	5h45m (az=256°)	0h11m (h=40.0° k= 99.7% waxing Vir colon= 82°)
○	8 Apr 1 BC	Thu	1721156	20h34m (az=113°)	6h12m (az=250°)	0h56m (h=35.1° k= 99.3% waning Lib colon= 95°)
○	9 Apr 1 BC	Fri	1721157	21h36m (az=118°)	6h43m (az=245°)	1h41m (h=30.8° k= 96.8% waning Sco colon=107°)
○	10 Apr 1 BC	Sat	1721158	22h35m (az=122°)	7h17m (az=240°)	2h29m (h=27.5° k= 92.5% waning Oph colon=120°)

(1) Azimuth direction (az) for moon rises and moon sets are in degrees counting from geographic north (0°) clockwise to the east direction. East is 90°, south 180°, and west 270°.

(2) Transit is the moment when the moon crosses the north meridian i.e., it stands exactly in north direction. There the moon reaches its highest point on its diurnal journey. Times are listed only if they fall within the chosen interval, starting at the start time. Missing values indicate that the event does not take place at the underlying interval.

(3) The moon phase ratio (k) is the illuminated fraction of the lunar disk to its entire area.

(4) The moon is within the border of the given constellation of stars. The borders of the actual constellations have been defined by the International Astronomical Union (IAU).