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Exodus and the Blood Moons

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This paper presents a synopsis of the evidence on which we raise the significant possibility that a lunar eclipse tetrad in the late 1500s BCE coincides with the original Exodus of the Bible, the first date of that tetrad marking the very first Passover in Egypt, and that the subsequent three total lunar eclipses of that tetrad marked the very first Sukkot, the second Passover, and the second Sukkot in Jewish history.

The making of this claim requires two separate arguments to be supported:

- 1) The Exodus, according to the Bible could have occurred in the 1579 BCE.
- 2) Lunar eclipse tetrads occurring in that era would have fallen on dates that Passover and Sukkot might have been celebrated over that particular two-year period.

The support of these arguments rely on two key assumptions:

- 1) The solar and lunar eclipse models used by the National Aeronautical and Space Administration (NASA) are accurate to the degree required to identify the lunar eclipses that have occurred throughout history, and the orbital mechanics of the earth, sun, and moon have not changed to such a degree that this eclipse data for 3000-4000 years ago is invalid. We note that this data is freely accessible over the Internet, and while lunar eclipse models can differ slightly from each other, the two most often used models in historical eclipse analysis -- NASA and EclipseWise -- only differ in that ancient timeframe by a mere 24 seconds. Users of these sites should note that since eclipse tables populate the year 0 BCE, anyone who uses these tables in the BC era, must add one year to each year in the tables.

<http://eclipse.gsfc.nasa.gov/LEcat5/LE-1599--1500.html>

<http://www.eclipsewise.com/lunar/LEcatalog/LE-1599--1500.html>

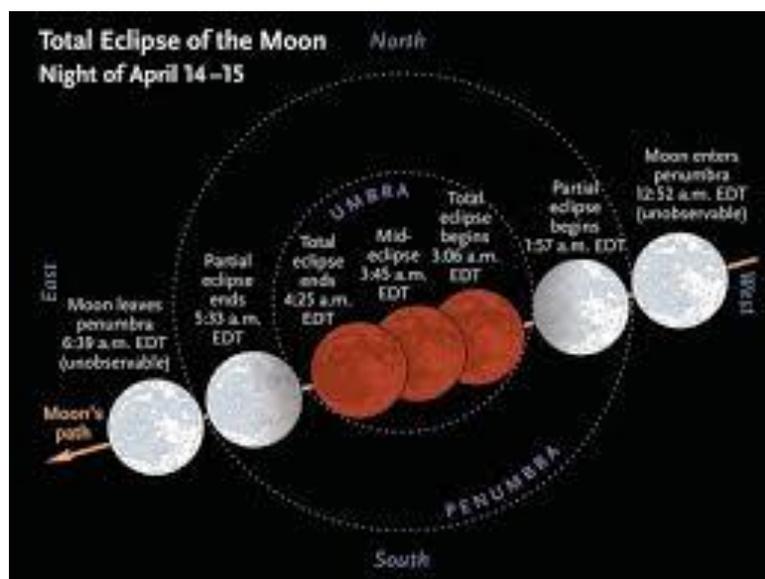
- 2) Solomon's Temple was destroyed in 586 BCE. While it is true that this date has not been accepted unanimously by all historians and archeologists, the evidence

pointing to this date is extensive, many would say overwhelming, because it has been cross-checked by so many different sources not only within the Babylonia culture but in the surrounding cultures and with multiple methodsⁱ.

TETRADES AND BLOOD MOONS

A Total Lunar eclipse occurs when the moon is fully engulfed in the Earth's umbral shadow, as it was for 1 hour 19 minutes on April 14, 2014, as shown in Figure 1. Every total lunar eclipse has main stages: the penumbral phase where the moon enters and is eventually fully contained within the very slight penumbral shadow; the partial phase where the moon is partially in the umbral shadow and partially in the penumbral shadow; and the total umbral phase. In the 100 years from 1599 BCE to 1500 BCE, the century of interest for this paper, there were 226 eclipses, with 87 (38.5%) reaching the total phase, 54 (24%) only reaching into the partial phase, and 85 (37.5%) only reaching into the barely perceptible penumbral shadow.

Figure 1 Total Lunar Eclipse of 14 April 2014



While the century of 1599 BCE to 1500 BCE held 226 eclipses, within that same century eight different tetrads occurred. A tetrad occurs when 4 total lunar eclipses occur back-to-back, with no partial or penumbral eclipses occurring in between. In the lunar eclipse tables this is shown as a series of four “T”s shown in yellow highlights in the table below.

Table 1. Example of Lunar Eclipse Tables

Catalog of Lunar Eclipses: -1599 to -1500 (1600 BCE to 1501 BCE)															
Calendar Date	TD of Greatest Eclipse	ΔT s	ΔT Sigmas	Luna Num	Saros Num	Ecl Type	QSE	Gamma	Pen Mag	Um Mag	Pen Dur m	Par Dur m	Total Dur m	Zen Lat °	Zen Long °
-1599 Jun 14	02:40:47	37177	2218	-44509	14	T-	pp	-0.0662	2.7329	1.7399	339.2	220.9	101.4	22S	112E
-1599 Dec 09	04:48:50	37166	2217	-44503	19	P	t-	-0.5712	1.8469	0.7735	339.5	187.4	-	21N	82E
-1598 Jun 03	17:02:45	37156	2215	-44497	24	P	a-	0.6843	1.5763	0.6280	287.4	159.0	-	19S	103W
-1598 Nov 28	05:24:10	37145	2214	-44491	29	N	t-	-1.2723	0.5774	-0.5296	226.8	-	-	18N	72E
-1597 Apr 25	03:22:56	37136	2212	-44486	-4	N	-a	-1.0991	0.8198	-0.1375	228.0	-	-	9S	103E
-1597 May 24	10:18:33	37134	2212	-44485	34	N	a-	1.4022	0.2560	-0.6862	132.3	-	-	16S	2W
-1597 Oct 18	11:57:00	37126	2211	-44480	1	N	-h	1.0653	0.9325	-0.1253	263.1	-	-	5N	27W
-1596 Apr 13	16:17:50	37115	2209	-44474	6	T	-a	-0.3728	2.1782	1.1698	336.0	208.3	61.8	4S	89W
-1596 Oct 06	21:24:35	37104	2207	-44468	11	T	-p	0.3241	2.2628	1.2638	325.1	204.8	72.0	0N	168W
-1595 Apr 02	22:01:14	37094	2206	-44462	16	T	t-	0.4041	2.1469	1.0867	356.7	213.5	47.1	1N	174W
-1595 Sep 26	12:14:56	37083	2204	-44456	21	T	p-	-0.3619	2.1768	1.2106	310.6	197.1	64.0	5S	30W
-1594 Mar 22	22:35:27	37073	2203	-44450	26	N	t-	1.1562	0.7742	-0.3003	255.2	-	-	6N	179E
-1594 Sep 16	04:00:15	37062	2201	-44444	31	N	a-	-1.0507	0.9195	-0.0593	239.6	-	-	10S	95E
-1593 Feb 10	12:22:46	37053	2200	-44439	-2	P	-h	-0.9395	1.1447	0.1236	276.6	80.2	-	18N	27W
-1593 Aug 07	02:41:05	37043	2198	-44433	3	P	-h	0.9596	1.1207	0.0742	284.5	64.4	-	20S	114E
-1592 Jan 31	00:46:34	37032	2196	-44427	8	T-	-p	-0.1875	2.5010	1.5265	322.4	209.9	91.3	21N	147E
-1592 Jul 26	04:53:33	37022	2195	-44421	13	T+	pp	0.2368	2.4630	1.3845	371.3	228.9	90.0	22S	81E
-1591 Jan 19	16:44:31	37011	2193	-44415	18	P	a-	0.5014	1.9196	0.9561	302.1	183.8	-	23N	93W
-1591 Jul 15	05:23:39	37001	2192	-44409	23	P	t-	-0.5068	1.9594	0.8974	349.2	200.8	-	24S	72E
-1591 Dec 10	18:51:09	36992	2190	-44404	-10	N	-a	-1.5640	0.0046	-1.0276	19.5	-	-	20N	129W
-1590 Jan 09	07:38:11	36990	2190	-44403	28	N	a-	1.2135	0.6301	-0.3672	208.4	-	-	25N	42E
-1590 Jun 05	01:42:55	36982	2189	-44398	-5	N	-a	1.3938	0.2890	-0.6879	146.2	-	-	19S	126E
-1590 Jul 04	11:17:05	36980	2188	-44397	33	N	a-	-1.2272	0.6106	-0.3981	213.3	-	-	25S	17W
-1590 Nov 30	00:09:43	36971	2187	-44392	0	P	-t	-0.9413	1.1754	0.0872	297.9	71.0	-	18N	150E
-1589 May 25	17:21:15	36960	2185	-44386	5	P	-a	0.6139	1.7021	0.7604	291.7	170.2	-	17S	109W

In the table above, “P” stands for Partial and “N” stands for penumbral. The “T+” and “T-” in 1592 are noted as being central eclipses wherein the totally eclipsed moon passes directly over the exact center of earth’s umbral shadow with the moons center crossing either north “+” or south “-“ of the central umbral shadow. (Central eclipses only rarely appear within tetrads.)

The term Blood Moon was coined by Mark Biltz in 2008 when he discovered an upcoming tetrad in 2014/2015, and then specifically noted that this tetrad would commence on Passover 2014, continue on Sukkot 2014, Passover 2015 would conclude

on Sukkot 2015, with all four total lunar eclipses falling on those feast days. Thus, a Blood Moon Tetrad is simply a normal tetrad that falls solely on Jewish feast days.

How common is this occurrence? One reason that Blood Moon tetrads do occur reasonably often is that all tetrads contain eclipses spaced exactly six lunar months apart, just like the Bible establishes for the time separation between the Jewish Feast days of Passover and Sukkot, in biblical calendar months 1 and 7 respectively. Therefore, if the very first lunar eclipse of the 4-part tetrad can “get off to a good start” by falling on a Passover, then there is only one factor that can cause it to fail to become a Blood Moon Tetrad, and that is the matter of the leap month -- Adar II -- that is inserted into the Jewish calendar about 7 times every 19 years. For a Blood Moon tetrad to occur, there must be no Adar II inserted into the second year, creating a 7 month gap, rather than 6 month gap between the first Sukkot (Sukkot 1) and the second Passover (Passover 2).

How might we know, without consulting a Jewish calendar, when an Adar II not be inserted during a tetrad? The answer to this is actually fairly simple. All that is required is that the first lunar eclipse of the tetrad fall on a Passover that is ‘late enough in April’ so that the following Passover, when adjusted to be about 10 days earlier in the next calendar year, does not occur too close to the Spring Equinox that the Jewish calendar would insert a leap month. Analysis of tetrads as compared to the Jewish feast days reveal that if the date of the first total lunar eclipse of the tetrad falls between the 99th day of the year (where day 1 is January 1), and the 114th day of the year, no Adar II will be inserted. This is not a hard and fast rule, as not every 99th day qualifies, but these are the most common ranges.ⁱⁱ

BLOOD MOON TETRADS IN RECENT HISTORY

In the Common Era (CE) years, Jewish calendars are easily obtained, and can keep track of when Adar II must be inserted, except for one particular difficulty – the conversion between Gregorian and Julian dates on the Eclipse Tables.

Between 1582 and 1752, various countries began to adopt a Gregorian calendar. The Julian calendar day Thursday 4 October 1582 was followed by the first day of the Gregorian calendar, Friday 15 October 1582 in many but not all countries (while the cycle of weekdays was not affected). Lunar eclipse tables therefore use the Julian calendar before October 4 1582 and use the Gregorian calendar beginning the day after. Hebrew calendar converters, such as www.hebcal.com, do not make these adjustments back in time. For instance, the tetrad whose first eclipse in the lunar eclipse tables is stated to be on April 2, 1493 would use Hebcal to reach the conclusion that it fell on Nissan 6. However, the Jewish calendar begins with a new moon on Nissan 1 and reaches full moon on Nissan 15, meaning the calculator must wrong by 9 days, which corresponds exactly to the 9 days that the Gregorian calendar and Julian calendar were offset in the 1400s. (The 10 days added to the Julian calendar to create the Gregorian date in 1582 become 9 days in the 1400s, 8 days in the 1300s, until no offset was required in the 200s). A trusted calculator to convert between Julian and Gregorian may be found here: <http://astropixels.com/ephemeris/calendarconverter.html>.

When all this is taken together, we have 8 or 9 tetrads in the Common Era that meet the test of becoming Blood Moon tetrads. They fall on the years listed in Table 2 below.

Table 2 Recent Blood Moon Tetrads

Tetrad	Day of Year of 1 st Lunar Eclipse
2014/2015	104
1967/1968	114
1949/1950	103
1493/1494	101 ⁱⁱⁱ
1428/1429	99
860/861	103
842/843 ^{iv}	93
795/796	103
162/163	106

A total of 55 tetrads occurred in the last 2000 years, from 1 CE thru 2015 CE. So the above Blood Moon tetrads comprise roughly 15% of the total.

Going forward in time, two additional Blood Moon Tetrads will occur before 3000 CE, according to eclipse data. While the tables themselves stop at 3000 CE, nothing prevents Blood Moon tetrads from occurring after 3000 CE.

Table 3 Future Tetrads

Tetrad	Day of Year of 1 st Lunar Eclipse
2647/2648	101
2582/2583	99

It can be seen easily from the data that Blood Moon Tetrads come in waves. This is an artifact of the way tetrads work, as tetrads also come in waves, with a few hundred years of no tetrads at all, followed by a few hundred years of from 16 to 19 tetrads occurring. An analysis of all tetrads that occurred from 3000 BCE to 3000 CE indicates that the period between 'tetrad waves' averages 590 years, varying from a minimum period of 530 years to a maximum period of 628 years.

Two other facts about Tetrad waves should be noted.

First, Tetrads only begin in the first half of the year. This is believed to be due to the elliptical nature of the earth's orbit, where the earth is closest to the Sun (perihelion) in early January and therefore moves fastest in its orbit at that time. The orbital mechanics of tetrads are such that a tetrad cannot form if the Earth's speed accelerates twice within a given tetrad. Any tetrad that forms in spring will last 1 1/2 years, and during that period the earth will only reach perihelion once. Any tetrad that attempts to form in fall would have to absorb two earth perihelions in 1 1/2 years.

Second, for reasons not fully understood, a careful analysis of the eclipse data reveals that the average "day of the year that a tetrad begins" within a given wave of tetrads is not constant in the Gregorian calendar but is shifting later with each successive wave of tetrads understood^v. The author calculated that the average tetrad begins 10.72 days later per wave, or 1.82 days later per century. For example, the tetrad wave in 600-800 CE had an average Gregorian start date of the 86th day of the year, but the next wave in the 1300-1500s CE had an average Gregorian start date of the 94th day of the year. This shifts the average period of Blood Moon Tetrad waves from 590 years to 601 years apart, but more importantly, it means that Blood Moons have a beginning and an end in recorded history. We project from the eclipse data that the very last Blood Moon Tetrad will occur sometime around 3200 CE, a date outside of the range of the NASA eclipse tables.

DID BLOOD MOON TETRADS OCCUR IN THE BC ERA?

There is no reason that Blood Moon tetrads would not occur in the BC era. In fact the lack of BC dates in the various books on Blood Moons such as the one from Mark Biltz^{vi} may simply be caused by the fact that automated Hebrew Date Calculators such as www.hebc.com stop at 1CE. However, the calculations performed to create the results shown in this paper reveal that the very first Blood Moon tetrad occurred in the 3000-2000 BCE millennium, more than 500 years prior to the Exodus.

This paper will not discuss the historical connection possibilities of all the Blood Moon tetrads in the BCE era, but will concentrate on the Exodus time-period. Before we look in detail at those tetrads, let us first generate a Biblical chronology of the Exodus.

DATING THE FIRST TEMPLE

As mentioned previously, we begin our chronology by assuming a date of 586 BCE for the destruction of the First Temple (also known as Solomon's Temple) and from this date we will use Biblical sources to develop a BCE date for the Exodus. We need a BCE date for the Exodus, because the lunar eclipse tables are configured for BCE. While we are not using Jewish calendar dates, we do use Jewish dating methods as much as possible.

Most Jewish historians consider that Solomon's Temple underwent 410 years of divine service before it was destroyed. Divine service would have begun at the Temple Dedication, meaning that exactly 410 years elapsed from the Temple Dedication to 586 BCE. And so, we may simply add 410 years to 586 BCE to reach a First Temple Dedication date of 996 BCE^{vii}.

We then add another 10 years to reach 1006 BCE as the date of the beginning of its construction. This 10 years is simply the sum of 7 years of construction (1 Kings 6:38) and the 3 additional years it took to make the completed Temple ready with all its

instruments for its dedication^{viii}. Thus, the construction of the Temple first began 420 years before it was destroyed.

This date, 1006 BCE for the beginning of construction of the First Temple, is a key to the calculation of the Exodus.

DATING THE EXODUS

Using the date of 1006 BCE, we now attempt to calculate the year of the Exodus. We have in First Kings 6:1 a very well-known verse of scripture:

*Now it came about in the **four hundred and eightieth year** after the sons of Israel came out of the land of Egypt, in the fourth year of Solomon's reign over Israel, in the month of Ziv which is the second month, that he began to build the house of the LORD.*

At this point, it is tempting to rush immediately to add 480 years to 1006 BCE, reaching an Exodus date of 1486 BCE. However, a detailed accounting of years in Exodus, Joshua, Judges and 1 and 2 Samuel reveals a problem with that approach.

Table 4 Accounting for the 480 Years of 1 Kings 6:1

<u>Activity</u>	<u>Number of Years</u>
The Years in the Wilderness	40
Conquest of Canaan ^{ix}	7
Period of the Judges	348 (93 missing)
Reign of Saul	42
Reign of David	40
Reign of Solomon before construction ^x	3
Total: To Begin Temple Construction	480

The problem is that while 348 years for the Period of the Judges does correctly correspond to the length of time *each Judge served*, it does not include any time in which the Israelites spent under servitude by Israel's enemies, also revealed in the book of Judges, as shown below.

Table 5 Period of Judges and Servitude

<u>Judge</u>	<u>Years</u>
Otniel	40
Ehud	80
Shamgar	0
Deborah	40
Gideon	40
Avimelech	3
Tola	23
Yair	22
Yiftach	6
Ivtzan	7
Elon	10
Avdon	8
Samson	22
Eli	40
Samuel	7 ^{xii}
Total	348

<u>Servitude</u>	<u>Years</u>
Mesopotamia	8
Moabites	18
Canaanites	20
Midianites	7
Ammonites	0 (18 ^{xi})
Philistines	40
Total	93

It makes sense to this author that the 1Kings 6:1 scripture, when referring to the 480th year, would only be counting the years in which the people were self-governing. The calculation in 1 Kings 6:1 is of a highly significant matter of massive spiritual implications -- the construction of the First Temple.

There is simply no possible way to fit the historical period of servitudes into the Biblical date of 480 years. Those 93 years cannot be fit into the record in any meaningful way in order to end up with 1 Kings 6:1 subsuming them in its 480 years. We will therefore add the additional 93 years to calculate the date of the Exodus.^{xiii}

Therefore to reach the date of the Exodus we simply start with 1006 BCE as the date that the Temple began its construction, and add 480 years according to 1 Kings 6:1 plus 93 years of servitudes.

1006 BCE + 480 Years + 93 years = 1579 BCE

Thus, 1579 BCE is our calculated chronological date of the Exodus. The author was not aware of tetrad dates when originally deriving this Exodus date.

Scholars and historians have disagreed wildly regarding the dates of the Exodus. Many secular historians doubt it even happened. However for those that do consider it a valid historical event, the date of 1579 BCE is much earlier than most secular historians would place for the Exodus, who usually place it in the 1300s BCE or even the 1200s BCE. Other biblical historians have simply added 480 years from their calculated temple construction date to achieve a date of 1400s BCE, but this solution has not been considered very tenable by most, because it places the Exodus during the 18th dynasty of Egypt, a long, strong empire at the peak of its power, which reigned continuously from 1543-1292 BCE. Nevertheless, many biblical historians are well aware of the periods of servitude, and some consider the periods of servitude to be longer than 93 years, some even longer than 111 years.

A date of 1579 BCE would mean that the Exodus occurred during the 15th Dynasty which ruled Egypt from about 1650 to 1550 BCE. This was the first Hyksos dynasty, a group that have moved into the region from the North East of Egypt, and they might well fit the Biblical description of a new regime that did not know the Jews, and could have easily feared their growing numbers. Within that dynasty, the Egyptian King Apophis was most likely ruling in the year 1579 BCE a reign of 40 years. The Bible does not state

that Pharaoh himself was killed in the Red Sea event, nor deposed soon afterward. Yet Egypt would have certainly been weakened by such an event, and indeed the 15th Dynasty did fall around 1550 BCE.

One interesting way to assess the likelihood of an early Exodus date being as early as 1579 is to look at Jericho excavations. If Exodus occurred in 1579 then Jericho would have been destroyed exactly 40 years later in 1539.

The following quote from Joshua's Jericho by Derek Walker is insightful in understanding Jericho archeology versus our claim of 1539:

Archeology studies by Ernst Sellin and Carl Watzinger, who led the first major expedition to Jericho 1907-11 dated its fall to the Middle Bronze Age (1550 BC), but this disagreed with what many thought was the biblical date of 1400 BC. Then John Garstang who excavated from 1930-1936 dated this City IV to the Late Bronze Age (1400 BC), which seemed to agree with the Biblical date. Then Kathleen Kenyon excavated 1952-1958, and concluded it was the Middle Bronze Age Jericho after all, and on that basis she dated its destruction at about 1550 BC. Her conclusions have generally been accepted despite Bryant Wood's arguments for a Late Bronze (1400 BC) date. Moreover Kenyon's date has recently been confirmed by accurate radiocarbon dating. In 1995, high precision radiocarbon dating was used for 18 samples from Jericho, including 6 samples of charred (carbonized) cereal grains from the burn layer and dated the destruction to 1562 BC, plus or minus 38 years. (i.e. 1524-1600 BC).

Our proposed date of 1579 for the Exodus, and therefore 1539 for the fall of Jericho, are safely within 23 years of the radio carbon mid-point, and only 11 years from the archeology mid-point.

EXAMINATION OF BLOOD MOON TETRADS IN THE BCE ERA

Now let us look at the tetrads that are in the region of time around the Exodus. The dates of these tetrads have been converted to BCE, and are therefore offset by one year from the eclipse tables shown.

A wave of tetrads began in 1662 BCE lasting thru 1368 BCE are listed below.

Table 6 Tetrads Around the Date of the Exodus

Tetrad Year (BCE)	Gregorian Day of Year, of First Eclipse	Is it a Blood Moon? Must fit between 99-114
1662/61	88	No
1644/43	98	Probable Miss
1626/25	110	Yes
1597/96	89	Close Miss
1586/85	58	No
1579/78	100	Yes
1575/74	-4	No
1568/67	69	No
1557/56	38	No
1539/38	49	No
1521/20	59	No
1474/73	52	No
1463/62	20	No
1445/44	31	No
1434/33	0	No
1416/15	10	No
1406/05	-21	No
1387/86	8	No
1369/68	3	No

As can be seen, only two tetrads in the entire list absolutely qualify as Blood Moon Tetrads, the one in 1626/25 BCE and the one in 1579/78 BCE. Two other tetrads in 1644/43 and 1597/96 are close, but cannot be considered for sure as Blood Moon Tetrads. Of these two tetrads, the 1579/78 tetrad is one of only 3 tetrads in that table that have another tetrad following it 40 years later. So we have an additional tetrad in 1539 BCE, ostensibly the year of the fall of Jericho and the year in which the Israelites first entered the Promised Land!

The 1579/78 tetrad is also interesting in that because it has a day count of only 100, following Passover 1 (occurring on April 10-11) and then Passover 2 (occurring on March 31-April 1 of the following year), the Jewish calendar would require the addition of an Adar II leap month in the third year.

The following chart details the eclipses surrounding the 1579/78 Tetrad, which is highlighted in yellow.

Table 7 Exodus Blood Moon Tetrad of 1579/78 BCE

-1579 May 05	10:40:13	36745	2152	-44263	-4	N	-a	-1.1749	0.6814	-0.2774	211.4	-	-	13S	9W
-1579 Jun 03	17:40:34	36743	2152	-44262	34	N	a-	1.3321	0.3856	-0.5584	160.7	-	-	19S	114W
-1579 Oct 28	20:16:51	36734	2151	-44257	1	N	-h	1.0650	0.9322	-0.1240	262.2	-	-	10N	154W
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-1577 Oct 07	20:54:36	36692	2144	-44233	21	T	p-	-0.3508	2.1982	1.2300	311.2	197.8	66.4	0S	162W
-1576 Apr 02	05:09:38	36682	2143	-44227	26	N	t-	1.0822	0.9081	-0.1627	272.1	-	-	2N	78E
-1576 Sep 26	12:26:34	36671	2141	-44221	31	N	a-	-1.0364	0.9481	-0.0355	243.3	-	-	5S	34W
-1575 Feb 20	20:03:54	36663	2140	-44216	-2	P	-h	-0.9765	1.0736	0.0591	268.6	55.8	-	15N	144W
-1575 Aug 17	10:00:12	36652	2138	-44210	3	Nx	-h	1.0099	1.0317	-0.0212	276.8	-	-	17S	3E
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-1574 Aug 06	11:45:06	36631	2135	-44198	13	T	-p	0.2974	2.3538	1.2713	369.5	224.9	78.9	21S	23W
-1573 Jan 31	01:08:40	36621	2134	-44192	18	T	a-	0.4778	1.9617	1.0004	303.7	186.7	3.0	22N	140E
-1573 Jul 26	12:14:50	36610	2132	-44186	23	T	t-	-0.4395	2.0831	1.0205	353.5	208.8	23.3	23S	31W
-1572 Jan 20	15:58:55	36600	2130	-44180	28	N	a-	1.1993	0.6561	-0.3413	212.7	-	-	24N	84W
-1572 Jun 15	08:54:10	36591	2129	-44175	-5	N	-a	1.4609	0.1649	-0.8100	111.3	-	-	21S	17E
-1572 Jul 14	18:29:21	36589	2129	-44174	33	N	a-	-1.1588	0.7356	-0.2720	230.3	-	-	25S	126W
-1572 Dec 10	08:16:16	36581	2127	-44169	0	P	-t	-0.9479	1.1638	0.0746	297.5	65.9	-	21N	28E
-1571 Jun 05	00:44:56	36570	2126	-44163	5	P	-a	0.6873	1.5674	0.6260	284.4	157.7	-	20S	139E
-1571 Nov 29	07:36:49	36560	2124	-44157	10	T	-p	-0.2801	2.3975	1.2914	373.1	225.3	80.7	19N	36E
-1570 May 25	17:55:43	36549	2123	-44151	15	T-	pp	-0.0508	2.7399	1.7891	321.6	213.5	99.7	18S	119W
-1570 Nov 18	08:33:43	36539	2121	-44145	20	T	a-	0.4043	2.1519	1.0811	350.4	208.6	44.6	16N	21E
-1569 May 15	07:46:22	36528	2120	-44139	25	P	t-	-0.8410	1.3132	0.3164	287.7	124.2	-	15S	33E
-1569 Nov 07	16:33:28	36518	2118	-44133	30	N	a-	1.0616	0.9165	-0.0961	247.0	-	-	13N	99W

All four lunar eclipses in the 1579/78 tetrad above had appeared 18 years earlier in the 1597/96 tetrad (see the “Saros Nbr” column of Table 1). This is part of the well-known eclipse pattern called a ‘saros’ where each solar and lunar eclipse is part of its own ‘saros family’ of eclipses that are very similar to each other, reappearing almost exactly every 18 years.

The first lunar eclipse date of the tetrad, shown on Julian date April 24 1578 of this table, but which would really occur on Gregorian date April 10, 1579, is the last *Total* Lunar Eclipse of Saros 6. That lunar eclipse saros continues forward in time until the very end of the era of the Judges. According to our chronology, the last year of the saros

would be one year prior to King Saul's reign, marking the beginning of the reign of the kings of Israel perfectly!

The second lunar eclipse is of Saros 11 and would mark the very first Sukkot. It will continue until David reaches the age of 23.

The third lunar eclipse, would mark the second ever Passover, and the fourth eclipse would mark the second ever Sukkot.

A reasonable question to ask about this 1579/78 tetrad is: where were these four lunar eclipses visible? According to the eclipse tables, the land of Israel (and Egypt) would have been able to see the second (Sukkot 1) and third (Passover 2) eclipse. However, we suggest that it is not wise to try to conclude from today's Eclipse tables what portion of the earth could see any particular eclipse, because Biblical events, such as Joshua's long day and Hezekiah's request that God turn back the clock a few hours, might have changed where on earth these eclipses might have occurred. Instead, we suggest that what is useful is to determine what percentage of the earth could see what eclipses, because even if the earth's rotation had been shifted, the relative positions of the eclipses would have still been fixed relative to each other over a brief 2 year period of this tetrad. The results are below:

Table 8 1579/78 Blood Moon Visibility

<u>Percentage of Earth</u>	<u>Number of Blood Moons Visible</u>
5%	None
45%	1
24%	2
15%	3
10%	All 4

All lunar eclipses have solar eclipses either 2 weeks before or 2 weeks after they occur. What solar eclipses happened near the 1579/8 tetrad? The only notable solar activity is the fact that the third lunar eclipse (Passover 2) is preceded and succeeded by a partial solar eclipse that begins a whole new solar eclipse saros. This is quite rare. It can be seen by the “pp” in the row of the third eclipse of the tetrad, and it corresponds to the second “p” that marks the new saros beginning. This lunar eclipse had previously been associated only with solar eclipses that preceded it by two weeks, but now, starting with the 3rd lunar eclipse of this tetrad, a new solar eclipse will also begin to succeed it by 2 weeks for the rest of the life of this lunar eclipse. This birth of this new solar eclipse saros will grow in its stature and will continue all the way until the 298 BCE, a decade in which Hellenistic civilization will begin to grow in world influence.

CONCLUSION

We have proposed that the Exodus occurred in 1579 BCE, the same year that the 1579/1578 BCE Blood Moon Tetrad began. No attempt was made to force any data to align; we simply proposed the best Biblical chronology we could muster for the date of the Exodus, and lo and behold, that date fell on one of only two Blood Moon tetrads in about a 1000 year period.

It is our recommendation that this topic be investigated further by Jewish Bible scholars, historians, archeologists and scientists, not only to examine and potentially verify the conclusions of this paper, but also to see what other hidden treasures and meanings may be found within Blood Moon Tetrads throughout history. This author’s strongly held view is that Blood Moon Tetrads are a new field, ripe for study, exploration, and a search for meaning by Jews.

ADDENDUM: CAVEATS AND FURTHER STUDY

The calculations revealed in this paper made no attempt to absorb the impact of Joshua's long day in Joshua 10:11 on the exact calendar timing of eclipses, nor does it suggest any impact for Hezekiah's request to have the sun 'turned back' a few hours, both of which occurred after the Exodus. Some historians have even noted changes in calendars of ancient cultures that potentially imply a change to the length of a solar year around 700 BCE. This paper does not deal with that possibility, but preliminary checks imply that in such a case, Blood Moon Tetrads would still occur, albeit not on the same calendar dates as indicated in this paper.

ⁱ For those that would argue with our assumption of 586 BCE, we would point out that had our work required a revision of 586 BCE, then the value of this paper to most of the research community would be significantly reduced.

ⁱⁱ In certain rare cases it is also possible for a tetrad whose first eclipse falls on the 96th day of the year to qualify. For instance, in 2013 Passover fell on its earliest date in more than 100 years: March 25. Were a tetrad to have begun on Passover 2012, day 96, it would have become a Blood Moon Tetrad. The author requests further study on this topic by Jewish scholars. Such analysis might even add additional Blood Moon Tetrads to the ones listed in this paper.

ⁱⁱⁱ These and earlier dates have to be adjusted to their Gregorian date because NASA eclipse data uses the Julian date for years earlier than 1582. The following Gregorian to Julian calculator was used: <http://astropixels.com/ephemeris/calendarconverter.html>

^{iv} While this tetrad has traditionally been considered a Blood Moon Tetrad, and while www.hebc.com allows it to be a Blood Moon Tetrad, further study of this event may cause it to be eliminated from being considered a Blood Moon Tetrad. Its Gregorian date, being only shifted 4 days later than its Julian date, implies the first Passover Blood Moon to occur on April 4th, and second Passover Blood Moon on March 23rd.

^v The author guesses it might be related to the precession of the earth.

^{vi} Mark Biltz: Blood Moons: Decoding the Imminent Heavenly Signs. WND Books. 2014.

^{vii} There is a minority view that simply adding 410 years does not reach back far enough, because divine service ended not at the physical destruction of the Temple, but when the last high priest, Jehozadak, son of Seraiah, was taken into captivity into Babylon. (1 Chron 5:41). This paper does not take this view because, when adding captivity of 70 years and construction/dedication of 10 years, there is no room to reach 490 years from laying the foundation of the First Temple to laying the foundation of the Second Temple, a view which many Jewish historians hold.

^{viii} This period of time is not precisely specified in Scripture; however, it must be at least 1 year since according to 1 Kings 8:2 it was dedicated in the 7th month and it was finished in the 8th month. Most scholars put this period at 3 years rather than 1 year so that the Temple was dedicated exactly 490 years after the Exodus (per 1 Kings 6:1) and was destroyed exactly 420 years from the beginning of its construction, which when adding the 70 years of captivity in Babylon also implies a 490 year period from start of construction of the First Temple, to the start of construction of the Second Temple. 1 Kings 7:13-51 contains a list of the many tasks needed for the preparation.

^{ix} Deduced through the age of Caleb at 85 in Joshua 14:10, he would have arrived in the land at age 78.

^x 1 Kings 6:1 states that it occurred in the 4th year of Solomon's reign, so it was therefore 3 years after his reign began.

^{xi} The servitude of 18 years of the Amorites, on one side of the Jordan River in Judges 10:8 seems to have overlapped with the 40 years of servitude of the Philistines on the other sides of the Jordan. If these periods did not overlap in time, then this would move the Exodus date another 18 years earlier, to 1597 BCE. Interestingly, there is another interesting tetrad on the date of 1597/1596 BCE; however, based on current eclipse models, it appears to arrive about 10 days too early (89 days from the beginning of the year) for it to be considered a Blood Moon Tetrad.

^{xii} Scripture does not include a precise record of the amount of time Samuel served as sole judge, but this could not have been more than 10 years. Scripture gives Samuel credit for serving as Judge of Israel all the days of his life. The number 7 was chosen so that the total number of years would add up to 480 years and align with 1 Kings 6:1.

^{xiii} The above account, while using only Hebrew sources, is very consistent with a passage in the New Testament, Acts 13:20, that sets the period of Judges to be 450 years, which would be arrived at in this account as the sum of 348 years of the Judges, plus 93 years of the servitudes, plus the 7 years of the Canaan conquest, plus the 2 years of Saul's reign, since the Acts scripture quotes his reign as 40 years, for a total of 450 years.