

The Measurement of Time An Introduction

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The creation of a rational chronology of Book of Mormon events necessarily involves the measurement of time. An accurate chronology must satisfy three criteria. First, events described in the Book of Mormon should be placed in their order of occurrence, which is not always the order in which they appear in the text.¹ Second, Book of Mormon events that can be linked to established historical events should be dated as securely as possible.² Third, measurements of actual time periods between Book of Mormon events should be made. This third criterion assumes the use of relevant calendars. The critical features of the calendars implied by the text of the Book of Mormon, as well as the methods and assumptions used to present and coordinate these calendars, will be examined in this chapter.

What is a Calendar? According to *The Oxford English Dictionary*, a *calendar* may be defined as a “system according to which the beginning and length of successive civil years, and the subdivision of the year into its parts, is fixed.”³ Such a system apparently requires a societal authority establishing a beginning point for each of the time measurements, a length of time during which such measurements will occur and the basic parts by which the progress of the measurements will be determined. This definition suggests conceptual issues that may affect a calendar. What person or group represents societal authority? For what purpose(s) does such an authority desire to measure time? How is the beginning or ending point of the calendar to be determined? Is the ending day immediately before the next beginning day or are the two days separated by some fixed or variable period? If the beginning or ending day relies on a natural event being observed, who watches for the event? How will the observation be reported and the report disseminated? Does the natural event always occur at the same time during a solar or seasonal year?

A *calendar* also may be defined as a “table showing the division of a given year into its months and days, and referring the days of each month to the days of the week; often also including important astronomical data, and indicating ecclesiastical or other festivals, and other events belonging to individual days.”⁴ Questions also arise about a calendar that exists in tangible form. Is the tangible display still in use? Are there related records that disclose how the physical calendar may have been used in the past? Does the physical calendar accurately display its original conceptual system? Does the physical calendar remain useful (within societal contexts involving biological, political, economic and religious controls) even though the initial system on

¹ For an example of apparent error in interpreting the order of events in the Book of Mormon, see Randall P. Spackman, “‘The Wrong King:’ A Textual Study of Mosiah 21:28 and Ether 4:1,” in the Occasional Papers appendix of this source book.

² Currently, four of such historical events appear in the Book of Mormon: the first regnal year of Judah’s king Zedekiah (1 Nephi 1:4); the time when Jeremiah was cast into prison, immediately before the destruction of Jerusalem (1 Nephi 7:14; 2 Nephi 25:10); and the birth and death of Jesus in the land of Judea (Helaman 14: 2-8, 14-29; 3 Nephi 1:4-21; 8:1-23). Scholars have examined these events from various chronological perspectives and, while there are disagreements and misunderstandings, this source book will provide what I consider to be plausible ranges of dates for these four events.

³ *The Compact Edition of the Oxford English Dictionary*, two vols. (Oxford: Oxford University Press, 1971), I: 318 (“Calendar”).

⁴ Ibid.

which the calendar was based is not widely understood by the populace or consistently followed by political, economic or religious authorities? The questions could go on and on. The detailed examination of such issues concerning each of the calendars used in this source book is beyond the scope of this chapter and may be impossible due to the lack of sufficient evidence.⁵ Nonetheless, some relevant issues and their potential influence on Book of Mormon chronology will be suggested.

My occasional reference to relevant issues that may create uncertainty is important because computer systems are readily available that will quickly calculate the time that has passed between ancient astronomical events and the present. Typically, the dates of such events are presented in terms of calendars that have been projected back in time as though they were in existence at the time of the astronomical events. Assumptions also may be made regarding the ancient calendars that existed at the time of such events, but such assumptions may not be reliable. Additionally, relevant issues about such calendars may be overlooked or ignored and, thus, the assumed ancient calendars may appear to be more useful and reliable than they are.

Modern interpretation of ancient dates and the passage of time measured by ancient calendars must be carried out with adherence to rational principles of interpretation. One must consider the effects of calendric misconceptions, potential observational errors and ancient political, economic and/or religious calendric manipulations. Moreover, one cannot overlook or ignore our present lack of information about ancient historical events. Our understanding is sometimes based on a few artifacts that appear to have been created relatively near the events themselves, but can we be certain they were not made much later from potentially unreliable memories or oral retellings? At times, we rely on quite late writings that purport to be copies of much earlier writings, but issues associated with errors, additions, deletions and document fabrication also must be considered.

In this chapter, calendars that measure or measured lengthy periods of time called *years* are the primary focus of attention. However, to understand the length of such calendars, their constituent parts (such as *days*, *weeks* and *months*) also may need to be examined. Particularly with ancient references to the passage of time, misunderstandings may arise. For example, an ancient reference to a *day* may initially seem quite simple to interpret. In current terms, a *day* might be defined as a 24-hour period in which the earth rotates on its axis. However, the word *day* also might be limited to the period of daylight, perhaps from the first visible sun to the sun's vanishing at the horizon or from the first light of dawn to the last light of evening. A *civil day* is a day reckoned according to custom or law, which subjects the day count and calendar to variations according to the mistakes or changing demands of the civil authorities.⁶

Likewise, if an ancient reference to a *day* was made in connection with a reference to some apparently important activity, one might interpret that *day* as just the time required to perform the activity, rather than 24 hours or a full daylight period filled with the activity dragging on and on. In addition, when events or conditions were described as occurring over multiple *days*, one must question whether full 24-hour periods were meant. A period referred to as *four days*, for example, might mean just two 24-hour *days* bracketed by parts of the *days* at the beginning and end of the period or it might mean just four daylight periods. Then again, a period of multiple *days* might

⁵ See, e.g., Anthony F. Aveni, *Empires of Time: Calendars, Clocks, and Cultures* (New York: Basic Books, Inc., 1989) for an introduction to such issues about several different calendars.

⁶ *The Compact Edition of the Oxford English Dictionary*, I: 650 ("Day"); Bonnie Blackburn and Leofranc Holford-Strevens, *The Oxford Companion to the Year* (Oxford: Oxford University Press, 1999), 661-62, 679-80.

simply be an estimate and not originally intended to be an accurate measurement at all. Rational interpretive principles must be applied to understand such statements as well as possible.

What Calendars Might Be Relevant? The first source to be used for identifying time measurement in subsequent chapters of this source book will be the Book of Mormon text itself. The various participants in the Book of Mormon narrative kept track of time, in part, by measuring and recording years passing away (e.g., 1 Nephi 17:4; Jacob 1:1; Mosiah 6:4; Alma 1:1; Helaman 1:1; 3 Nephi 1:1; 4 Nephi 1:1; Mormon 2:2; Moroni 10:1). Thus, the first parts of this chapter examine time keeping systems presented in the Book of Mormon.

In the instances where established historical events are described in the text, Hebrew and Christian scriptures and other historical sources provide additional information. Based on such sources and the goal of this source book to communicate Book of Mormon chronology as accurately and thoroughly as possible, several different time measuring systems are examined in this chapter:

1. *Egypt.* Nephi mentioned that the “language” of his father, Lehi, consisted of “the learning of the Jews and the language of the Egyptians” (1 Nephi 1:2). Many hundreds of years later, Mormon noted that Lehi had “been taught in the language of the Egyptians” and, thus, “he could read these engravings [on the plates of brass] and teach them to his children, that thereby they could teach them to their children, and so fulfilling the commandments of God, even down to this present time” (Mosiah 1:4). These statements indicate that Lehi, Nephi and subsequent generations of Nephite record keepers understood the Egyptian language at least sufficiently to be able to read the brass plates. Based on that understanding, perhaps Lehi and Nephi also understood Egyptian calendars. Whether either prophet used Egyptian calendars is not mentioned in the text.

If Lehi and Nephi understood and used Egyptian calendars, how long that use might have been preserved in different geographical contexts is not known. Nephi wrote later in his life that he had not taught his followers “many things concerning the manner of the Jews; for their works were works of darkness, and their doings were doings of abominations” (2 Nephi 25:2). Presumably, he would not have taught his people much about the manner of the Egyptians either. Moroni, the last of the Nephite record keepers, noted that the characters he used for writing were “called among us the *reformed* Egyptian, being handed down *and altered by us*, according to our manner of speech” (Mormon 9:32, italics added). Thus, Egyptian calendars initially might have been relevant to Lehi’s and Nephi’s practice of time keeping, but once they left Judah and found themselves in regions independent of the direct cultural influence of Egypt, such practices may have been altered or discarded.

2. *Judah.* Nephi referred to his father’s calling as a prophet in “the first year of the reign of Zedekiah, king of Judah” (1 Nephi 1:4). Nephi also stated that Jeremiah had been cast into prison (1 Nephi 7:14). According to the Hebrew scriptures (Jeremiah 32:1-5), Jeremiah was in prison during some part of the tenth regnal year of Zedekiah. Additionally, Nephi indicated that Jerusalem was destroyed “immediately after [Lehi] left Jerusalem” (2 Nephi 25:10). The Hebrew scriptures (2 Kings 24:17-25:21; 2 Chronicles 36:11-21; Jeremiah 39:2) also report that the destruction of Jerusalem occurred in the eleventh regnal year of Zedekiah. Thus, the time keeping systems in Judah prior to the Babylonian exile of the Jews are germane to understanding when Lehi left Jerusalem.
3. *Babylonia.* Zedekiah was installed as a king of Judah by Nebuchadrezzar, the emperor of Babylonia (2 Kings 24:11-18; 2 Chronicles 36:9-11). Jeremiah was in prison in the eighteenth year of Nebuchadrezzar (Jeremiah 32:1-5). The destruction of Jerusalem in

Zedekiah's eleventh regnal year was also dated in the nineteenth regnal year of Nebuchadrezzar (2 Kings 25:8). Hence, Babylonian calendars at that time may be vital for understanding when Lehi left the land of Judah.

4. *Arabia*. When Lehi and his followers escaped from Jerusalem, they travelled through wilderness regions that led to the Red Sea and then south-southeast into Arabia (1 Nephi 2:1-10; 16:10-17, 33-36). The general locations of Lehi's base camp near the Red Sea and the camp of mourning near Nahom (in northwestern and southwestern regions, respectively, of the Arabian Peninsula) seem to be supported by credible evidence.⁷ From Nahom, they turned eastward into a land of "much affliction," eventually spending some "eight years" in wilderness regions before reaching a seacoast area they called Bountiful (1 Nephi 17:1-6). Apparently, "the party of Lehi and Sariah emerged from the desert at some point along the south coast of modern Oman. The 100-mile long maritime plain is the only region in southern Arabia that fits Nephi's portrait of 'much fruit,' 'wild honey,' and 'timbers' (1 Nephi 17:5; 18:1)."⁸ After "many days" in Bountiful, Lehi's party decided to construct a ship in accordance with commandments from the Lord (1 Nephi 17:7-18:4), a task that may have required many more days, perhaps even years. Thus, ancient Arabian calendars may be relevant to an understanding of Book of Mormon time keeping.
5. *Mesoamerica*. Lehi and his followers eventually reached "a land of promise" after a dangerous ocean voyage (1 Nephi 2:20; 5:4-5; 18:1-23). Over the past century, geographic and cultural comments in the Book of Mormon⁹ have been linked to a limited area in southern Mexico, Guatemala and El Salvador¹⁰ and with many aspects of the local culture.¹¹ In the same century, the term *Mesoamerica* was coined to describe both a larger zone in the southern part of the North American continent and the dominant cultural tradition in that zone at the time of the Spanish conquest (i.e., more than a thousand years after the end of Book of Mormon history; Moroni 10:1).¹² Geographically defined, Mesoamerica includes "most of central, southern, and southeastern Mexico (and encompasses the Yucatán Peninsula), Guatemala, Belize, and the westernmost portions of Honduras and El Salvador."¹³ Culturally defined, most Mesoamericans were farmers (e.g.,

⁷ See, e.g., S. Kent Brown, "Refining the Spotlight on Lehi & Sariah," *Journal of Book of Mormon Studies* 15/2 (2006): 47-49; Jeffrey R. Chadwick, "The Wrong Place for Lehi's Trail and the Valley of Lemuel," *The FARMS Review* 17/2 (2005):209-15.

⁸ Brown, "Refining the Spotlight," 56.

⁹ In preparing my review of John L. Sorenson's book, *Mormon's Map*, I compiled a table of 1,068 verses that had been thought to be relevant for constructing a Nephite conceptual geography. The table itself was not published with my review, but was made available on request from The Foundation for Ancient Research and Mormon Studies ("FARMS"), P.O. Box 7113, University Station, Provo, UT 84602. Randall P. Spackman, "Interpreting Book of Mormon Geography," *The FARMS Review* 15/1 (2003): 19-46, at 29.

¹⁰ John L. Sorenson, *The Geography of Book of Mormon Events: A Source Book*, Revised (Provo, Utah: FARMS, 1992), 20-35.

¹¹ See, e.g., John L. Sorenson, *An Ancient American Setting for the Book of Mormon* (Salt Lake City, Utah: Deseret Book and Provo, Utah: FARMS, 1985); idem, *Images of Ancient America: Visualizing Book of Mormon Life* (Provo: FARMS Research Press, 1998); idem, *Mormon's Map* (Provo, Utah: FARMS, 2000).

¹² Paul Kirchhoff, "Mesoamerica," *Acta Americana* 1 (1943): 92-107. Munro S. Edmonson refers to this land by a similar English name, *Middle America*, or by the Aztec name, *Anahuac*, the land between the seas. Munro S. Edmonson, *The Book of the Year: Middle American Calendrical Systems* (Salt Lake City, Utah: University of Utah Press, 1988), 1.

¹³ Michael D. Coe, *Breaking the Maya Code* (New York: Thames and Hudson, 1992), 58.

peppers, squash, beans and maize), who lived in villages, towns and cities and traded in organized markets. Although their culture was not identical everywhere, they had books, held many common beliefs (such as the certainty that one's own blood or a captive's blood must be spilled to honor one's ancestors and the gods), and used a 260-day sacred calendar for timing personal rituals and public ceremonies.¹⁴ Several other calendars also were in use or, based on the surviving books and other ancient artifacts, appear to have been used hundreds (perhaps thousands) of years before the Spanish conquest.¹⁵ Hence, Mesoamerican calendars would appear to be relevant to understanding the measurement of time in the Book of Mormon.

6. *Judea*. The time when Jesus Christ was born is mentioned in the Book of Mormon (e.g., 1 Nephi 10:2-11; Helaman 14:2-8; 3 Nephi 1:4-21). Herod, the king, then reigned in Judea (e.g., Matthew 2:1; Luke 1:5-2:16). The time of Jesus' death at Jerusalem also is mentioned in the Book of Mormon (e.g., 1 Nephi 10:11; 19:7-12; Helaman 14:14-28; 3 Nephi 8:5-10:14). The Jewish calendars in use at the time of Jesus' birth and death are certainly important for placing the Book of Mormon text in its historical context.
7. *Rome*. At the time of Jesus' birth, Augustus led the Roman Empire (Luke 2:1) and at the time of Jesus' ministry and death, Tiberius ruled the Empire (Luke 3:1-22). Jesus' crucifixion was ordered by Pontius Pilate (e.g., Mark 15:1-15; Luke 3:1; John 18:28-19:22), the Roman authority who then governed Judea. The Roman's time keeping systems (principally, the Julian calendar named after Julius Caesar, who inaugurated it decades earlier) are relevant to the historical context of the Book of Mormon. Various techniques for projecting the Julian calendar back in time, to ages before it existed, have been devised; so, the Julian proleptic calendar also will be examined.
8. *BC/AD System*. The Julian calendar was in use when a new time labeling system was devised in Rome, and a couple of hundred years later popularized in England, that identified each year of the Julian calendar in what is now the widely disseminated BC/AD system. This system carried over to the Gregorian or western calendar used in many parts of the world. The abbreviation "B.C." or "BC" refers to the English phrase "Before Christ." The abbreviation "A.D." or "AD" refers to the Latin phrase "Anno Domini," which is usually replicated in English as "The Year of Our Lord." The relationship of the Julian calendar and earlier Roman time keeping systems to the calculation and adoption of the BC/AD system are important for understanding the ongoing references to what has come to be known as the Christian Era or, in a less religiously-characterized iteration, the Common Era (with derivative abbreviations, "BCE" and "CE").
9. *Gregorian Reform*. Since the current western or Gregorian calendar was derived as a correction to the Julian calendar, the relationship of our current calendar to the Julian calendar will be examined. The use of the Gregorian calendar in this source book provides a helpful comparative tool for modern readers; so, the Gregorian proleptic calendar also will be reviewed.
10. *Julian Date System*. Each of the potentially relevant calendars may be correlated (some more securely than others) with the Julian date system that has been used by astronomers

¹⁴ Coe, *Breaking the Maya Code*, 59.

¹⁵ See, e.g., Aveni, *Empires of Time*, 197-212; Coe, *Breaking the Maya Code*, 60-72; Edmonson, *The Book of the Year*, 111-38; John H. Linden, "Glyph X of the Maya Lunar Series: An Eighteen-Month Lunar Synodic Calendar," *American Antiquity* 51/1 (1986): 122-36.

to measure time since the late 19th century AD. This system presents the passage of time in days and fractions of a day that have elapsed since noon, Greenwich Mean Time ("GMT"), on Monday, January 1, 4713 BC in the Julian proleptic calendar (which is the equivalent of November 24, 4714 BC in the Gregorian proleptic calendar). For that day and each day thereafter until the present, the Julian date system assigns an immediately succeeding and larger integer to noon GMT. These integers (and the fractions representing the passage of time between noons) are referred to as Julian day numbers (or "JDN"), with JDN 0 used for noon GMT on Monday, January 1, 4713 BC in the Julian proleptic calendar. This system permits the number of days between the noon-hours on any two days to be determined by subtraction. In the following chapters of this source book, specific dates generally will be given in terms of Julian and Gregorian calendars (or the related proleptic calendars) and the Julian date system, with each date identified by the JDN integer at noon (GMT) on that date.

*Perceptions of Time.*¹⁶ Our physical senses, with their limited capacities and related memories, emotions, thoughts and actions, suggest that time is perceptible during consciousness and that time is an orderly progression of events that occur simultaneously or one after another. Events that happen at relatively slow speeds (when compared with the speed of light) are perceived (on the earth or, in terms of our perception of the universe, by astronauts who are located very near the earth) to occur at certain points in space and at specific times. In addition, intervals of time and space between events are thought to be measurable. Time itself may be remembered or projected as a measure of duration between past, current and future events.

Time appears to have a direction, passing only from past to future. We remember the past and sense the present, but we do not sense or remember the future. We may think about or project the future. Based on such thoughts, we may experience emotions about the future, such as joyful anticipation, concern or dread. We apparently do not act in the future, although we may act in the present and possibly influence the future.

Time also may be thought of as absolute, as though it exists separately from everything else, including even our recognition that it exists. Nonetheless, our sense of time and estimates of the elapsed time between events may be relative. For example, during times of great danger or pain, our emotions or senses may materially slow our perception of the passage of time. Alternatively, the measurement of elapsed time may appear objective and accurate, at least within the limits of precision permitted by an independent measuring tool or technique.

This brief recital of ideas about our understanding of time is important to the topic of this source book. Human perceptions, memories, thoughts, actions and emotions are bound up with nature and time. In most cases, our perceptions of events and the passage of time are earth-centered and psychologically-restricted. This seems to have been the human condition for some time, perhaps for many thousands of years.

For example, in Mayan time keeping, each day appears to have been thought to reveal the gods for whom it was named. The gods' names recurred in cycles of days (e.g., 9, 13, 20, etc.).¹⁷ The passage of time was a complex, religious and (given our apparently psychological penchant

¹⁶ See, e.g., Stephen W. Hocking, *A Brief History of Time: From the Big Bang to Black Holes* (New York: Bantam Books, 1988), 18-20, 23, 33, 145; Aveni, *Empires of Time*, 5.

¹⁷ Aveni, *Empires of Time*, 195-200; Coe, *Breaking the Maya Code*, 61-62; Linda Schele and David Freidel, *A Forest of Kings: The Untold Story of the Ancient Maya* (New York: Quill/William Morrow and Company, 1990), 77-82.

for superstition) somewhat horoscopic aspect of daily life. As this introduction is being written, hundreds of years after such cycles were devised and turned into calendars, some “New Age” religionists apparently look forward to December 21, AD 2012 (according to one accepted method for correlating Gregorian and Mayan calendars) or December 23, AD 2012 (according to another accepted method), as a day predicted thousands of years ago to be a time of natural calamity and/or great change in human enlightenment.¹⁸

The day will be known as 4 Ahau 3 Kankin 13.0.0.0.0, in our current description of five of the Mayan cycles of time. Thirteen Mayan *baktuns* (periods of 144,000 days) will have ended since the assumed first day more than five millennia earlier. The ancient Maya apparently did not think the 2012 benchmark in the continuing cycles of their calendars would be the termination point of the current natural creation.¹⁹ Nonetheless, human perceptions of time and events are so deeply psychological that some enthusiasts are reported to have promoted catastrophic predictions as the calendric import of that day.²⁰

Without rational principles of interpretation, all sorts of misunderstandings might be conjured from ancient artifacts and perhaps misused in the name of religion. That cautionary note also is applicable to interpretations of the Book of Mormon. Without adherence to rational principles of interpretation, misunderstandings may arise. The following chapters include my analyses and corrections (if I have been successful) of several examples of what I can only suggest have been irrational interpretations of the Book of Mormon text.

¹⁸ Robert K. Sitler, “The 2012 Phenomenon: New Age Appropriation of an Ancient Mayan Calendar,” *Nova Religio* 9/3 (2006): 24-38.

¹⁹ Schele and Freidel, *A Forest of Kings*, 81-82.

²⁰ See, e.g., Sitler, “The 2012 Phenomenon,” *Nova Religio* 9/3 (2006): 25-27.