

SOLI-LUNAR CYCLES

IN

GREEK RESEARCH

AND

JEWISH REVELATION

by

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Those who are acquainted with the work of the Foundation for the Study of Cycles⁽¹⁾ or who have otherwise investigated the subject know that rhythmic fluctuations or cycles pervade not only inanimate nature but also many departments of human activity and thought.

The present treatise is concerned with discoveries which indicate that such cyclic relationships extend into the realms of the moral and the theological.

Physical and moral phenomena are, of course, in some ways quite distinct. Modern investigation has demonstrated that in many spheres the moral bears little or no causal relation to the physical. Injustice does not occasion an eclipse, nor envy an earthquake. Physical elevation not moral depravation attracts lightning. Physical phenomena occur in accordance with established and uniform physical principles. So, likewise, the physical is no criterion of the moral. Degrees of holiness and sin cannot be measured by a ruler. Size is no criterion of moral worth. It is only figuratively that a man's character can be weighed in the balances. Moral phenomena are governed by moral laws.

Nevertheless, the moral and the physical are not entirely

(1) A purely secular scientific organization "created to pursue and foster research into rhythmic fluctuations in all branches of natural and social phenomena" and numbering amongst its members some of the greatest scientists of Britain and America.

separate realms. They do exist together and, however we explain it, must bear some inter-relationship. Either the moral has arisen from the physical, as materialists say, or the underlying substance of things has both physical and moral potentialities, or both the physical and moral realms owe their existence to a Divine Author. That there is some inter-relationship no one will deny.

Further, it is evident that in time we have an element common to both realms.

There is a physical time order. "The sun knoweth his going down." The moon and the planets have their appointed seasons. Eclipses occur at fixed times. Ancient Greek research long ago brought to light the fundamental elements of these physical cycles.

But time is related also to the moral realm. The righteous are not always oppressed. "The time of the promise draws nigh." "The fulness of time comes." In this moral realm the sacred literature of the Jews is supreme. Here we find professed revelations of great moral cycles, times appointed for the duration of empires and kings and for the deliverance of the righteous.

Centuries of independent research in regard to these appointed times or cycles of the physical and moral realms have culminated in the discovery of certain curious relationships between them. These relationships constitute the burden of this thesis and, we humbly hope, may seem of sufficient significance to some to strengthen their faith in a theological interpretation of nature and history.

Physical Cycles

The real and apparent motions of sun, moon, and planets form the basis of nature's time order. The day, the lunar month, the year, and the planetary periods are the principal units. The matter is complicated, however, by the fact that each of these heavenly luminaries possesses more than one type of periodic motion. The moon, for example, has four main periodic elements all producing easily observable effects, and all known centuries before the time of Christ. Each planet has two principal periods.

The four lunar periods or months are the sidereal, the synodic, the anomalistic, and the nodical.

The sidereal month is simply one complete revolution of the moon about the earth or, in other words, the mean time taken for the moon to return to the same place in regard to the fixed stars.

The synodic month is the mean time taken for the moon to return to the same position in relation to the earth and the sun. And as the earth itself is in motion about the sun, this does not correspond to the sidereal month. The synodic month is the time from full moon to full moon or from new moon to new moon.

The anomalistic month is the time taken for the moon to return to the corresponding point on its elliptical orbit. And as the ellipse itself is in motion the anomalistic month is not the same in length as the sidereal. The anomalistic fluctuation is the principal cause of the considerable difference in length observable between individual synodic months. It also affects the nature of eclipses. When a full solar eclipse occurs with the moon at apogee the eclipse is total, but when a

full solar eclipse occurs with the moon at perigee the eclipse is annular.

The nodical month is fundamental to eclipses. The moon in its revolution about the earth does not revolve in the same plane that the earth does in its revolution about the sun, but in a plane at an angle to it. The nodical month is the time taken for the moon to return to the corresponding point in its plane. And as the plane is in motion neither does this period correspond to the sidereal month. It is obvious, further, that eclipses can occur only when the sun, earth, and moon are in a straight line. Two conditions are therefore necessary:

- (1) The moon must be full (for a lunar eclipse) or new (for a solar eclipse);
- (2) The moon must be at a node, i.e., it must be cutting the ecliptic, the plane in which the earth revolves about the sun.

Hence it is evident that eclipses will recur only at intervals which are synodic nodical cycles.

The two principal planetary periods are the sidereal and the synodic. The sidereal period is the mean time taken by the planet to complete one revolution about the sun. The synodic period is the mean time taken for the planet to return to the same position in relation to the earth and the sun.

Of these various units in nature's time order the most important are those which are suited to calendareographical uses, viz., the day, the synodic month, and the tropical year. It is well known, further, that these units are not commensurate. One tropical year, for example, does not contain an exact number of synodic months. It is possible, however, to find periods which do contain very nearly exact

numbers of both tropical years and synodic months. Such periods are called soli-lunar cycles⁽¹⁾ and are of first importance in the formation of calendars based on the motions both of sun and moon.

The first cycle of this sort to be used in Greece⁽²⁾ was the eight years' cycle or octaeteris. Commenting upon the origin and nature of this cycle Geminus tells us⁽³⁾ that the period was considered to contain 99 months (of which 3 were intercalary) and 2922 days. These numbers were arrived at, he says, on the assumption that the lunar year contains 354 days⁽⁴⁾ and the solar year $365 \frac{1}{4}$ days. Thus the epact would be $11 \frac{1}{4}$ days, which in eight years would amount to a whole number of days and a whole number of months; viz., 90 days or 3 months. In other words, 8 solar years exceed 8 lunar years by 3 lunar months. If, then, the lunar years are not to lag farther and farther behind the solar, it will be necessary in the course of every eight years to make three of the lunar years leap years of 13 instead of 12 lunar months.

Geminus then proceeds to note certain modifications of the 8 years' cycle suggested by a more accurate estimate of the length of the lunar month. The true length of the lunar month is, he says, $29 \frac{1}{2}$ plus $\frac{1}{33}$ days.⁽⁵⁾ Hence 99 months contain not 2922 days but $2923 \frac{1}{2}$ days. Thus, he says, every 16 years 3 days will have to be added in

(1) Censorinus calls them great years (anni magni) cf. *De Die Natali*, 18/5.

(2) It was also the first cycle employed by the Babylonians in their calendar and the first cycle employed by the early Christians for fixing the date of Easter.

(3) *Gemini Elementa Astronomiae* 8/27 f. Manitius' edition p.110, l. 21, f. Geminus flourished in Rhodes c. B.C. 77.

(4) The lunar year consisted of 12 months alternately "full" and "hollow", i.e. of alternately 30 and 29 days.

(5) $29 \frac{1}{2} + \frac{1}{33} = 29.5303$ days, which is not far from 29.5306 days, the actual length of the synodic month.

order to harmonize the days with the lunar months. But since 8 solar years do contain 2922 days,⁽¹⁾ in 16 years the months will be in excess of the years by the 3 added days. This excess will increase to a full lunar month in 10 of the 16 year periods or in 160 years, when a full month will have to be dropped out to correct the cycle.⁽²⁾

Finally, Geminus notices the 19 years' or Metonic cycle⁽³⁾ and its modifications. This cycle equates 19 years, 235 months (7 of which are intercalary), and 6940 days. In order to obtain the correct proportion of "full" and "hollow" months the Greeks dropped every 64th day from an hypothetical calendar containing 235 months of 30 days each. Thus the omitted day in the "hollow" months did not always come at the end of the month. The 64th day was arrived at by dividing 7050 (the number of days in 235 months of 30 days each) by 110 (the difference between 7050 and 6940 and hence the number of days that had to be dropped out).⁽⁴⁾

Callippus suggested that the error of Meton's cycle could be corrected by dropping one day after four cyclic periods or 76 years.

(1) Actually 2921.94 days.

(2) This system of correcting the octaeteris on the basis of a 160 years' cycle seems to have been first suggested by the great Greek geometrician and astronomer, Eudoxus, and a system based upon it to have been actually introduced in Athens possibly in 381 or 373 B.C., cf. Heath, Aristarchus p.293. Judged by accurate modern values the 160 years' cycle has an error of slightly more than two days:

160 years = 58,438.75 days

1979 months = 58,441.03 days

(3) Named after Meton who discovered it c. 432 B.C. It has an error of less than a day (19 years = 6939.60 days, 235 months = 6939.69 days) and came to be the most widely used of all calendareographical cycles of the tropical year and the synodic month. It is still used in the Jewish calendar and also, for fixing the date of Easter, in our own calendar.

(4) Heath, Aristarchus, p.293. Geminus 8/50-56.

The Callipic cycle thus equates 76 years, 940 months, and 27,759 days (instead of 27,760.)⁽¹⁾

About 125 B.C. Hipparchus devised a still further correction, dropping another day after four Callipic cycles, thus equating 304 years, 3760 months and 111,035 days (instead of 111,036).⁽²⁾

Thus the practical necessity of devising an accurate calendar led the Greeks and other ancient peoples to investigate the relationship between the synodic month and the tropical year. Scientific interest led them on to investigate other more profound mysteries of nature's time measurements: the remaining elements of the moon's motion, (elements which affect the time and character of eclipses), and the periodicity of the planets. The brilliant results of this research are set forth in Claudius Ptolemy's⁽³⁾ great *Syntaxis Mathematica* or "Almagest" the greatest extant astronomical work of antiquity, a work "which for fourteen centuries was the authoritative 'scripture of astronomy.'"⁽⁴⁾

In discussing the motions of the moon Ptolemy tells us⁽⁵⁾ that the ancient mathematicians sought for a period which would harmonize the Moon's various incommensurate motions, and that, through observations of

(1) Actually 76 years = 27,758.41 days
and 940 months = 27,758.75 days

(2) Cf. Heath, Aristarchus, p.296,7.
Actually 304 years = 111,033.63 days
3760 months = 111,035.01 days

(3) Ptolemy flourished at Alexandria about A.D. 140.

(4) Astronomy, Russel, Dugan, Stewart,, p.243.

(5) Ptolemy, Syn. Math. 4/2.

The extent of the errors of the cycle may be seen from the following figures:

223 synodic months = 6585.32 days
239 anomalistic months = 6585.54 days
242 nodical months = 6585.36 days
241 sidereal months = 6584.52 days

lunar eclipses, discovered that 6585 $1/3$ days (18 years 11 days) was such a period, for it contained 223 synodic months, 239 anomalistic months, 242 nodical months, and 241 sidereal months. In later times this remarkable period came to be known as the "saros". Amongst the shorter periods it is the fundamental eclipse cycle. Each saros contains a series of eclipses very similar to that in the previous saros.

After telling us that some tripled this period of 6585 $1/3$ days in order to eliminate the fraction, Ptolemy proceeds to recount that Hipparchus,⁽¹⁾ by making use of Chaldean observations as well as his own discovered another distinct and very remarkable eclipse cycle, a cycle which equates 345 years, 4267 synodic months, 4573 anomalistic months, 4630.5 nodical months,⁽²⁾ and 4612 sidereal months.⁽³⁾

Two other lunar cycles are mentioned by Ptolemy, the one a synodic anomalistic cycle equating 251 synodic and 269 anomalistic months,⁽⁴⁾ the other a synodic nodical cycle equating 5458 synodic and 5923 nodical months.⁽⁵⁾

In modern times the search for eclipse cycles has been taken

(1) Hipparchus flourished c. B.C. 130.

(2) Ptolemy does not note the number of nodical months in the period though in the very nature of the case, as an eclipse interval, it must contain either an integral or (as in this case) a semi-integral number of nodical months.

(3) The errors of the cycle may be seen from the following:

345 years = 126,008.56 days

4267 synodic mo. = 126,007.02

4573 anomalistic mo. = 126,006.96 days

4630.5 nodical mo. = 126,006.18 days

4612 sidereal mo. = 126,007.50 days

(4) A very accurate cycle

251 synodic months = 7412.178 days

269 anomalistic months = 7412.174 days

(5) Another very accurate cycle

5458 synodic months = 161,177.95 days

5923 nodical months = 161,177.98 days

taken up by the well-known astronomer Simon Newcomb.⁽¹⁾ He discovered that 358 synodic months and 388.5 nodical months form a cycle.⁽²⁾ He further noticed that the third multiple of this cycle has the additional feature of being an anomalistic cycle: 1074 synodic months, 1165.5 nodical months, and 1151 anomalistic months are all of very nearly the same length.⁽³⁾ Finally Mr. Newcomb noticed that in its eighteenth multiple the cycle possesses the yet additional feature of embracing an integral number of Julian years. Thus 521 Julian years, 6444 synodic months, and 6993 nodical months are equated. Newcomb illustrated the cycle historically by measuring 521 year intervals from the Nineveh eclipse of June 15th, 763 B.C. Thus eclipses recur on June 15th by the Old Style or Julian Calendar of the years 763, 242 B.C., A.D. 280, 801, 1322, and 1843. However, June 15th, 1843, Old Style is the same as June 27th, 1843 by the Gregorian or present day calendar. It must be remembered, therefore, that this cycle is remarkable simply in regard to the artificial Julian year but not in regard to the true tropical year. It should be noticed, too, that in this form (521 years) the anomalistic error of the cycle has increased to such an extent that it can no longer be regarded as an anomalistic cycle.⁽⁴⁾

(1) Cf. Newcomb's article, Eclipse, in the eleventh edition of the Encyclopaedia Britannica.

(2) 358 synodic months - 10,571.951 days
388.5 nodical months - 10,571.947 days

(3) 1,074 synodic months - 31,715.85 days
1,165.5 nodical months - 31,715.84 days
1,151 anomalistic months - 31,715.29 days

(4) 521 Julian years - 190,295.25 days
6444 synodic months - 190,295.11 days
6993 nodical months - 190,295.05 days
521 tropical years - 190,291.19 days
6906 anomalistic months - 190,291.72 days

TABLES OF CYCLES

The calendareographical and eclipse cycles that we have been discussing above are units in nature's time order, some of them remarkable and important units, but they are not the only units, nor the only remarkable units. In order, therefore, to obtain a more comprehensive grasp of nature's time order and in order to provide a basis of comparison by which we may judge of the relative accuracy and unusualness of various cyclical periods, we shall set forth in tabular form some of the main types of cycles.

TABLE 1

Cycles of the Solar Year and the Lunar Year

The epact between one solar year and one lunar year is 10.8751 days. This epact increases to a full lunar year in $\frac{354.3671}{10.8751} = 32.5852$ solar years. That is, in 32.5852 solar years there are 32.5852 lunar years plus one lunar year. Hence all multiples of 32.5852 will contain integral epacts, and those multiples which are themselves integral will be true cycles of the solar year and the lunar year, that is, will contain integral numbers of each.

By this method we have located the solar year lunar year cycles found in the following table. The table contains all cycles shorter than 4,000 years with errors less than a day. The bracketed number of the primary cycle appears after cycles which are not themselves primary. In calculating the errors of the cycles the values employed are: for the tropical year, 365.24219879 days; for the lunar year, 354.3670582 days, which are the values for the epoch A.D. 1900. The effect of secular acceleration on the error is such that in past centuries cycles with a lunar-greater-than-solar error had somewhat smaller errors, but those with a solar-greater-than-lunar error had somewhat larger. The effect is so slight, however, that for our present purposes we shall only occasionally need to draw attention to it.

TABLE 1.

Cycles of the Solar Year and the Lunar Year

Solar Years	Lunar Years	Days in the Solar Period	Lunar Differ- ence (days)
163	168	59,534.48	- .81
391	403	142,809.70	+ .22
554	571	202,344.18	- .59
782 (391)	806	285,619.40	+ .45
945	974	345,153.88	- .36
1,173 (391)	1,209	428,429.10	+ .67
1,336	1,377	487,963.58	- .14
1,499	1,545	547,498.06	- .95
1,564 (391)	1,612	571,238.80	+ .90
1,727	1,780	630,773.28	+ .09
1,890 (945)	1,948	690,307.76	- .73
2,118	2,183	773,582.98	+ .31
2,281	2,351	833,117.46	- .50
2,509	2,586	916,392.68	+ .54
2,672 (1,336)	2,754	975,927.16	- .28
2,900	2,989	1,059,202.38	+ .76
3,063	3,157	1,118,736.85	- .05
3,226	3,325	1,178,271.33	- .86
3,291	3,392	1,202,012.08	+ .99
3,454 (1,727)	3,560	1,261,546.55	+ .17
3,617	3,728	1,321,081.03	- .64
3,845	3,963	1,404,356.25	+ .40

TABLE 2.

Cycles of the Solar Year and the Lunar Month

The epact between one solar year and one lunar year increases to a full lunar month in $\frac{29.53059}{10.8751} = 2.715$ solar years. Hence all multiples of 2.715 will contain integral numbers of lunar months and those multiples which are themselves integral will be true cycles of the solar year and the lunar month, that is, they will contain integral numbers of each.

By this method we have located the solar year lunar month cycles found in the following table. The table contains all cycles shorter than 3000 years which have errors less than a day. Below 100 years all cycles whose errors are less than two days are included. The value of the synodic month employed in calculating the errors is that for the epoch 1900, viz., 29.53058818 days. The bracketed number of the primary cycle appears after cycles which are not themselves primary.

Cycles of the Solar Year and the Lunar Month

Solar Years	Lunar Months	Days in the Solar Period	Lunar Differ- ence (days)
8	99	2,921.94	+ 1.59
11	136	4,017.66	- 1.50
19	235	6,939.60	+ .09
27	334	9,861.54	+ 1.68
30	371	10,957.27	- 1.42
38 (19)	470	13,879.20	+ .17
46	569	16,801.14	+ 1.76
49	606	17,896.87	- 1.33
57 (19)	705	20,818.81	+ .26
65	804	23,740.74	+ 1.85
68	829	24,836.47	- 1.24
76 (19)	940	27,758.41	+ .35
84	1,039	30,680.34	+ 1.94
87	1,076	31,776.07	- 1.16
95 (19)	1,175	34,698.01	+ .43
114 (19)	1,410	41,637.61	+ .52
125	1,546	45,655.27	- .99
133 (19)	1,645	48,577.21	+ .61
144	1,781	52,594.88	- .90
152 (19)	1,880	55,516.81	+ .69
163	2,016	59,534.48	- .81
171 (19)	2,115	62,456.42	+ .78
182	2,251	66,474.08	- .73

TABLE 2.

Cycles of the Solar Year and the Lunar Month

Solar Years	Lunar Months	Days in the Solar Period	Lunar Differ- ence (days)
190 (19)	2,350	69,396.02	+ .86
201	2,486	73,413.68	- .64
209 (19)	2,585	76,335.62	+ .95
220	2,721	80,353.28	- .55
239	2,956	87,292.89	- .47
258	3,191	94,232.49	- .38
277	3,426	101,172.09	- .29
296	3,661	108,111.69	- .21
315	3,896	115,051.29	- .12
334	4,131	121,990.89	- .03
353	4,366	128,930.50	+ .05
372	4,601	135,870.10	+ .14
391	4,836	142,809.70	+ .22
410	5,071	149,749.30	+ .31
429	5,306	156,688.90	+ .40
448	5,541	163,628.51	+ .48
467	5,776	170,568.11	+ .57
478 (239)	5,912	174,585.77	- .93
486	6,011	177,507.71	+ .66
497	6,147	181,525.37	- .85
505	6,246	184,447.31	+ .74
516 (258)	6,382	188,464.97	- .76

TABLE 2.

Cycles of the Solar Year and the Lunar Month

Solar Years	Lunar Months	Days in the Solar Period	Lunar Differ- ence (days)
524	6,481	191,386.91	+ .83
535	6,617	195,404.58	- .67
543	6,716	198,326.51	+ .92
554 (277)	6,852	202,344.18	- .59
573	7,087	209,283.78	- .50
592 (296)	7,322	216,223.38	- .42
611	7,557	223,162.98	- .33
630 (315)	7,792	230,102.59	- .24
649	8,027	237,042.19	- .16
668 (334)	8,262	243,981.79	- .07
687	8,497	250,921.39	+ .02
706 (353)	8,732	257,860.99	+ .10
725	8,967	264,800.59	+ .19
744 (372)	9,202	271,740.20	+ .28
763	9,437	278,679.80	+ .36
782 (391)	9,672	285,619.40	+ .45
801	9,907	292,559.00	+ .54
812	10,043	296,576.67	- .97
820 (410)	10,142	299,498.60	+ .62
831 (277)	10,278	303,516.27	- .88
839	10,377	306,438.20	+ .71
850	10,513	310,455.87	- .80

TABLE 2.

Cycles of the Solar Year and the Lunar Month

Solar Years	Lunar Months	Days in the Solar Period	Lunar Differ- ence (days)
858 (429)	10,612	313,377.81	+ .80
869	10,748	317,395.47	- .71
877	10,847	320,317.41	+ .88
888 (296)	10,983	324,335.07	- .62
896 (448)	11,082	327,257.01	+ .97
907	11,218	331,274.67	- .54
926	11,453	338,214.28	- .45
945 (315)	11,688	345,153.88	- .36
964	11,923	352,093.48	- .28
983	12,158	359,033.08	- .19
1,002 (334)	12,393	365,972.68	- .10
1,021	12,628	372,912.28	- .02
1,040	12,863	379,851.89	+ .07
1,059 (353)	13,098	386,791.49	+ .16
1,078	13,333	393,731.09	+ .24
1,097	13,568	400,670.69	+ .33
1,116 (372)	13,803	407,610.29	+ .41
1,135	14,038	414,549.90	+ .50
1,154	14,273	421,489.50	+ .59
1,165	14,409	425,507.16	- .92
1,173 (391)	14,508	428,429.10	+ .67
1,184 (296)	14,644	432,446.76	- .83

TABLE 2.

Cycles of the Solar Year and the Lunar Month

Solar Years	Lunar Months	Days in the Solar Period	Lunar Differ- ence (days)
1,192	14,743	435,368.70	+ .76
1,203	14,879	439,386.37	- .74
1,211	14,978	442,308.30	+ .85
1,222 (611)	15,114	446,325.97	- .66
1,230 (410)	15,213	449,247.90	+ .93
1,241	15,349	453,265.57	- .57
1,260 (315)	15,584	460,205.17	- .48
1,279	15,819	467,144.77	- .40
1,298 (649)	16,054	474,084.37	- .31
1,317	16,289	481,023.98	- .22
1,336 (334)	16,524	487,963.58	- .14
1,355	16,759	494,903.18	- .05
1,374 (687)	16,994	501,842.78	+ .03
1,393	17,229	508,782.38	+ .12
1,412 (353)	17,464	515,721.98	+ .21
1,431	17,699	522,661.59	+ .29
1,450 (725)	17,934	529,601.19	+ .38
1,469	18,169	536,540.79	+ .47
1,488 (372)	18,404	543,480.39	+ .55
1,499	18,540	547,498.06	- .95
1,507	18,639	550,419.99	+ .64
1,518	18,775	554,437.66	- .86

TABLE 2.

Cycles of the Solar Year and the Lunar Month

Solar Years	Lunar Months	Days in the Solar Period	Lunar Differ- ence (days)
1,526 (763)	18,874	557,359.60	+ .73
1,537	19,010	561,377.26	- .78
1,545	19,109	564,299.20	+ .81
1,556	19,245	568,316.86	- .69
1,564 (391)	19,344	571,238.80	+ .90
1,575 (315)	19,480	575,256.46	- .61
1,583	19,579	578,178.40	+ .99
1,594	19,715	582,196.06	- .52
1,613	19,950	589,135.67	- .43
1,632	20,185	596,075.27	- .35
1,651	20,420	603,014.87	- .26
1,670 (334)	20,655	609,954.47	- .17
1,689	20,890	616,894.07	- .09
1,708	21,125	623,833.68	- .00
1,727	21,360	630,773.28	+ .09
1,746	21,595	637,712.88	+ .17
1,765 (353)	21,830	644,652.48	+ .26
1,784	22,065	651,592.08	+ .35
1,803	22,300	658,531.68	+ .43
1,822	22,535	665,471.29	+ .52
1,833 (611)	22,671	669,488.95	- .99
1,841	22,770	672,410.89	+ .60

TABLE 2.

Cycles of the Solar Year and the Lunar Month

Solar Years	Lunar Months	Days in the Solar Period	Lunar Differ- ence (days)
1,852 (926)	22,906	676,428.55	- .90
1,860 (372)	23,005	679,350.49	+ .69
1,871	23,141	683,368.15	- .81
1,879	23,240	686,290.09	+ .78
1,890 (315)	23,376	690,307.76	- .73
1,898	23,475	693,229.69	+ .86
1,909	23,611	697,247.36	- .64
1,917	23,710	700,169.30	+ .95
1,928 (964)	23,846	704,186.96	- .55
1,947 (649)	24,081	711,126.56	- .47
1,966 (983)	24,316	718,066.16	- .38
1,985	24,551	725,005.76	- .29
2,004 (334)	24,786	731,945.37	- .21
2,023	25,021	738,884.97	- .12
2,042 (1,021)	25,256	745,824.57	- .03
2,061 (687)	25,491	752,764.17	+ .06
2,080 (1,040)	25,726	759,703.77	+ .14
2,099	25,961	766,643.38	+ .22
2,118 (353)	26,196	773,582.98	+ .31
2,137	26,431	780,522.58	+ .40
2,156 (1,078)	26,666	787,462.18	+ .48
2,175 (725)	26,901	794,401.78	+ .57

Cycles of the Solar Year and the Lunar Month

Solar Years	Lunar Months	Days in the Solar Period	Lunar Differ- ence (days)
2,186	27,037	798,419.45	- .93
2,194 (1,097)	27,136	801,341.38	+ .66
2,205 (315)	27,272	805,359.05	- .85
2,213	27,371	808,280.99	+ .74
2,224	27,507	812,298.65	- .76
2,232 (372)	27,606	815,220.59	+ .83
2,243	27,742	819,238.25	- .67
2,251	27,841	822,160.19	+ .92
2,262	27,977	826,177.85	- .59
2,281	28,212	833,117.46	- .50
2,300	28,447	840,057.06	- .42
2,319	28,682	846,996.66	- .33
2,338 (334)	28,917	853,936.26	- .24
2,357	29,152	860,875.86	- .16
2,376	29,387	867,815.46	- .07
2,395	29,622	874,755.07	+ .02
2,414	29,857	881,694.67	+ .10
2,433	30,092	888,634.27	+ .19
2,452	30,327	895,573.87	+ .28
2,471 (353)	30,562	902,513.47	+ .36
2,490	30,797	909,453.07	+ .45
2,509	31,032	916,392.68	+ .54

Cycles of the Solar Year and the Lunar Month

Solar Years	Lunar Months	Days in the Solar Period	Lunar Differ- ence (days)
2,520 (315)	31,168	920,410.34	- .97
2,528	31,267	923,332.28	+ .62
2,539	31,403	927,349.94	- .88
2,547	31,502	930,271.88	+ .71
2,558 (1,279)	31,638	934,289.54	- .80
2,566	31,737	937,211.48	+ .80
2,577	31,873	941,229.15	- .71
2,585	31,972	944,151.08	+ .88
2,596 (649)	32,108	948,168.75	+ .62
2,604 (372)	32,207	951,090.69	+ .97
2,615	32,343	955,108.35	- .54
2,634 (1,317)	32,578	962,047.95	- .45
2,653	32,813	968,987.55	- .36
2,672 (334)	33,048	975,927.16	- .28
2,691	33,283	982,866.76	- .19
2,710 (1,355)	33,518	989,806.36	- .10
2,729	33,753	996,745.96	- .02
2,748 (687)	33,988	1,003,685.56	+ .07
2,767	34,223	1,010,625.16	+ .16
2,786 (1,393)	34,458	1,017,564.77	+ .24
2,805	34,693	1,024,504.37	+ .33
2,824 (353)	34,928	1,031,443.97	+ .41

TABLE 2.

Cycles of the Solar Year and the Lunar Month

Solar Years	Lunar Months	Days in the Solar Period	Lunar Differ- ence (days)
2,843	35,163	1,038,383.57	+ .50
2,862 (1,431)	35,398	1,045,323.17	+ .59
2,873	35,534	1,049,340.84	- .92
2,881	35,633	1,052,262.77	+ .67
2,892 (964)	35,769	1,056,280.44	- .83
2,900 (725)	35,868	1,059,202.38	+ .76
2,911	36,004	1,063,220.04	- .74
2,919	36,103	1,066,141.98	+ .85
2,930	36,239	1,070,159.64	- .66
2,938 (1,469)	36,338	1,073,081.58	+ .93
2,949 (983)	36,474	1,077,099.24	- .57
2,968	36,709	1,084,038.85	- .48
2,987	36,944	1,090,978.45	- .40

TABLE 3.

Soli-Lunar - Anomalistic Cycles

In the preparation of this table two separate tables of solar-synodic and solar-anomalistic tables were compared for cycles common to both. The resulting cycles are free from the considerable error⁽¹⁾ occasioned by the moon's anomaly; that is, in these cycles the solar-synodic error is the only error of any magnitude and therefore comes very close to representing the actual error found in practice. The table displays all numbers whose soli-lunar error is not appreciably greater than a day and whose lunar-anomalistic error is less than two days. (It should be remembered, of course, that a two day lunar-anomalistic error when reduced to its observable effect upon the length of the synodic period amounts to a very small fraction of a day.) In the soli-lunar error column, plus and minus signs indicate whether the lunar period is greater or less than the solar. Similarly, in the lunar-anomalistic error column, plus and minus signs indicate whether the anomalistic period is greater or less than the lunar.

(1) Though the average value of the synodic month is, as we have said, 29.53058818 days, the actual value varies nearly thirteen hours, mainly on account of the eccentricity of the lunar orbit; that is on account of the moon's anomalistic motion. See Russel-Dugan-Stewart, Astronomy p. 160.

TABLE 3.

Soli-Lunar-Anomalistic Cycles

Solar Years	Lunar Months	Anomalistic Months	Soli-Lunar Error in Days	Lunar Anomalistic Error in Days
106	1,311	1,405	- 1.07	- .46
133	1,645	1,763	+ .61	+ .85
239	2,956	3,168	- .47	+ .40
372	4,601	4,931	+ .14	+ 1.25
478 (239)	5,912	6,336	- .93	+ .79
486	6,011	6,442	+ .66	- 1.95
611	7,557	8,099	- .33	+ 1.65
725	8,967	9,610	+ .19	- 1.56
858	10,612	11,373	+ .80	- .70
964	11,923	12,778	- .28	- 1.16
1,097	13,568	14,541	+ .33	- .31
1,203	14,879	15,946	- .74	- .77
1,230	15,213	16,304	+ .93	+ .55
1,336	16,524	17,709	- .14	+ .09
1,469	18,169	19,472	+ .47	+ .94
1,575	19,480	20,877	- .61	+ .48
1,708	21,125	22,640	- .00	+ 1.34
1,814	22,436	24,045	- 1.07	+ .88
1,822	22,535	24,151	+ .52	- 1.87
1,947	24,081	25,808	- .47	+ 1.73
1,955	24,180	25,914	+ 1.12	- 1.01
2,061	25,491	27,319	+ .05	- 1.47

TABLE 3.

Soli-Lunar-Anomalistic Cycles

Solar Years	Lunar Months	Anomalistic Months	Soli-Lunar Error in Days	Lunar Anomalistic Error in Days
2,194 (1,097)	27,136	29,082	+ .66	- .62
2,300	28,447	30,487	- .42	- 1.08
2,433	30,092	32,250	+ .19	- .22
2,539	31,403	33,635	- .88	- .68
2,566	31,737	34,013	+ .80	+ .63
2,672 (1,336)	33,048	35,418	- .28	+ .17
2,805	34,693	37,181	- .33	+ 1.03
2,911	36,004	38,586	+ .74	+ .57

TABLE 4.

Soli-Lunar-Nodical Cycles

The following table was prepared in much the same way as the table of soli-lunar-anomalistic cycles. Two separate tables were first made, the one of solar-synodic cycles, the other of solar-nodical cycles. All that then remained was to note what periods were common to both tables and therefore cyclic in both respects.

Soli-lunar-nodical cycles are, of course, eclipse cycles. If, for example, we take as our starting point a January 6th when the moon is full and is suffering eclipse, any accurate soli-lunar cycle will lead us to another January 6th when the moon will be full, but only a soli-lunar-nodical cycle will lead us to another January 6th when the moon will be not only full but also again suffering eclipse.

The table displays all numbers whose soli-lunar error is not appreciably greater than a day and whose lunar-nodical error is less than two days. The practical effect of the lunar-nodical error is relatively small. An interval may have a lunar-nodical error approaching two days and yet be a true eclipse interval. The moon may still be sufficiently close to the plane in which the earth is revolving about the sun, to pass through the earth's shadow. As in the previous table, in the soli-lunar error column, plus and minus signs indicate whether the lunar period is greater or less than the solar; and in the lunar-nodical error column, plus and minus signs indicate whether the nodical period is greater or less than the lunar.

TABLE 4.

Solli-Lunar-Nodical Cycles

Solar Years	Lunar Months	Nodical Months	Solli-Lunar Error in Days		Lunar-Nodical Error in Days	
19	235	255	+	.09	-	.57
38 (19)	470	510	+	.17	-	1.14
57 (19)	705	765	+	.26	-	1.72
334	4,131	4,483	-	.03	+	1.52
353	4,366	4,738	+	.05	+	.95
372	4,601	4,993	+	.14	+	.38
391	4,836	5,248	+	.22	-	.19
410	5,071	5,503	+	.31	-	.77
429	5,306	5,758	+	.40	-	1.34
448	5,541	6,013	+	.48	-	1.91
706 (353)	8,732	9,476	+	.10	+	1.90
725	8,967	9,731	+	.19	+	1.33
744 (372)	9,202	9,986	+	.28	+	.76
763	9,437	10,241	+	.36	+	.18
782 (391)	9,672	10,496	+	.45	-	.39
801	9,907	10,751	+	.54	-	.96
820 (410)	10,142	11,006	+	.62	-	1.53
1,097	13,568	14,724	+	.33	+	1.71
1,116 (372)	13,803	14,979	+	.41	+	1.13
1,135	14,038	15,234	+	.50	+	.56

TABLE 4.
Solι-Lunar-Nodical Cycles

Solar Years	Lunar Months	Nodical M Months	Solι-Lunar Error in Days	Lunar-Nodical Error in Days
1,154	14,273	15,489	+ .59	- .01
1,173 (391)	14,508	15,744	+ .67	- .58
1,192	14,743	15,999	+ .76	- 1.15
1,211	14,978	16,254	+ .85	- 1.73
1,488 (372)	18,404	19,972	+ .55	+ 1.51
1,507	18,639	20,227	+ .64	+ .94
1,526 (763)	18,874	20,482	+ .73	+ .37
1,545	19,109	20,737	+ .81	- .20
1,564 (391)	19,344	20,992	+ .90	- .78
1,583	19,579	21,247	+ .99	- 1.35
1,602	19,814	21,502	+ 1.07	- 1.92
1,860 (372)	23,005	24,965	+ .69	+ 1.89
1,879	23,240	25,220	+ .78	+ 1.32
1,898	23,475	25,475	+ .86	+ .75
1,917	23,710	25,730	+ .95	+ .17
1,936	23,945	25,985	+ 1.04	- .40
1,955 (391)	24,180	26,240	+ 1.12	- .97
2,251	27,841	30,213	+ .92	+ 1.69
2,270	28,076	30,468	+ 1.00	+ 1.12
2,289 (763)	28,311	30,723	+ 1.09	+ .54

TABLE 5.

Soli-Lunar-Anomalistic-Nodical Cycles.

There are a few periods common to Table 4 and Table 5 and, therefore, embracing the characteristics of both. The effect upon eclipses is that eclipses separated by such intervals will be of similar character: an annular eclipse will be followed by an annular eclipse, a total eclipse by a total eclipse.

TABLE 5.

Soli-Lunar-Anomalistic-Nodical Cycles.

Solar Years	Lunar Months	Anomalistic Months	Nodical Months	Soli-Lunar Error in Days	Lunar-Anom. Error in Days	Lunar- Nodical Error in Days
372	4,601	4,931	4,993	+ .14	+ 1.25	+ .38
725	8,967	9,610	9,731	+ .19	- 1.56	+ 1.33
1,097	13,568	14,541	14,724	+ .33	- .31	+ 1.71
1,955	24,180	25,914	26,240	+ 1.12	- 1.01	- .97

The above tables display all the more accurate lunar cycles embracing a whole number of years. We have refrained from making a complete table of cycles of the solar year and the sidereal month because such a table would be little more than a duplicate of table No. 2. The length of the sidereal month is such that solar-year synodic-month cycles are also solar-year sidereal-month cycles, the main difference being that each year contains one more sidereal month than it does synodic months. Thus in 315 years there are 3,896 synodic months, but 3,896 plus 315 or 4,211 sidereal months. Another difference is that the error of the sidereal cycles reaches its minimum somewhat earlier than the error of the synodic cycles. A glance at Table No. 2 will show that after the 19 years' cycle the synodic cycles reach their first period of minimum error at the cycles of 334 and 353 years. The sidereal cycles, however, reach their first period of minimum error with the 277 years' cycle as the following brief table will show.

Solar Years	Sidereal Months	Days in the Solar Period	Sidereal Difference in Days
239	3,195	87,292.89	- .18
258	3,449	94,232.49	- .08
277	3,703	101,172.09	+ .02
296	3,957	108,111.69	+ .12

MORAL CYCLES

There now remains the interesting task of examining "the professed revelations of great moral cycles"⁽¹⁾ found in the apocalyptic literature of the Old and New Testaments, and of tracing the history of exposition respecting them.

We shall be concerned, therefore, with:

- (1) The "time and times and half a time" of Daniel 7/25, 12/7, and Revelation 12/14, which period is unquestionably identical with the "forty and two months" of Revelation 11/2 and 13/5, and with the 1,260 days of Revelation 11/3 and 12/6;⁽²⁾
- (2) The 2,300 days of Daniel 8/14;
- (3) The 70 weeks of Daniel 9/24;
- (4) The 1,290 days of Daniel 12/11;
- (5) The 1,335 days of Daniel 12/12;
- (6) The 5 months of Revelation 9/5;
- (7) The "hour and day and month and year" of Revelation 9/15;
and
- (8) The "three days and a half" of Revelation 11/9.

Of these periods the 70 weeks of Daniel 9/24 was the first to receive an interpretation which proved, to a considerable extent, stable.

(1) See above, page 2.

(2) Thus Augustine says, "It is patent from the context that the time, times and half a time means a year, and two years, and half a year; that is to say, three years and a half." City of God, chapter 23.

Commenting on the passage in his Chronographies (written about A.D. 221) Julius Africanus says:

"This passage, therefore, as it stands thus, touches on many marvellous things. At present, however, I shall speak only of those things in it which bear upon chronology, and matters connected therewith.

"That the passage speaks, then, of the advent of Christ who was to manifest Himself after seventy weeks, is evident. For in the Saviour's time, or from Him, are transgressions abrogated, and sins brought to an end. And through remission, moreover, are iniquities, along with offences blotted out by expiation; and an everlasting righteousness is preached, different from that which is by the law; and visions and prophecies (are) until John, and the Most Holy is anointed. For before the advent of the Saviour these things were not yet, and were therefore only looked for.

"And the beginning of the numbers, that is, of the seventy weeks which make up the 490 years, the angel instructs us to take from the going forth of the commandment to answer and to build Jerusalem. And this happened in the twentieth year of the reign of Artaxerxes

"king of Persia. For Nehemiah his cupbearer besought him, and received the answer that Jerusalem should be built. And the word went forth commanding these things; for up to that time the city was desolate. For when Cyrus, after the seventy years' captivity, gave free permission to all to return who desired it, some of them under the leadership of Joshua the high priest and Zerobabel, and others after these under the leadership of Esdra, returned, but were prevented at first from building the temple, and from surrounding the city with a wall, on the plea that that had not been commanded. It remained in this position, accordingly, until Nehemiah and the reign of Artaxerxes, and the 115th year of the sovereignty of the Persians. And from the capture of Jerusalem that makes 185 years. And at that time King Artaxerxes gave order that the city should be built; and Nehemiah being despatched, superintended the work, and the street and the surrounding wall were built, as had been prophesied. And reckoning from that point, we make up seventy weeks to the time of Christ.

"For if we begin to reckon from any other point, and not from this, the periods will not correspond, and very many odd results will meet us. For if we begin the calculation of the seventy weeks from Cyrus

"and the first restoration, there will be upwards of one hundred years too many, and there will be a larger number if we begin from the day on which the angel gave the prophecy to Daniel, and a much larger number still if we begin from the commencement of the captivity. For we find the sovereignty of the Persians comprising a period of 230 years, and that of the Macedonians extending over 370 years, and from that to the 16th year of Tiberius Caesar is a period of about 60 years.

"It is by calculating from Artaxerxes, therefore, up to the time of Christ that the seventy weeks are made up, according to the numeration of the Jews. For from Nehemiah, who was despatched by Artaxerxes to build Jerusalem in the 115th year of the Persian Empire, and the fourth year of the 83rd Olympiad, and the 20th year of the reign of Artaxerxes himself, up to this date, which was the second year of the 202d Olympiad, and the sixteenth year of the reign of Tiberius Caesar, there are reckoned 475 years, which make 490 according to the Hebrew numeration, as they measure the years by the course of the moon; so that, as is easy to show, their year consists of 354 days, while the solar year has 365 $\frac{1}{4}$ days. For the latter exceeds the period of twelve months, according to the

"moon's course by $11 \frac{1}{4}$ days. Hence the Greeks and the Jews insert three intercalary months every eight years; for 8 times $11 \frac{1}{4}$ days makes up three months. Therefore 475 years make 59 periods of 8 years each, and three months besides. But since thus there are three intercalary months every eight years, we get thus 15 years minus a few days; and these being added to the 475 years, make up in all the seventy weeks." (1)

Africanus' main calculation will bear the test of the closest criticism. His date for the starting point of the 70 weeks, the fourth year of the 83d Olympiad, which corresponds to B.C. 445, is the date assigned also by modern scholars to the 20th year of Artaxerxes. So, too, the second year of the 202d Olympiad (A.D.30) corresponds, as he says, to the 16th year of the sole rule of Tiberius, and was the 475th solar year or the 490th lunar year from B.C. 445.

His view of the 70 weeks, which regards them as weeks of lunar years extending from the decree to Nehemiah (Nehemiah 2) to the time of Christ, has been adopted by a long line of expositors reaching down to modern times. Zockler tells us⁽²⁾ that it was the view adopted by Chrysostom (d.A.D.407), favoured by Jerome (d.A.D.420), adopted by

(1) Robers and Donaldson's edition of the Ante-Nicene Fathers, vol. 6, p.134, 135.

(2) Zockler on Daniel, p.207-209 in Schaff's edition of Lange's Commentary.

Theodoret (d.A.D.429), Isidore of Pelusium (d.A.D.450), the Venerable Bede (d.A.D.735), Euthymius Zigabenus (early 12th century), by a majority of the expositors in the Oriental church generally, by Thomas Aquinas (d.1274), by Hassenkemp (d.1777), by J.D. Michaelis (d.1791), and others. Bede's exposition of the passage which, we are told, was the basis of most of the mediaeval exegesis,⁽¹⁾ is so suggestive that we subjoin our translation of it. Bede has been discussing hebdomads of various kinds. The first hebdomad, according to his enumeration, is the Creation week (Gen.1); the second, the seven-day week of the fourth commandment (Ex. 20/9); the third, the seven weeks leading to the Feast of Pentacost (Deut.16/9 f.); the fourth, the seventh month of the Jewish year, almost all of which was given over to religious duties (Numbers 29); the fifth, the seventh year, the year of rest for the land (Leviticus 25/3); the sixth, the Jubilee after seven weeks of years (Leviticus 25/8); the seventh he identifies with Daniel's "seventy weeks" and comments as follows:⁽²⁾

"The seventh form of hebdomad is that which the prophet Daniel employs.. That he should regard each hebdomad as seven years is in accordance with the custom of the law, but that he should cut short⁽³⁾ the years themselves is new. Thus each year is composed of twelve lunar months; for he does not insert, every 2nd or 3rd year, the customary

(1) C. W. Jones, *Beda's Opera de Temporibus* p.344.

(2) *De Tempore Ratione*, cap.9, p.198-201 in Jones *Beda's Opera de Temporibus*.

(3) Latin, abbrevians.

"intercalary months which grow out of the annual 11 days' epact; but, on the contrary, when they have increased to twelve months, introduces another whole year. He has done this, not because he begrudges recognition of the truth to those who are in quest of it, but rather because (after the fashion of a prophet) he desires to exercise the skill of the seekers. For he would prefer that his pearls should be hidden from his own sons and be sought for by fruitful sweat, than that they should be profusely poured forth and, with fastidious contempt, be trodden under foot by swine.

"But, in order that we might understand these things more clearly let us look at the very words of the angel to the prophet, 'Seventy hebdomads', he says, 'are cut off⁽¹⁾ in regard to your people and your holy city, that transgression might be finished, sin be brought to an end, iniquity be destroyed, everlasting righteousness be brought in, vision and prophecy be fulfilled, and the Holy of Holies be anointed.' No one doubts but that these words refer to the incarnation of Christ who bore the sins of the world, fulfilled the law and the prophets, and was anointed with

(1) Latin, abbreviatae sunt.

the oil of gladness above his fellows; and that the seventy hebdomads, each defined as 7 years, amount to 490 years. But it ought to be noted that it is not said simply that these hebdomads are assigned or determined but that they are 'cut off.'⁽¹⁾ He thus darkly cautions the reader that he might know that shorter years than ordinary are intended.

"Know therefore," he says, 'and consider: from the going forth of the word that Jerusalem is to be built again up to Christ, the Leader, shall be 7 hebdomads and 62; and it shall be built again with street and wall in troublous times.' We know (from the pen of Ezra)⁽²⁾ that Nehemiah, when he was cupbearer of King Artaxerxes, in the 20th year of his reign, in the month Nisan, secured permission from him to restore the walls of Jerusalem (Cyrus having long before given permission to build the temple). This task, as we are told, he accomplished in troublous times, and so much was he opposed by the neighbouring peoples that all the builders are said to have worn swords and to have fought with one hand and built the wall with the other.

(1) Latin, abbreviatae sunt.

(2) Bede evidently believed Ezra wrote the book of Nehemiah.

"From this time, therefore, to Christ, the Leader, the 70 hebdomads are to be computed; that is, the 490 years of 12 lunar months, which amount to 475 solar years. From the 20th year of Artaxerxes (mentioned above) to the death of Darius, the Persians reigned 96 years. From that time to the death of Cleopatra, the Macedonians reigned 300 years. Thence to the 17th year of Tiberius Caesar the Romans held the monarchy for 59 years. All these periods added together give the number we mentioned, 475 years, and contain 25 nineteen years' cycles (for 19 times 25 amounts to 475). And, since in each cycle there are 7 intercalary months, in the 25 cycles or 475 years there are a total of 25 times 7 or 175 intercalary months. If, therefore, you wish to know how many lunar years they can make, divide the 175 by 12 (12 times 14 amounts to 168). Accordingly, the result is 14 years and 7 months. Add these to the aforementioned 475 years and they become 489 years. Add, also, the seven months' excess and the part of the 18th year of Tiberius Caesar in which our Lord suffered, and you will find from the time before mentioned to His passion 70 weeks out off, that is 490 lunar years.

"But to His baptism when the Holy of Holies was anointed by the Holy Spirit descending upon Him as a dove, not only had the 7 and 62 hebdomads been completed, but also part of the 70th hebdomad had already begun. 'After 62 hebdomads,' he says, 'the Christ shall be slain, and the people who will have denied Him shall cease to be.' Not immediately after the 62 hebdomads was Christ slain but at the end of the 70th hebdomad. This hebdomad he has separated from the others because (so far as we can judge) he was going to relate more things in regard to it. For in it Christ was crucified, in it He was denied by the deceitful populace, not only at the time of His passion but from the moment His coming was heralded by John.

"The next phrase, 'And the people with their leader who shall come shall destroy the city and the sanctuary and its end will be a ruin, and after the end of the war desolation is determined,' does not pertain to the 70 hebdomads, for it was previously predicted that the 70 hebdomads themselves reached to the leadership of the Christ. This passage, therefore, since Christ's advent and passion had already been pre-dicted, shows us what would come to pass even after these things in regard to the people who had refused to receive Him. For it speaks of the coming leader Titus, who in the 40th

year after our Lord's passion, together with the Roman people, so demolished the city and the sanctuary that there was not left one stone upon another.

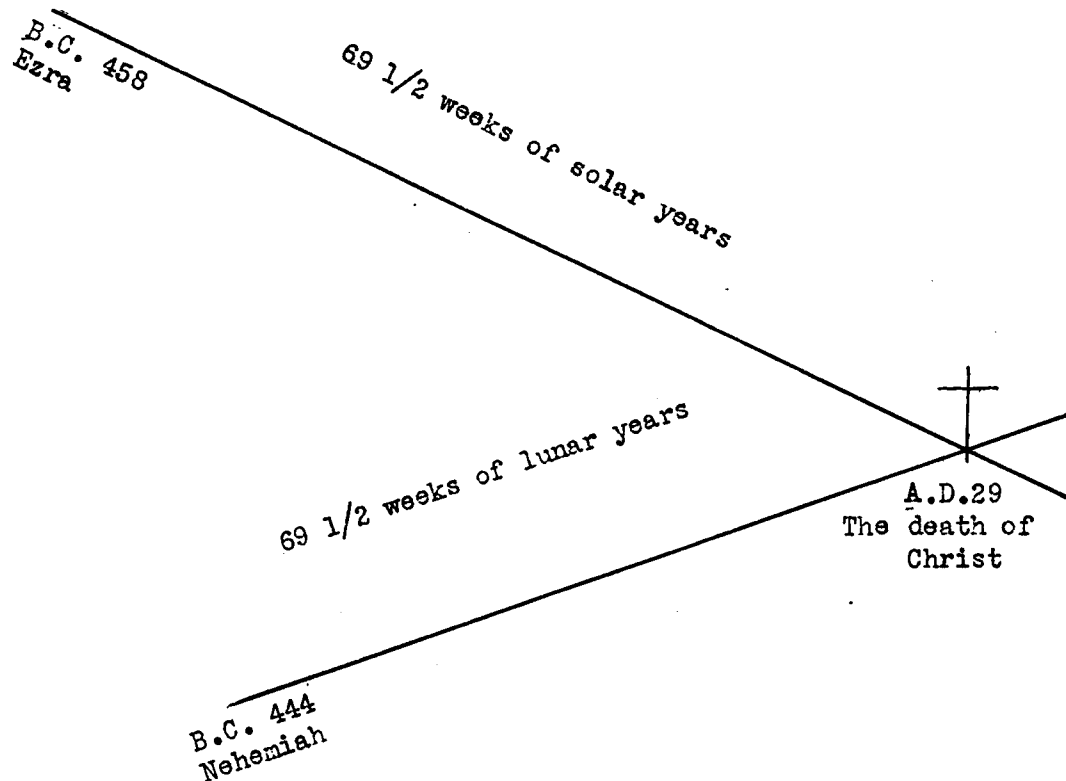
"But from these anticipatory foretastes he soon returns in order to expound the things of the omitted hebdomad. 'He shall confirm the covenant with many for one hebdomad.' That is, in that last one in which John the Baptist, the Lord, and His apostles, by their preaching turned many to the faith. 'And in the midst of the hebdomad he shall cause the sacrifice and the oblation to cease.' The midst of this hebdomad coincides with the 15th year of Tiberius Caesar, the year of Christ's baptism. From this time on, purification by animal sacrifices was less and less esteemed by the believers.

"The next phrase, 'And there will be in the temple the abomination of desolation, and right up to the consummation and the end desolation will continue,' respects subsequent times. It is a prophecy, to the truth of which both the history of ancient times and the daily happenings of our own bear witness."

Modern expositors⁽¹⁾ who follow Africanus and Bede differ from

(1) e.g. Dr. H. Grattan Guinness.

them only in placing the death of Christ in the midst instead of at the end of the 70th week⁽¹⁾ and in admitting a secondary fulfillment in solar years measured from the decree given to Ezra in the seventh year of Artaxerxes (Ezra 7).⁽²⁾ The periods lie thus:



(1) This is by no means a recent refinement. Calvin in commenting on the phrase, 'In the midst of the week he shall cause the sacrifice and the oblation to cease,' said "We ought to refer this to the time of the resurrection. For while Christ passed through the period of His life on earth, He did not put an end to the sacrifices; but after He had offered Himself up as a victim, then all the rites of the law came to a close." Calvin's Commentary on Daniel, p.226.

(2) This date as a terminus a quo for the 70 weeks also is not new. It was held by Abraham Calovius (d.1686), Sir Isaac Newton (d.1727), G.S. Faber (d.), E.B. Pusey (d.1882) and many others.

The dates given above are those assigned to the events by competent chronologists. A.D. 29 is the date given for the death of Christ in the article "Jesus Christ" in the Encyclopaedia Britannica (14th edition). B.C. 458 is the date assigned to the seventh year of Artaxerxes in all recent works on the chronology of the period. B.C. 444 corresponds to the 21st year of Artaxerxes⁽¹⁾ in the first month of which Nehemiah received his commission.

From the month Nisan B.C. 458 when the decree was given to Ezra⁽²⁾ to the corresponding month Nisan A.D. 29 when Christ was crucified is a period of 486 solar years. From the above tables⁽³⁾ it will be seen that this period is a soli-lunar-anomalistic cycle containing to within a fraction of a day a whole number of lunar months. From the month Nisan B.C. 444 when permission to return was granted to Nehemiah⁽⁴⁾ to the month Nisan A.D. 29 when Christ was crucified is a period of 472 solar years. In 472 solar years there are, to the nearest month, 5,838 lunar months which is the number of lunar months in $486 \frac{1}{2}$ lunar years.⁽⁵⁾

From the above it will be seen that the history of the exegesis of Daniel's seventy weeks has involved a considerable acquaintance with the time order of nature as well as with that of history, and that the

(1) In Neh. 2/1 it is called the 20th year of Artaxerxes, but this must be by the Jewish civil reckoning (beginning with the seventh month) for December of the previous year is also said to fall in the 20th of Artaxerxes (Neh. 1/1). Cf. the review of Parker and Dubberstein's, Babylonian Chronology, in the Journal of Near Eastern Studies, vol.2, No.2, April 1943.

(2) Ezra 7/9.

(3) See tables 2 and 3 above.

(4) Neh. 2/1.

(5) 472 solar years = 172,394.32 days
 $486 \frac{1}{2}$ lunar years = 172,399.57 days.

From the above it will be seen that the history of the exegesis of Daniel's seventy weeks has involved a considerable acquaintance with the time order of nature as well as with that of history, and that the final positions arrived at display an interesting relationship between the volumes of revelation, history, and nature: the interval of 69 1/2 weeks of years is significant in all three.

Before we proceed to examine the remaining chronologic intervals we have mentioned, we propose to glance briefly at the history of the exposition of the passages which form their setting; i.e., of the 7th, 8th, 11th and 12th chapters of Daniel, and of the book of the Revelation.

DANIEL 7

The four empires of Daniel, represented in chapter 2 by the four metals of the image, and in chapter 7 by the four great beasts arising from the sea, have from very early times been identified with the Babylonian, Medo-Persian, Macedonian, and Roman Empires. Zockler tells us that "The 'orthodox' view which refers the first three kingdoms to Babylon, Medo-Persia, and Greece, but the fourth to Rome and the states which have sprung from it since the empire" was held "by Josephus (Ant. 10/10/4), by a majority of church fathers - especially by Jerome, Orosius, and Theodoret; also by all the expositors of the Middle Ages after Walafrid Strabo (d.A.D.849), and by a majority of moderns."⁽¹⁾

(1) Zockler's Commentary on Daniel, Shaff's edition p.86.

Hippolytus, bishop of Rome (d.A.D. 235) expresses the view very succinctly. He says,

"The 'golden head of the image' is identical with the 'lioness' by which the Babylonians were represented. 'The golden shoulders and the arms of silver' are the same with the 'bear' by which the Persians and Medes are meant. 'The belly and thighs of brass' are the 'leopard' by which the Greeks who ruled from Alexander onwards are intended. The 'legs of iron' are the 'dreadful and terrible beast' by which the Romans who hold the empire now are meant. The 'toes of clay and iron' are the 'ten horns' which are to be. The 'one other little horn springing up in the midst' is the 'anti-christ'. The stone that 'smites the image and breaks it in pieces' and that filled the whole earth, is Christ who comes from heaven and brings judgment on the world."⁽¹⁾

After the Roman Empire had broken up, the ten horns of Daniel 7/7, 24, gradually came to be interpreted of the invading barbarian tribes or of the kingdoms they established on the site of the former empire. Thus Berengaud, an Apocalyptic commentator of the 11th century, says:

"The fourth beast, by which the Romans are designated, is described as having ten horns.

(1) Roberts and Donaldson's Ante-Nicene Fathers, vol. 5, p. 178, 9.

By these horns are designated those kingdoms which destroyed the Roman Empire."⁽¹⁾

Finally, at the time of the Reformation, the little horn which arose among the ten horns, displaced three, had "eyes like the eyes of a man and a mouth speaking great things," and "made war with the saints,"⁽²⁾ came to be interpreted by almost all Protestants, of the Roman Catholic Papacy. Thus Luther says that when Daniel "saw the terrible wild beast which had ten horns, which by the consent of all is the Roman Empire, he also beheld another small horn come up in the middle of them. This is the Papal power, which rose up in the middle of the Roman Empire."⁽³⁾

The three displaced horns were variously interpreted: some considered them contemporary states out of which the Papal temporal dominions were carved, others as three successive barbarian tribes⁽⁴⁾ up-rooted before the growing power of the Pope of Rome. The number ten was regarded as a round number unaffected, eventually, even by the fall of the three horns before the rising little horn.

(1) "Quarta Bestia, per quam Romani designati sunt, decem cornua habuisse describitur, per quae ea regna quae Romanum imperium destruxerunt designata sunt." Quoted in Elliott's, *Horae Apocalypticae*, 5th edition, vol. 3, p.141.

(2) Dan. 7/8, 20, 21.

(3) Luther's works vol. 2 p. 386, quoted in H.Grattan Guinness' *Romanism and the Reformation*, p.231, 2.

(4) The Heruli, Ostrogoths and Lombards.

DANIEL 8.

We now turn to the vision of the ram and the he-goat of the eighth chapter of Daniel.

The first part of this vision is so clearly explained in the chapter itself that it has never occasioned any difficulty. The ram is the Medo-Persian empire; the he-goat, the Macedonian; the great horn of the he-goat, Alexander; the four notable horns which arose after the great horn was broken, the four kingdoms into which Alexander's empire split after his death.

On the other hand, the concluding part of the vision, the little horn which waxed exceeding great toward the south, and toward the east, and toward the glorious land, has been variously interpreted.

Josephus (Ant. 10/11/7 and 12/7/6), followed by hosts of others down to modern times, saw the fulfillment of this vision of the "little horn" in the career of Antiochus Epiphanes. ⁽¹⁾

The early church fathers, however, thought that the passage must have at least a secondary reference to the 'Antichrist.' ⁽²⁾

Sir Isaac Newton, followed by Bishop Newton, Cuninghame and others, interpreted the "little horn" of the Romans. They maintained that when the Romans conquered Macedon they became in that capacity, and in that capacity alone, a horn of the Macedonian beast. Thence it pushed

(1) See 1 Maccabees 1/1-10 f.

(2) So Irenaeus, R. and D. Ante-Nicene Fathers, vol. 1, p. 554; and Origen, idem, vol. 4, p. 594.
By 'Antichrist' the fathers meant the power pre-figured in 2 Thess. 2, Daniel 7/25, Rev. 13/6, etc.

its conquests in the precise directions prophesied of the little horn, "became mighty as a horn of the he-goat, not by its own Greek power but by the strength of Italy and the West: and that it notoriously stood up against the Prince of princes and took away the daily sacrifice, when it crucified the Messiah and placed the abomination of desolation in the temple of Jerusalem."⁽¹⁾

Faber and Elliott, on the other hand, understood by the little horn the Mohammedans; Faber interpreting it of the Saracens, Elliott of the Turks.

All four of the above powers unquestionably did flourish in the geographical theatre indicated by the prophecy; have had a part in giving "the sanctuary and the host to be trodden under foot;" and were, the first two to the Jews, the last two to both Jews and Christians, awesome and desolating judgments. It may be, then, that this prophecy is one of those "to be regarded as having many fulfillments by 'springing and germinal developments.'" ⁽²⁾

DANIEL 11 and 12.

Just as the predictions of the seventh chapter of Daniel are parallel and supplementary to those of the second, so the predictions of the eleventh chapter are parallel and supplementary to those of the eighth.

After a brief mention of the coming Persian monarchs (v.2), and of the career of Alexander the Great (v.3), and of the divisions of his

(1) I am following Faber's summary of the view in his Sacred Calendar of Prophecy vol. 2, p. 139, 140.

(2) Farrar, The Book of Daniel, p. 286.

empire (v.4), we enter upon the main theme of the chapter, the struggle between the "king of the north" and the "king of the south."⁽¹⁾

A description of the initial successes of the king of the south (v.5-9) is followed by an account of the campaigns of three great kings of the north.

That the first of these (v.10-20) corresponds to Antiochus the Great and the second (v.21-39) in its primary reference to Antiochus Epiphanes has been recognized since the days of Josephus. The third (v.40-45) has been variously interpreted of Antiochus, the Romans, the Mohammedans, or of some future king.

The Christian fathers, moreover, regarded Antiochus as simply a type of Antichrist. Thus Jerome says in regard to this prophecy, "Our writers are of opinion that all these prophecies relate to Antichrist.-- And since many of the things which we are about to read and expound, do not agree with the person of Antiochus, they consider him a type of Antichrist."⁽²⁾

Subsequently, in line with this interpretation of the fathers, Mede, Isaac Newton, Bishop Newton, Elliott, Guinness, and others applied these prophecies to the Roman desolation of Jerusalem, the Roman Catholic Papacy, and the exploits of the Mohammedan powers.

(1) The directions are in relation to Palestine.

(2) Quoted from Bishop Newton's, Dissertations on the Prophecies, p.331.

THE BOOK OF THE REVELATION

In the course of the history of exegesis of the Revelation, the seven seals, the seven trumpets, and the seven vials (which constitute the framework of the book) came to be applied with a considerable measure of agreement to historical events of the Christian era.

The seven seals (Rev. 6 f.) have been most commonly interpreted of the events of the first four centuries A.D., thus:

The first seal - Of the period of victory, prosperity, and internal peace under the Antonines in the century immediately after the Revelation was given, i.e., A.D. 96 - 180, during which period the Roman empire attained its greatest extent.

The second, third, and fourth seals - Of the civil war, famine, and pestilence which subsequently prevailed in the empire until the time of Diocletian.

The fifth seal - Of the persecution of Christians under Diocletian, the great "era of martyrs."

The sixth seal - Of the end of the Pagan world brought about by the official acceptance of Christianity by Constantine.

The seventh seal - Regarded as embracing the succeeding trumpets.

The above interpretation of the seals is that adopted, in large measure, at any rate, by Brightman (1600), Mede (1632), Fleming (1700), Isaac Newton (1720), Bishop Newton (1754), Elliott (1844), Guinness (1905), and many others.

The seven trumpets (Rev. 8 f.) have been most commonly inter-

preted of the fall of the Western and Eastern divisions of the Roman Empire, thus:

The first trumpet - Of the invasion of Alaric the Goth, c. A.D. 395.

The second trumpet - Of the invasion of Genseric the Vandal, c. A.D. 428.

The third trumpet - Of the invasion of Attila the Hun, c. A.D. 433.

The fourth trumpet - Of the invasion of Odoacer the Heruli, the fall of the Western Empire, the beginning of the "Dark Ages," A.D. 476.

The fifth trumpet - Of Mohammed and the Saracens, A.D. 610 f.

The sixth trumpet - Of the invasions and conquests of the Turks, c. A.D. 1060 f.

The seventh trumpet - Regarded as embracing the seven vials.

The above interpretation has been adopted in its essentials by a large number of expositors including practically all those named above.

Prior to the pouring forth of the seven vials, which we are distinctly told are the last (Rev. 15/1), there are four supplementary chapters (10-14) dealing largely, in the view of all the expositors named above, with the rise of the Roman Catholic Papacy which is identified with the beast of Revelation 13.

The seven vials (Rev. 15 and 16), having reference to judgments upon the beast (Rev. 16/2), whose rise and exploits have just been described (Rev. 13), have been interpreted generally of judgments leading to the weakening of the Papacy; so Brightman (1600), Pareus (1615), Mede (1632), Jurieu (1685), and Fleming (1700); and more specifically, thus:

The first vial - Of the outbreak of infidelity in France prior to the French Revolution.

The second, third, and fourth vials - Of the French Revolution and the conquests of Napoleon which drenched Europe in blood.

The fifth vial - Of the serious weakening of the Papal power by the loss of the Papal States in 1870.

The sixth vial -

- (1) The drying up of the Euphrates - Of the gradual diminution of Turkish power (because of the identification of the symbol with the Turks, Rev. 9/14).
- (2) The coming of the kings of the East - Of the return of the Jews to Palestine consequent upon its being freed from Turkish control, A.D. 1917.
- (3) The frogs - Of unholy influences leading the nations of the world to war.

The seventh vial - Of the great catastrophies of this present era of world wars and atomic power.

The application of the first four vials to the French Revolution is common to Bicheno (1800), Galloway (1802), Frere (1826), Faber (1828), Cunningham (1838), Elliott (1844), Barnes (1851), Guinness (1905), and many others.

This view was prepared for by the prevalence before the Revolution of the conviction that all the vials were still future. So Bengel (1742), Bishop Newton (1754), and Dr. Gill (1776).

The exegesis of the Revelation had made sufficient progress prior to the historical fulfillment of the vials to enable a large amount

of correct anticipation. So might be regarded the anticipation from the fifth vial of some calamity affecting the City of Rome as the centre of Roman Catholic worship. So Brightman (1600), Pareus (1615), Mede (1632), Fleming (1700), Gill (1776), and others. So also the anticipation from the sixth vial of the decline of the Turkish Empire and the return of the Jews to Palestine. So, Brightman (1600), Mede (1632), Bishop Newton (1754), Faber (1828), Cuninghame (1838), and others. Also, from the sixth and seventh vials, the anticipation of a world war in which England as the favoured home of Protestantism would be involved, Elliott (1844).⁽¹⁾

CHRONOLOGIC PROPHECIES

In the course of the history of the exegesis of the chronological element of the above predictions the "days" of prophecy have been quite variously interpreted. They have been taken literally, or they have been regarded as mystical periods of indefinite length, or they have been thought to symbolize months, or years, or even planetary periods.⁽²⁾

Thus the early Christian fathers regarded the time and times and half a time of Daniel 7/25 etc.,⁽³⁾ as a period of 3 1/2 literal years during which, after the division of the Roman Empire into ten kingdoms, Antichrist would reign.

- (1) In this review of the exegesis of the Revelation, I am largely indebted to the "sketch of the history of apocalyptic interpretation" found in Elliott's, *Horae Apocalypticae*, vol.4; as well as to the individual works of Fleming, Bengel, Bishop Newton, Faber, Barnes, and Guinness.
- (2) The non-Christian Greek world also was familiar with a symbolic interpretation of prophetic periods; cf. Claudius Ptolemy, *Tetrabiblos* 2/6, Loeb edition p.167, where, for a lunar eclipse, 1 hour of obscuration = 1 month's duration of the predicted event, etc.
- (3) For the seven places in which the period occurs (in one form or another), see above p. 32.

In subsequent times, however, this same period, especially in its reference to the prophesying of the witnesses, Rev. 11/3, and to the woman's wilderness-dwelling, Rev. 12/14, (by which were understood the Church's witnessing and suffering respectively), came to be interpreted of the whole duration of the Church's existence. This was accomplished by considering a "time" to represent a hundred years,⁽¹⁾ or by understanding the phrase mystically.⁽²⁾

Julius Africanus (A.D. 220), on the other hand, interpreted the 2,300 days of Daniel 8/14 as 2,300 months. He says:

"For if we take the day as a month just as elsewhere in prophecy days are taken as years, and in different places are used in different ways...we shall find the period fully made out to the 20th year of the reign of Artaxerxes, from the capture of Jerusalem. For there are thus given 185 years,⁽³⁾ and one year falls to be added to these - the year in which Nehemiah built the wall of the city. In 186 years,

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- (1) So Tichonius, in the 4th century A.D.
 - (2) So Primasius (6th century), Andreas (6th century), the Venerable Bede (8th century), Ambrose Ansbert (9th century), Berengaud (11th century), and Bruno Astensis (12th century).
 - (3) Incidentally, Africanus is quite wrong in saying that 185 years elapsed from the capture of Jerusalem to the 20th year of Artaxerxes. He seems to be reckoning the 70 years' captivity back from Cyrus' accession (559 B.C.) instead of from his capture of Babylon and decree that the exiles could return. See above p.34.

therefore, we find 2,300 Hebrew months,⁽¹⁾ as eight years have in addition three intercalary months. From Artaxerxes, again, in whose time the command went forth that Jerusalem should be built there are seventy weeks."⁽²⁾

Many expositors, furthermore, from early times interpreted the 3 1/2 days of Rev. 11/9, 11 as 3 1/2 years,⁽³⁾ adducing in support of this view the Biblical precedents of the 40 years wandering in the wilderness (Numbers 14/34),⁽⁴⁾ and the 390 years punishment of Israel (Ezekiel 4/5),⁽⁵⁾ in which passages a day unmistakeably symbolizes a year. Subsequently this year-day principle was applied also to the other prophetic periods. Thus Joachim Abbas near the close of the 12th century applied it to the five months or 150 days of Rev.. 9/5 and to the 42 months or 1,260 days of Rev. 13/5. The famous Jewish Rabbis, Saadia Geon and Solomon Jarchi of the 12th and 13th centuries, applied it to the 1,290 and 1,335 days of Daniel 12/11 and 12/12. R. Isaac, a Portugese Jew of the 15th century applied it to the 2,300 days of Daniel 8/14, as did also Abarbanel of the 17th century.⁽⁶⁾

- (1) Practically true. In 186 years there are 2,300 lunar months and 15 days.
- (2) R. and D. Ante-Nicene Fathers, vol. 6, p.137. The fragment of Julius Africanus from which this quotation comes is preserved in the Chronographia of George Syncellus, a Byzantine historian of the eighth century.
- (3) So Tichonius (4th century), Prosper (5th century), Primasius (6th century), Ambrose Ansbert (9th century), Haymo (9th century), Berengaud (11th century), and Bruno of Asti (12th century).
- (4) So Primasius and Ambrose Ansbert.
- (5) So Haymo and Bruno of Asti.
- (6) Again I am indebted to Elliott, Horae Apocalypticae vol. 3, p. 279 f.

The earliest expositors who applied the year-day principle to the periods of 1260, 1290, and 1335 days dated their beginning either from Christ's birth or from Titus' or Hadrian's destruction of Jerusalem. Subsequent to the Reformation, however, and the identification of the little horn of Daniel's fourth beast with the spiritual Power which then dominated Europe, it was thought that the terminus a quo of the three times and a half must be some epoch when, in accordance with Daniel 7/25, the times and the laws and the saints of the Most High were given into the hand of this little horn. This was thought enigmatically to relate to "a grant from the imperial head of the Roman World, by which the Latin Patriarch was constituted the ruler of all the churches, and by which he was made a supreme judge in all spiritual cases." ⁽¹⁾ Hence the year 606 A.D. when the Emperor Phocas declared the Roman church to be head of all the churches ⁽²⁾ came to be the date most commonly regarded as the probable point of commencement for the 1260 years of the little horn's dominion. Thus David Chytraeus (A.D. 1571) says, "If the commencing date... be dated from Alaric's taking of Rome, the ending date would be A.D. 1672: if from Phocas' Decree, its ending would be A.D. 1866." ⁽³⁾ So also, "Pareus in his commentary on the Apocalypse A.D. 1643 boldly reckons the 1,260 years of Papal dominion from the decree of Phocas in 606....

(1) Faber, Sacred Calendar of Prophecy, vol. 1, p.136.

(2) "Hic, rogante Papa Bonifacio, statuit sedem Romanae et Apostolicae Ecclesiae caput esse omnium ecclesiarum" Paul. Diac. de gest. Longobard. lib. 4 c.36. quoted in Faber, Sacred Calendar of Prophecy, vol. 1, p.142.

(3) Quoted in Elliott's Horae Apoc. vol. 3, p.303.

Boniface III he says was exalted by a decree of Phocas 'to the chaire of universal pestilence' in 606. 'From the yeere of Christ therefore 606, until this time the holy citie hath been trodden under foot by the Roman Gentiles, which is the space of 1,037 yeeres, and is yet to be trodden down 223 yeeres more, to wit, until the yeere of Christ 1866.'"⁽¹⁾ Holland (A.D. 1650) said, "There remain 216 years more."⁽²⁾ Fleming (1700), Dr. Gill (1746), Reader (1778), Galloway (1802), Frere (1816), Bickersteth (1823), and Elliott (1844) concurred in selecting A.D. 606 as the commencing epoch of this period.

Fleming, however, thought that special "prophetical years" of 360 days each were intended. Hence he says (writing c.A.D. 1700),

"If we may suppose that Antichrist began his reign in the year 606, the additional twelve hundred and sixty years of his duration, were they Julian or ordinary years, would lead us down to the year 1866, as the last period of the seven-headed monster; but seeing they are prophetical years only, we must cast away eighteen years, in order to bring them to the exact measure of time that the Spirit of God designs in this book; and thus the final period of Papal usurpation (supposing that he did indeed rise in the year 606) must conclude with the year 1848."⁽³⁾

(1) Quoted in Dr. H. Grattan Guinness', History Unveiling Prophecy, p. 347, 348.

(2) Ibid p. 348.

(3) Fleming, The Rise and Fall of the Papacy, p.16.

Elliott, again, is careful to mention that the calculation is approximate. He says,

"Let me now, in reference to this epoch, note a few important events which rendered not the one year only, but the four that may be associated with it, from 604 to 608, (like the four associated with the Justinian Decree from 529 to 533),⁽¹⁾ not a little remarkable."⁽²⁾

Grattan Guinness writing in 1878 after the fall of the Papal temporal power in A.D. 1870, would date the commencing epoch A.D. 606 to 610 (the latter being the date of Phocas' death) and the corresponding terminal epoch A.D. 1866 to 1870.⁽³⁾

Respecting the 2,300 days of Daniel 8/14, Bishop Newton quotes Jerome as saying, "This place most Christians refer to Antichrist; and affirm that what was transacted in a type under Antiochus will be fulfilled in truth under Antichrist," and then comments:

"The days, without doubt, are to be taken, agreeably to the style of Daniel in other places, not for natural, but for prophetic days or years; and as the question was asked, not only how long the daily sacrifice shall be taken away, and the transgression of desolation continue, but also how long the vision shall last; so the answer is to be understood, and

- (1) Elliott with others noted that 1260 years from Justinian's Decree terminated with the era of the French Revolution and regarded this as an initial fulfillment of the prediction.
- (2) Elliott, Hor. Apoc., vol. 3, p.302.
- (3) Guinness, The Approaching End of the Age, p. 426, Light for the Last Days, p.173.

these two thousand and three hundred days denote the whole time from the beginning of the vision to the cleansing of the sanctuary. The sanctuary is not yet cleansed, and consequently these years are not yet expired. When these years shall be expired, then their end will clearly show from whence their beginning is to be dated, whether from the vision of the ram, or of the he-goat, or of the little horn. It is difficult to fix the precise time, when the prophetic dates begin, and when they end, till the prophecies are fulfilled, and the event declares the certainty of them."⁽¹⁾

Of the three points of commencement suggested by Newton, Mr. Bicheno, writing in 1797, chose the first and accordingly dated the commencement of the 2,300 years from the beginning of Xerxes invasion of Greece B.C. 481, 480.⁽²⁾ Subsequent expositors⁽³⁾ saw confirmation of this in the Greek War of Independence which began 2,300 years later in A. D. 1821 and was an important epoch in the downfall of the Turkish Empire, and hence an initial step toward the cleansing of the sanctuary, or freeing of Palestine from Mohammedan control.

The 150 days of Rev. 9/5 (the fifth trumpet) have been commonly applied to the 150 years A.D. 612 to 762 during which the Saracens made rapid advances. So, practically, said Brightman (1600), and Fleming (1700);

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- (1) Bishop Newton, Dissertations on the Prophecies p. 290.
 - (2) Elliott, Hor. Apoc., vol. 3, p.446.
 - (3) Elliott, Guinness, etc.

so exactly, Daubuz (1720), Bishop Newton (1754), Faber (1828), and Elliott (1844).

The hour and day and month and year of Rev. 9/15 (the sixth trumpet) has been interpreted either as 391⁽¹⁾ or 396⁽²⁾ years depending on whether the expositor regarded the prophetic "year" of the expression as representing 360 or 365 true years. It has been applied, either to the period from the commencement of the Turkish invasions, c. A.D. 1057, to the fall of Constantinople A.D. 1453,⁽³⁾ or to the period from the Turkish revival under the Othmans, c. A.D. 1300, to the peace of Karlowitz, A.D. 1699⁽⁴⁾, which marked the end of Turkish aggression in Europe.

There is still one other prophetic period which must be discussed in this sketch, viz., the period of seven times or 2,520 years. In the preface to Faber's, Sacred Calendar of Prophecy (1828) we are informed that,

"The present Treatise rests upon the grand master number of seven times, produced by the duplication of the three times and a half, and hitherto almost universally overlooked. Yet the period, marked out by this palmary number, comprehends what our Lord

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- (1) So, Fleming (1700), Isaac Newton practically (1720), Bishop Newton (1754), and Guiness (1878).
 - (2) So, Brightman (1600), Mede (1632), Whiston (1744), Faber (1828), Cuninghame (1838), and Elliott (1844).
 - (3) So Mede (1632), Fleming (1700), Isaac Newton (1720), and Elliott (1844).
 - (4) So Brightman, in anticipation, (1600), Whiston (1744), Bishop Newton, roughly (1754), Faber (1828), Cuninghame (1838), and Guiness (1908).

styles the times of the Gentiles⁽¹⁾....it is the chronological measure of Daniel's great compound metallic image."

In the body of the work Faber justifies his regarding the seven times as a legitimate prophetic period,

- (1) By an appeal to the obviously imperfect character of the three times and one half.
- (2) By noting that the usually assigned commencing epoch of the 3 1/2 times (7th century A.D.) is removed, roughly at any rate, by a complementary period of 3 1/2 times from the era of Nebuchadnezzar.
- (3) By supposing that the "seven times" prophetically pronounced upon Nebuchadnezzar⁽²⁾ was designed to have a double fulfillment; first, in the personal life of Nebuchadnezzar, and secondly, in the historical life of the great image which also, in a sense, was Nebuchadnezzar, for he was its declared head⁽³⁾ and its animating principle.⁽⁴⁾ Faber says,

"Hence the seven times, during which the king was to be physically deranged, are the figure of seven prophetic times or 2520 natural years, during which the great compound Empire...should be subject to the moral madness

- (1) Luke 21/24.
- (2) "Let seven times pass over him" Dan. 4/16,23,25.
- (3) Daniel 2/38.
- (4) In the book of Revelation the 4th Empire is still mystically called "Babylon" Rev. 17.

of Paganism or Popery or Mohammedism or Infidelity."

Subsequent expositors⁽¹⁾ follow Faber in this interpretation of the seven times, but, as we shall see later, it was left to Guinness to adequately apply the prediction. Faber attempts to date the period from the birth of Nebuchadnezzar, but this date has not been recorded by history and can only be fixed by conjecture. Cuninghame, more satisfactorily, makes the period commence at the time when the ten tribes were made tributary to Shalmanezar, and thus terminate at the French Revolution. Elliott simply says that a certain measure of dubiousness attends its terminating epoch,

"For, according as it is measured from the cognate Assyrian king's first invasion of the sacred land of Judea, or from the rise of the independent Babylonian empire 100 years later, the terminating epoch will either fall about the time of the French Revolution A.D. 1791, or somewhat later than the close of the present century."⁽²⁾

(1) Notably, Cuninghame, Elliott, and Guinness.
 (2) Elliott, Hor. Apoc. vol. 4, p. 239.

ADJUSTMENT OF THE PHYSICAL CYCLES TO THE MORAL

Now that we have traced both the gradual approach of careful students of the time order of nature to an appreciation of the true character of that time order, and the gradual approach of careful students of the time order of Revelation to an appreciation of what they have believed to be the true character of its time order, there remains but to recount the discovery of the remarkable relationships that exist between these two time orders of the physical and moral worlds, relationships which throw still further light upon the correct interpretation and application of the time periods and confirm our conviction in the reality of Divine revelation.

The initial discoveries in this regard were made about the middle of the 18th century by a Swiss astronomer M. de Cheseaux who is otherwise known for having observed and described the six-tailed comet of the year 1744. The account of De Cheseaux's discoveries is preserved in the "Memoires Posthumes de M. de Cheseaux" edited and published by his sons in 1754. In this work De Cheseaux, after explaining how by calculation he came upon the fact that 315 years is a soli-lunar cycle, says:

"The cycle of 315 years thus found, I forthwith observed that it was the quarter of the 1,260 years' period, or the $3 \frac{1}{2}$ 'times' of Daniel... and consequently that this prophetic period was itself a lunar cycle....

"The agreement of this period, destined by the Holy Spirit to designate civil periods, with

the length of most remarkable periods of celestial movements, led me to conjecture that it might also be thus with the period of 2,300 years. I examined then this last period by astronomic tables and I found that...the prophetic period of 2,300 years... is also a cyclical period....

"The equality of the errors of this cycle of 2,300 years with those of the preceding led me to conclude that their difference, that is, 1,040 years ought to be entirely exempt from error, and one all the more remarkable because it unites at the same time the three kinds of cycles, and forms consequently this famous cycle of the fourth kind vainly sought so long, and ultimately believed to be chimeric or impossible.... This period of 1,040 years or solar revolutions, indicated in a certain way by the Holy Spirit, is a cycle at once solar, lunar, and diurnal, perfectly exact....May I be permitted...to give to this cycle the name of THE DANIEL CYCLE?"(1)

These discoveries of De Cheseaux "seem to have almost completely dropped out of sight"(2) for some fifty years, but interest in them was revived in the nineteenth century, first by Mr. William Cuninghame and

(1) Quoted in H. Grattan Guinness, Creation Centred in Christ, vol. 1, p.329, 330.

(2) *Ibid* vol.1, p.327.

later by Professor Birks of Cambridge in his Elements of Prophecy (1843).

Dr. H. Grattan Guinness tells us that:

"It was when reading this work of Professor Birks just after the fall of the Papal temporal power in 1870 that my attention was arrested by that portion of it referring to these remarkable cycles, and I was consequently led to investigate their character with considerable care, and in doing so made a number of chronological discoveries, some of which I have since published in my writings on the fulfillment of prophecy."⁽¹⁾

The most remarkable of Dr. Guinness' discoveries relating to the cyclical character of the prophetic times were:

- (1) That 2,300 years is not simply a soli-lunar cycle but a soli-lunar-anomalistic cycle.
- (2) That astronomy as well as Scripture knows of a 75 year period supplementary to 2,520 years.

"In the last chapter of Daniel the angel intimates to the prophet in answer to his chronological inquiries, that while the scattering of the power of the holy people should terminate at the end of the second half of the 2,520 years, yet that there should be additions of thirty and forty-five years before the era of full blessedness would arrive (Dan. 12/11-13). In other

(1) Grattan Guinness, Creation Centred in Christ, vol. 1, p.328.

words, to the long period of 2,520 years Scripture adds a brief period of seventy-five years, and as we have just seen, astronomy does the same. The difference between 2,520 true lunar and the same number of true solar years is seventy-five years. In other words, the seventy-five years added in the prophecy is exactly equal to the exact of the whole 'seven times.' If 2,520 lunar, and the same number of solar years begin together, the former will run out seventy-five years before the latter."⁽¹⁾

- (3) That the period of 391 years, the hour, day, month and year of Rev. 9/15, is a soli-lunar-nodical cycle.

This last is perhaps the most important of Guinness' cyclical discoveries and yet one that, strangely enough, he did not emphasize. It is simply alluded to in his Creation Centred in Christ. He speaks there of "the prophetic 391 years' lunar and eclipse cycle."⁽²⁾

The Canadian scientist Dr. W. Bell Dawson (d.1944)⁽³⁾ made a still further important discovery linking the prophetic numbers not simply with solar year, lunar month cycles, but with a very accurate solar year, lunar year cycle. In his paper, Prophetic Numbers in Daniel, in Relation to Celestial Cycles, he tells us:

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- (1) G. Guinness, The Approaching End of the Age, thirteenth edition, p.442.
 (2) G. Guinness, Creation centred in Christ, vol. 1, appendix 6, p. 520.
 (3) Son of the late Sir John William Dawson who for many years was principal and chancellor of McGill University.

"It occurred to the writer that instead of the method adopted by De Cheseaux, this higher result could be obtained by taking the numbers 2,300 and 1,260 in the prophecies to represent lunar years; and it was then discovered that in the corresponding number of solar years there were fractional remainders which, if added together would be almost exactly unity. By taking the half-sum, therefore, (instead of the difference as De Cheseaux did) an equivalent in whole numbers would be found between lunar years and solar years....

2300 lunar years = 2,231.517159 solar years

1260 lunar years = 1,222.483313 solar years

Half the sum = 1780 lunar years = 1,727.000236 solar years

This cycle falls short of perfect exactitude by only two hours in its whole period, as shown by the above decimal of a year (.000236)."⁽¹⁾

The tables which appear in the first part of this present treatise enable us to evaluate accurately the cyclical character of these Biblical numbers.

From the first table, for example, we see that 391 years is a solar year, lunar year cycle; and that of the five cycles of that nature shorter than 1,000 years the 391 years' cycle is the most accurate. Also

(1) Journal of the Transactions of the Victoria Institute for 1935, p.142. The first announcement of this discovery appeared thirty years before in the Transactions of the Royal Society of Canada for 1905.

from this table we see that of the 16 cycles shorter than 3,000 years the 1,727 years' cycle is the most accurate.

From the second table we see that the Biblical periods of 391, 486,⁽¹⁾ 1260, 2300, and 2520 years are all soli-lunar cycles with an error of less than a day. We note, however, that numbers which are soli-lunar cycles of this accuracy are not extremely rare. There are 202 such cycles in 3,000 years or about one in every 15 years. If one were to choose a number at random the chance of its being a soli-lunar cycle with an error of less than a day is about one in fifteen.

From this second table we note also that the cycles of 1,040 and 1,727 years are both at points of minimum error, and that such points of minimum error recur about every 380 years.

We note further from this second table that 1,040 years is very nearly a true cycle of the solar year, the lunar month, and the day, as De Cheseaux claimed, its greatest error being .11 of a day. We note also that no other cycle shorter than 1,040 years so nearly approaches being a year-month-day cycle except only the cycle of 706 years whose greatest error is .10 of a day. We note further that 706 is the sum of 391 and 315, the latter being the primary cycle at the base of the 1,260 and 2,520 years' cycles.

In regard to the third table we notice that, on the average, only one number in 100 years is a soli-lunar-anomalistic cycle, yet of the four Biblical cycles, 315, 391, 486,⁽¹⁾ and 2,300, two are anomalistic in their primary form, viz., 486 and 2,300, while the remaining two are

(1) See above, p.44

anomalistic in their fifth multiples.

From the fourth table we see that of the forty soli-lunar-nodical cycles shorter than 3,000 years the 391 years' cycle is the most accurate. We may practically say that 391 years is the most accurate eclipse cycle, embracing a whole number of years, in existence. When it is recalled that 391 years is also the most accurate cycle of the solar year and the lunar year shorter than 1,000 years the truly phenomenal character of this cycle will begin to appear. A further comparison of this fourth table with the first will reveal that 391 is the only number common to both tables. It is not simply the most accurate but the only solar year, lunar year, eclipse year cycle in existence.⁽¹⁾

Of the four numbers in the fifth table, one, viz., 1,955, the fifth multiple of 391, is also a solar year lunar year cycle, and hence is the most remarkable of the four.

The solar eclipse of Jan. 26, A.D. 1153, and that of January 24, A.D. 1544,⁽²⁾ are historical illustrations of eclipses separated by the 391 years' cycle. The apparent two-day error is the error of the Julian calendar not of the cycle. In the 391 Julian years there are 97 leap years and therefore 391 times 365 plus 97 days or 142,812 days, but there are only 142,810 days in 391 true tropical years. The total eclipse of November 24, A.D. 29⁽³⁾ and the yet future total eclipse of November 22, A.D. 1984,⁽⁴⁾ is an illustration of an eclipse recurring even after the

(1) 391 solar years = 403 lunar years = 412 eclipse years. All of the soli-lunar-nodical cycles of Table 4 could be expressed in terms of eclipse years. The eclipse year is simply the time occupied by the sun in passing from one of the nodes of the moon's orbit to the same node again. Russell, Dugan, Stewart, "Astronomy" vol. 1, p.226.

(2) Referred to in G.F. Chambers, "Story of Eclipses" p.149, 152.

(3) Referred to in Chambers.

(4) Listed in the Encyclopaedia Britannica, art. Eclipse.

fifth multiple of this 391 years' cycle. Again the apparent error is mainly of the calendar not of the cycle.

In regard to the fulfillment of this prophetic cycle in the history of the Turks, we note that,

"In 1308 a band of Turks and of Turcopuli, or Turks who were in the regular employ of the Empire, was induced to cross into Europe and join with the Catalan Grand Company to attack the Emperor Andronicus. This entry of the Turks into Europe, though not of the Ottoman Turks is itself an epoch-making event."⁽¹⁾

and that,

"The peace of Karlowitz (January 26, 1699) marks the definite termination of Turkey's power of offence in Europe."⁽²⁾

The new moons and eclipses⁽³⁾ of A.D. 1699 must have occurred, of course, on the same days of the year as those of 1308 for these years are separated by the 391 years' eclipse cycle.⁽⁴⁾

(1) The Cambridge Medieval History, vol. 4, p.658.

(2) The Encyclopaedia Britannica, 11th Edition, art. Turkey.

(3) In every year there are, at least, two solar eclipses.

(4) Compare above, p.61.

DAWSON'S CYCLE

Dr. W. Bell Dawson's discovery, which we have mentioned above, may be regarded as the discovery that the sum of the Biblical cycles 1,260 and 2,300, i.e. 3,560, is cyclical when regarded either as solar or as lunar years.⁽¹⁾ This is an extremely rare phenomenon. There are only four other numbers smaller than 10,000 that are of this character, viz. 1,545, 5,105, 8,665, and 9,303. A legitimate theological inference from Dawson's discovery is that the 2,300 and 1,260 year periods may be expected to be fulfilled on either a lunar or a solar scale and perhaps on both.

GUINNESS' ANTICIPATIONS

Of equal interest and importance to Guinness' discoveries concerning the relationships between the prophetic time order and the time order of nature, were his discoveries concerning the relationship of that prophetic time order to its fulfillment in the time order of history. Guinness' researches along this line were far more comprehensive and exhaustive than those of any previous expositor. Perhaps the most significant of all were his measurements of the period of "seven times" from the critical epochs in the downfall of Judah, and his measurements of the period of three and one-half times from the Nabonassar era.

We shall examine first Guinness' measurements of the "seven times" from the fall of Judah. And, in order to avoid giving any false

(1) 3560 solar years = 44,031 lunar months. Error - .90 days
 3560 Lunar years = 3,454 solar years. Error + .17 days

impression respecting his anticipations of events and times future to his own day, we subjoin a rather extended quotation from his work, *Light for the Last Days* (1887).

"The first nineteen or twenty years of Nebuchadnezzar, which witnessed all the stages of the fall of Judah before Babylon, were the main and terminal years of the captivity era. All that had gone before was only preparatory. The fall of the ten tribes before the Assyrian conquerors, and even the brief captivity of Manasseh, did not permanently shake the throne of Judah, or compromise the independent sovereignty of the house of David. The penumbra of the eclipse had indeed fallen on the moon, but not as yet the dark shadow. All through these years Babylon was steadily rising, and with the accession of Nebuchadnezzar, and his first campaign against Judah, reached its climax. In the eighth year of Nebuchadnezzar the throne of David fell, and the independent national existence of Judah ceased until the 'times of the Gentiles' should be fulfilled. Hence those nineteen years especially form the important critical era; the rubicon of history was crossed at one or other of the crises in its course. It extended from B.C. 605 to B.C. 587, and the principal crisis in it was the fall of Jehoiachin in the eighth year of Nebuchadnezzar, B.C. 598.

"The corresponding terminal years after the lapse of 'seven times' in full solar measure, extend from A.D. 1915 to A.D. 1934. During these years then we may expect to see the full and final fall of the anti-typical 'Babylon the Great;' and if that event is to answer chronologically to the culminating point of the typical Babylon, it seems probable that it will occur at one of the central dates A.D. 1917 or 1923. This Gentile age closes, as we have seen, with an era, and not with a date. Most of the critical years in that era are already passed; the first four or five of the still future dates seem to be connected with Eastern and not Western chronology, and are consequently scarcely likely to indicate anything connected with 'Babylon the Great.' For its fall we should consequently look to one of the four final dates, and for the reasons above stated apparently not to the last. Which of the remaining three stands pre-eminent above its fellows? It is impossible to say. One of them, A.D. 1923, has a distinct historical

pre-eminence as corresponding chronologically to the Jehoiachin overthrow of B.C. 598. Of the four campaigns of Nebuchadnezzar against Judah this was by far the most fatal; indeed, we may say it was not an overthrow, but the overthrow of the kingdom of Judah; it was emphatically the breaking up of the nation and the fall of the independent sovereignty. It was moreover the date of the captivity of the prophet Ezekiel, the date from which he uniformly reckons the visions of the remarkable series that were granted to him in Babylon and by the river of Chebar, visions of the departing and returning glory; and the question naturally occurs whether its answering year in this 'time of the end' is not destined to witness the return of the glory and the re-establishment of the throne of Judah.

"On the other hand, the astronomical features of this measurement of the 'seven times' are not as remarkable as are those of two other measurements; that from the first of Nebuchadnezzar, and that from his final overthrow of Zedekiah. It was in the year B.C. 606 that Nebuchadnezzar first came against Judah, and carried Daniel and the Hebrew children among others captive. At this time he was acting on behalf of his father, and it was not until nearly two years later, B.C. 604, that he himself acceded to the throne. That year is consequently, properly speaking, the first of Nebuchadnezzar; and it was probably also the year in which he saw the vision of the great image, in connection with which it was said to him, 'Thou art this head of gold.' This year has therefore some special claims to be considered as a very principal starting point of the 'times of the Gentiles.' Measured from it the period runs out in A.D. 1917, and it is a very notable fact that a second most remarkable period also expires then. The 1,335 years of Daniel xii. 12, the ne plus ultra of prophetic chronology, which is evidently Eastern in character, and consequently lunar in scale, measured back from this year 1917, lead up to the great Hegira era, the starting-point of the Mohammedan calendar, the birthday of the power which has for more than twelve centuries desolated Palestine and trodden down Jerusalem. The two periods lie thus:

B.C. 604	2520 solar years	A.D. 1917
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A.D. 622	1335	A.D. 1917
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"The year 1917 is consequently doubly indicated as a final crisis date, in which the 'seven times' run out, as measured from two opening events, both of which are clearly most critical in connexion with Israel, and whose dates are both absolutely certain and unquestionable. The 1,335 years' measure is, as we before pointed out, the half-week or 1,260 years, plus the additional seventy-five, which in the prophecy is added in two sections of thirty and forty-five years. The passage in which these periods are announced gives no distinct indication of the events to which they lead, nor does it state whether lunar or solar years are intended. Prophecy indeed never does this; but the astronomic features of this period seem to indicate distinctly that lunar years are intended, for seventy-five years is exactly the difference between seven times lunar and seven times solar, and hence the addition of seventy-five years to the lunar measurement of the period makes it equal to the solar measurement. We have before stated that both Jewish and Mohammedan chronology are strictly lunar, and that chronological periods connected with Eastern events seem to be always calculated on this scale, while those connected with Western or Papal events are measured by the solar year.

"The coincidence of the close of these two periods seems to answer a question which will occur to every reflective mind,—the question, Are the supplementary seventy-five years of the last verses of Daniel to be added to the latest solar terminus of the seven times? The answer is, They may be; it is possible: but it seems extremely unlikely, because of the astronomic fact just indicated.

"The year in which these two periods—the one of over twenty-five centuries, and the other of over thirteen centuries—run out together is astronomically a notable one. We have before met, in the course of our investigation, years such as 1848, in which several prophetic periods meet; but they were only those from more incipient starting-points, and minus the seventy-five terminal years. Here, on the contrary, we have a main starting-point, the first of Nebuchadnezzar, as our terminus a quo for the one period, and the acknowledged commencing date of the great Eastern apostasy, Mohammedanism, as that of the other; and we see that the latter in its extended form meets the former, and expires with it in the future year A.D. 1917.

"Thoughtful readers will weigh the facts and draw their own conclusions, asking themselves, in the light of all the chronological facts mentioned in this work, if the year B.C. 604 witnessed the rise of the typical

Babylon, and its supremacy over the typical Israel, what event is the corresponding year in this time of the end likely to witness? The fall of the anti-typical Babylon--the extinction of Gentile supremacy on earth, and the restoration of Judah's throne in the person of Christ? The secret things belong to God. It is not for us to say. But there can be no question that those who live to see this year 1917 will have reached one of the most important, perhaps the most momentous, of these terminal years of crisis.

"Yet we must also call attention to a further interesting fact connected with the last possible measure of this comprehensive and wonderful 'seven times,' that starting from the capture of Zedekiah and the burning of the temple in the nineteenth year of Nebuchadnezzar, and terminating in A.D. 1934. The termination of the 'times of the Gentiles' meets at this point the 1,335 lunar years, dated from the Omar capture of Jerusalem-- an event more momentous in its effects on Palestine and Jerusalem than the Hegira era of the commencement of Mohammedanism. No chronologic prophecy of Scripture indicates any date whatever beyond this year, as astronomic considerations forbid the thought that the supplementary seventy-five is to be added to these solar measures."⁽¹⁾

From our vantage point of A.D. 1946 the errors of Guinness' anticipations are quite apparent. The great culminating crisis of the ages has not yet occurred. Christ has not yet come. Whether or not chronologic prophecy indicates any date beyond the year 1934, there have been dates, extremely critical dates, beyond that year. Nevertheless, even if we were to concede more than we have a right to concede respecting Guinness' premature anticipation of the end of the age,⁽²⁾ there yet remains a remarkable residuum of correct anticipation. The years 1917,

(1) Grattan Guinness, Light for the Last Days, p.220-224.

(2) We should note carefully that Guinness himself distinguishes between his own "wishful thinking" and what could be certainly inferred from the predictions. That 1917 would be critical he felt was certain, but exactly what would constitute its critical character he felt was quite uncertain: "The secret things belong unto God. It is not for us to say."

1923, and 1934 have been critical and critical in the very connection in which the nature of the prophecies would lead us to suppose. The year of the Hegira 1335 came to an end on Tuesday, October 16, 1917. Two weeks later (October 31) Beersheba fell to the British forces under Allenby. On November 2 Lord Balfour issued the famous declaration which proclaimed that,

"His Majesty's Government view with favour the establishment in Palestine of a national home for the Jewish people, and will use their best endeavours to facilitate the achievement of that object, it being clearly understood that nothing shall be done which may prejudice the civil and religious rights of existing non-Jewish communities in Palestine, or the rights and political status enjoyed by Jews in any other country."

On December 11th Allenby entered Jerusalem. Since 1917 the Jewish population in Palestine has risen from 50,000 to 550,000.

In regard to 1923 we would quote from the article "Zionism" in the Encyclopaedia Britannica (14th edition):

"In December 1920 the proposed terms of the Palestine mandate were submitted by the British Government to the League of Nations for confirmation by the council....The mandate came into full operation on September 29, 1923. In its final form it recites the Balfour Declaration in the preamble, and includes among its

provisions various articles dealing with Jewish immigration."

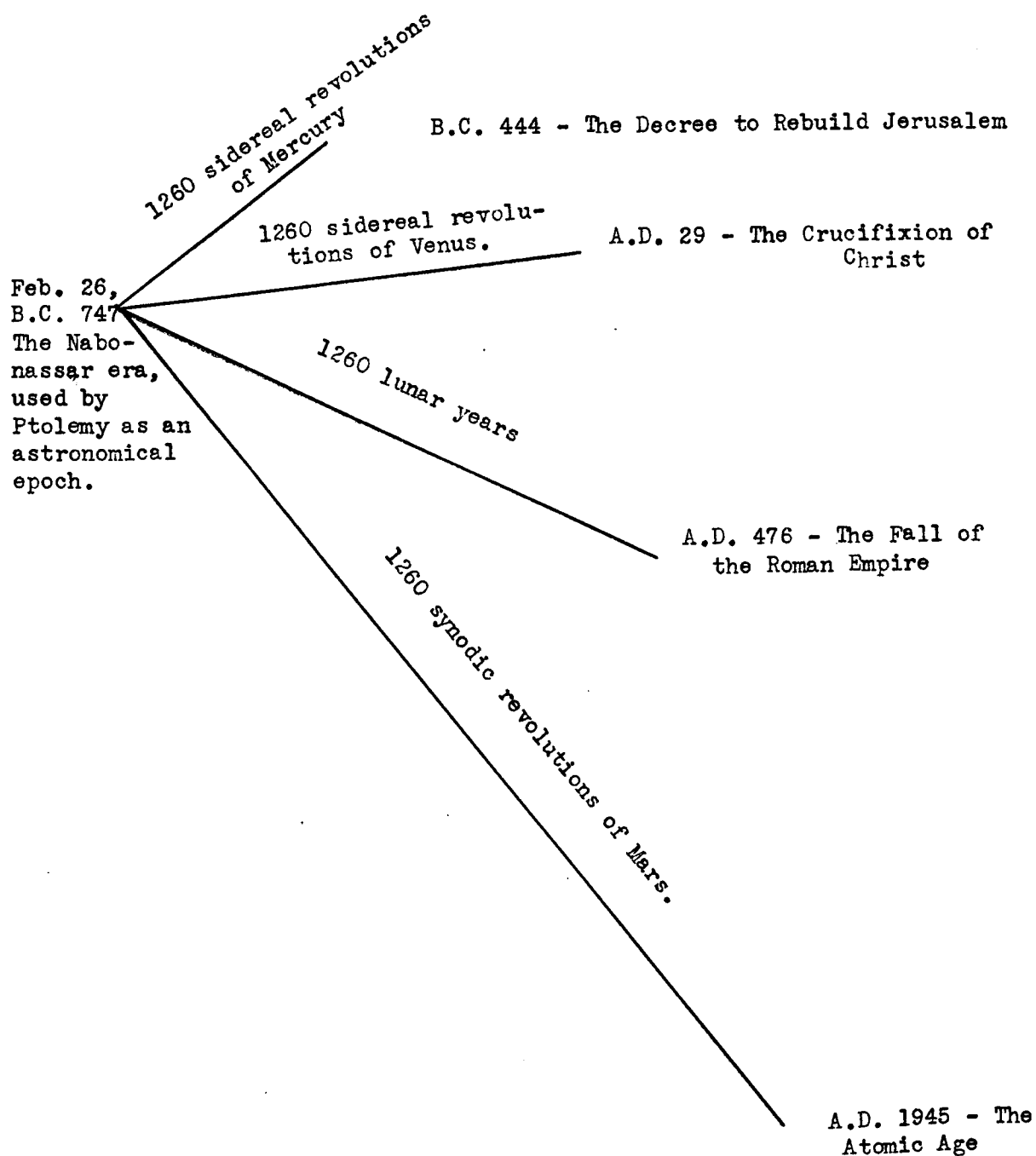
The years 1933 and 1934 saw the rise of Hitler and the commencement of his persecution of the Jews which resulted in a large exodus of Jews from Europe to Palestine as the following statistics⁽¹⁾ of Jewish immigration from 1917 to 1939 will show:

1917 - 1921	18,885
1922	7,844
1923	7,421
1924	12,856
1925	33,801
1926	13,081
1927	2,713
1928	2,178
1929	5,249
1930	4,944
1931	4,075
1932	9,553
1933	30,327
1934	42,359
1935	61,854
1936	29,727
1937	10,536
1938	12,868
1939	16,405

It will be seen that more Jews returned to Palestine in the three years 1933 to 1935 than in the sixteen previous years, 1917 to 1932.⁽²⁾

Dr. Guinness' measurements from the so-called Nabonassar era may be summarized graphically thus:

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- (1) Based on the American Jewish Year Book for 1940-41, and quoted in Conrad Hoffman, The Jews Today, p. 76.
 - (2) In another work, Guinness said that 1934 was "a date in the future which promises to be of importance in connection with the full restoration of the Jewish people." Guinness, On this Rock, p. 135.



Guinness noticed also that seven times lunar or 2,520 lunar years from the Nabonassar era terminate exactly to the very day with the Peace of Karlowitz, January 26, 1699.⁽¹⁾

Justification for choosing the Nabonassar era as a starting point for the prophetic times may be found in the following considerations:

(1) The striking parallel between Daniel's prophecies and the astronomical canon of Ptolemy which begins with the first year of Nabonassar. This parallel has been recognized and commented upon for some time. Thus Faber (1828) says:

"That the four great kingdoms, which form the subject of Nebuchadnezzar's vision of the image and of Daniel's vision of the four beasts, are those four great kingdoms which are equally employed as the basis of Ptolemy's Astronomical Canon; namely, the Babylonian, the Medo-Persian, the Macedonian, and the Roman: is a matter so clear and self-evident, that it is well denominated by Mr. Mede the A B C of prophecy."⁽²⁾

Again Faber says that the mode of reckoning the four kingdoms that is found in the prophecy of the great image (Daniel 2), whereby each successive kingdom is recognized only from the time when it replaces the kingdom which precedes it,

"exactly corresponds with, and is admirably illustrated by, the famous Astronomical Canon

(1) Guinness, On This Rock, p. 126.

(2) Sacred Calendar of Prophecy, vol. 1, p. 62.

of Ptolemy. As the good Spirit of God employs the four successive Empires of Babylon and Persia and Greece and Rome, in the capacity of the grand calendar of prophecy: so Ptolemy has employed the very same four Empires, in the construction of his invaluable Canon In short, the Canon of Ptolemy may well be deemed a running comment upon the altitudinal line of the great metallic image. As the parts of the image melt into each other, forming jointly one grand succession of supreme imperial domination: so the Canon of Ptolemy exhibits what may be called a picture of unbroken imperial rule, though administered by four successive dynasties, from Nabonassar to Augustus and his successors."⁽¹⁾

From this position it was no great step to the dating of prophetic times from the date with which the Ptolemaic Canon began, especially in view of -

(2) The critical character of the epoch in relation to Hebrew history.

The Assyrian monarch who was the contemporary of the Babylonian king Nabonassar (B.C. 747-733), and who completely dominated him, was Tiglath-Pileser III (B.C. 745-728). He inaugurated a new policy of conquering small states, deporting their populations, and turning them into Assyrian provinces.⁽²⁾ He it was who first attacked the kingdom of

(1) Faber, Sacred Calendar of Prophecy, vol. 2, p. 9, 10.
 (2) The Westminster Historical Atlas to the Bible, p. 49.

Israel and carried some of the inhabitants captive (2 Kings 15/29).

Hence the Hebrew people reckoned the beginning of their trials to date from the Assyrian kings (Nehemiah 9/32), whose invasions they considered to be Divinely ordained (1 Chronicles 5/26).

Justification for the employment of apocalyptic numbers of planetary periods in this particular case may be found in the astronomical character of the epoch.⁽¹⁾ Under the providence of God this epoch came to be employed, first of all perhaps, by the Babylonian astronomers, and then by the Greeks, as an astronomical epoch, that is, as an astronomical point of reference. To this epoch, the noon of February 26, B.C. 747, Ptolemy reduces solar, lunar, and planetary positions. Throughout his great work, the Syntaxis Mathematica, or Almagest, there are constant references to this epoch. First of all Ptolemy calculates the position of the sun at this epoch (Syn. Math. 3/7), then the position of the moon at this epoch (Syn. Math. 4/8), then the position of the planet Mercury at this epoch (Syn. Math. 9/11), then the position of the planet Venus at this epoch (Syn. Math. 10/5), then the position of the planet Mars at this epoch (Syn. Math. 10/10), then the position of the planet Jupiter at this epoch (Syn. Math. 11/4), and finally the position of the planet Saturn at this same epoch of the noon of February 26, B.C. 747, the first official year of Nabonassar, king of Babylon (Syn. Math. 11/8). In other

(1) In fact, it is questionable whether the first year of Nabonassar was ever used as an historical era until after it had become famous as an astronomical epoch. Though it is true that one Babylonian chronicle does begin, like Ptolemy's Canon to which it may bear some relationship, with the reign of Nabonassar, this is not considered sufficient evidence to prove "that the Babylonians employed an official or unofficial era beginning with Nabu-našir." I am greatly indebted to Dr. Arno Poebel of the Oriental Institute, the University of Chicago, for very carefully outlining for me the facts bearing upon this question.

words, Ptolemy, at the conclusion of each of the several parts of his work dealing with the sun and the moon and the five planets then known, has a section relating their positions to this epoch of the first year of Nabonassar.

It must have been this fact which prompted Guinness to measure apocalyptic numbers of planetary revolutions, as well as of solar and lunar years, from this epoch, with the astonishing results we have outlined above.

That God has raised up historians for the purpose of recording, though unwittingly, the fulfillment of Biblical predictions is a conviction often expressed. Josephus' history of the fall of Jerusalem has been viewed in that light, Gibbon's Decline and Fall of the Roman Empire and (as we have seen) Claudius' Ptolemy's Canon of the Kings. This last named writer may be viewed, in particular, as having been providentially raised up to enable the chronology of ancient times to be established, and hence to enable the fulfillment of the chronological predictions to be exhibited. The astronomical character of Ptolemy's chronology is likewise remarkably appropriate to the astronomical character of Daniel's prophetic times. It might be said of Ptolemy as was said of Pharaoh of old, "For this very purpose did I raise thee up, that I might show in thee my power and that my name might be published abroad in all the earth." (1)

The fundamental motions of the moon, - the synodic, anomalistic, and nodical, - and their primary cycles as set forth in Ptolemy's Syntaxis are basic to an understanding of the cyclic character of the numbers of Jewish apocalyptic. The epoch, also, with which Ptolemy's Canon commences seems to be a fundamental epoch of commencement for the prophetic periods.

(1) Romans 9/17.

And as that epoch of Ptolemy's Canon is astronomical as well as historical, and the planets Mercury, Venus, and Mars, as well as the earth and the moon, are in Ptolemy's Syntaxis related to it; so also, when measured from this epoch, apocalyptic numbers of revolutions of Mercury, Venus, and Mars, as well as of the earth and the moon terminate at epochs of momentous significance in regard to the relationship between the four great kingdoms of this world (which are the theme alike of Daniel's predictions and of Ptolemy's Canon), and the everlasting Kingdom of God.

The variety of matters to which the 1260 year period is applied in prophecy, and the very general way in which it is used on at least one occasion (Dan. 12/7), as well as the fact of its frequent occurrence making it the prophetic number, perhaps justify the extended application made of it above.

It will be noticed that in measuring 1260 synodic periods of Mars from the Nabonassar era to A.D. 1945 Guinness breaks away from the limitation he had previously set upon the prophetic times (A.D. 1934). In so doing he is more in line with what other expositors before him had said. Elliott had written:

"At the same time some signs are still wanting, even as I revise this a fifth time in 1861:- especially the non-gathering as yet of the Jews to Palestine; and predicted troubles consequent:- whence a further presumption in favour of the later allocation of Daniel's concluding seventy-five years."⁽¹⁾

(1) Elliott, Hor. Apoc. vol. 4, p. 242.

By the "later allocation of Daniel's seventy-five years," Elliott meant that

"the additional seventy-five years may be measured from the full completion of the 1260 years in 1866 or 1867."⁽¹⁾

The first indication that Guinness was reconsidering his statement that "no chronologic prophecy of Scripture indicates any date whatever beyond this year (A.D. 1934)" appears in an appendix to his work, *Creation Centred in Christ* (1896), in which, in question and answer form the following information is given:

- Q. Have the Prophetic Times any later termination than you have already indicated?
- A. If the 1260, 1290, and 1335 years of Daniel 12 be reckoned in solar measure from A.D. 610, the year of the death of Phocas, they terminate in the years 1870, 1900, and 1945; and it is remarkable that 2,300 solar years from the birth of Alexander the Great, and 2,300 calendar years⁽²⁾ from his death, both terminate in A.D. 1945; and also 1,260 synodic periods of Mars reckoned from the Nabonassar era. The 2,300 years of prophecy commence with the times of Xerxes and Alexander the Great, Dan. 8/2, 5, 13.

(1) *Ibid.*, p. 111 and 112.

(2) By "Calendar Years" Guinness meant years of 360 days each. Cf. Fleming above, p. 58.

Q. Why have you not given prominence to the date
A.D. 1945?

A. Because it lies beyond the termination of
"seven times" (or 2,520 years) reckoned from
the destruction of the Temple by Nebuchadnezzar,
B.C. 587, which seems the proper full commence-
ment of the 'Times of the Gentiles.' A. D.
1945 may possibly prove to be the date of some
important event connected with the returning
glory of Israel (Ezekiel 43/4, 5), though A.D.
1923-4, or "seven times" from the Ezekiel
starting point (Jehoiachin's captivity) seems
to me a more probable Jewish crisis date.
While stating the facts as to the course of
Prophetic, Historic, and Astronomic Times,
I have carefully avoided attempting to anticipate
or predict the "day or hour" of the Coming of
Christ, which I hold to be purposely concealed.⁽¹⁾

Subsequently Guinness broke away completely from this limitation of
prophetic chronology to A.D. 1934, and wrote as follows:

"One thousand two hundred and sixty synodic
revolutions of Mars occupy 2691 years,⁽²⁾ the

(1) Guinness, Creation Centred in Christ, vol.1, p.521, 522.
(2) It is of interest to note that 2691 years, which is to the
nearest year 1260 synodic revolutions of Mars, is a soli-lunar
cycle, the sum of the two Biblical cycles 2300 and 391. See
above Table 2, p.22.

period which extends from the Nabonassar Era to A. D. 1945. Remembering that to the second half of 'seven times' Daniel adds 75 years in the last chapter of his prophecy, we note that A.D. 1945 is 75 years later than A.D. 1870, the date of the downfall of Papal Temporal Power at the culmination of Papal exaltation by the decree of Papal Infallibility. We further notice that 2,300 solar years from the birth of Alexander the Great, and 2,300 calendar years from his death, terminate in A.D. 1945. While regarding this date as probably one of great importance in relation to the duration of the four Empires, and the downtreading of the Jewish people and 'Sanctuary,' we avoid the attempt to predict the time of the second advent of Christ. As a 'thief in the night' will be the coming of that great event - an occurrence for which we should always be prepared."⁽¹⁾

So wrote Guinness in 1908. Toward the close of 1945 the editor of the modern Jewish periodical, "Commentary", wrote:

"Every schoolboy who listens to the radio knows that 1945 marks an epoch in world history."⁽²⁾

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- (1) Guinness, On This Rock, p.178 (written A.D. 1908. Guinness' dates are 1834 - 1910)
 (2) Commentary, for November 1945 p. 1.

We are, of course, still (1946) too close to the epoch to estimate its full significance. But that Europe's "ten kingdoms" have received a tremendous blow, and that the Jewish question has once again come to the fore, no one can deny. Ten million of the world's pre-war Jewish population of sixteen million lived in Europe. Of these ten million, "six million ... were ruthlessly slaughtered in the Nazi campaign of extermination"(1) Hitler is said to have been told by an astrologer,

"You will die on a Jewish Holiday."

Much perturbed, Hitler demanded,

"Which one?"

"I do not know," replied the astrologer.

Hitler became very angry, "You must know,"

he shouted, "I insist upon the truth."

"I do not know," persisted the astrologer,

"because any day you die will be a Jewish Holiday."(2)

CONCLUSION

Our main thesis, viz., that the time order of the Bible, the time order of nature, and the time order of history bear marks of a common Authorship might conceivably be criticized from literary, scientific, and historical standpoints: An attempt could be made to call in question the genuineness of the book of Daniel, and to minimize the significance of the cyclic and historical phenomena we have adduced.

(1) Associated Press dispatch from Nuernberg, Germany, Dec. 14, 1945.

(2) Edmund Fuller, *Thesaurus of Anecdotes* (1942), p. 353. Needless to say the point of the anecdote by no means depends upon its literal truth.

We cannot here enter upon the complex critical questions relating to the authorship and date of the book of Daniel; but we would point out that the "traditional" view which regards the work as genuine has been strengthened rather than weakened by modern archeological discoveries. Thus Montgomery, though himself rejecting the traditional view, admits that,

"Archaeology has ... inspired a considerable revival of the defence of the authenticity of the book, with many extensive monographs, e.g., those of Wright, Wilson and Boufflower."⁽¹⁾

In regard to the cyclic phenomena it ought to be remembered that though the chance of lighting upon a single number which is a soli-lunar cycle with an error of less than half a day,⁽²⁾ is one in thirty, the chance of lighting upon two such numbers consecutively is but one in nine hundred (30 times 30), and the chance of lighting upon three such numbers is but one in 27,000 (30 times 30 times 30). Further we must remember that the Biblical cycles are related not only to simple synodic cycles but also to anomalistic and nodical cycles. In fact all of the most accurate lunar cycles will be found to bear some simple relationship to the Biblical numbers. We have already seen this to be true of the most accurate solar year, lunar year cycles, viz., 391, and 1727, and the most accurate nodical cycle viz., 391. It is also true of the most accurate anomalistic cycle viz., 1336, which is the difference between 1727 and 391. We note, too, that among the shorter synodic,

(1) Montgomery's Daniel p. 109, in the International Critical Commentary series.

(2) The prophetic numbers 391, 1260, and 2300 are all soli-lunar cycles with errors less than half a day.

anomalistic, nodical, and sidereal cycles the numbers 353, 239, 391, and 277, are the most accurate⁽¹⁾ and that the sum of these numbers is 1260.

Respecting the fulfillment of the predictions in the course of history as we have outlined it above, exception might be taken to the admission of multiple fulfillments of the chronologic periods. It must be remembered, however, that there is a difference between the finding of a single fulfillment when one has the choice of several scales and several starting points, and the finding of many fulfillments by the employment of several scales and several starting points. The former case is comparable to a blindfolded person after many tries at length choosing the one black bead from amongst nine white ones; the latter case, however, is as if he were to choose immediately the one black bead from the nine white ones and then one red bead from nine green ones, and then one blue bead from nine yellow ones. In the first case the likelihood of his choosing the different coloured bead increases with every trial; but in the second case the likelihood of his still continuing to choose the different coloured bead decreases rapidly with every trial.

The rather general manner in which some of the prophetic periods are mentioned in the Bible leaves the way open for such a comprehensive treatment of them. That profoundly solemn declaration in Daniel 12/7 (for example) is not exhausted by any one period of 1260 literal days in the time of Antiochus Epiphanes, nor by any one period of 1260 solar years or lunar years or periods of Mercury, Venus, or Mars, but includes and transcends them all. There is a grandeur about the historical fulfillment

(1) At the present epoch 334 is slightly more accurate (about half an hour) than 353, but in past centuries, because of the effect of secular acceleration, 353 was the more accurate cycle.

of the prophetic times in keeping with the grandeur of the predictions themselves and the majesty of their Author.

"For wisdom and might are His. And He
changeth the times and the seasons; He
removeth kings and setteth up kings; He
giveth wisdom unto the wise and knowledge
to them that have understanding; He
revealeth the deep and secret things;
He knoweth what is in the darkness, and
the light dwelleth with Him." (1)

(1) Daniel 2/20-22.

APPENDIX A - THE PROPHETIC MONTH REGARDED AS AN
ASTRONOMICAL CYCLE

The prophetic month may be considered as the unit at the base of the main chronological predictions of the book of the Revelation, the five months (Rev. 9/5), the hour, day, month, and year (Rev. 9/15), and the forty-two months (Rev. 11/2). Interpreted on the year-day scale this prophetic unit becomes an astronomical unit, the thirty years' soli-lunar cycle.⁽¹⁾ The error of this cycle, however, is nearly one and one-half days, and hence the cycle rapidly deteriorates and requires correction.

A modern student setting out to devise means of correcting a cycle would doubtless proceed, as the Greeks of old did, by tracing the growth of the error of the cycle until it reached proportions such as could be corrected by intercalation.⁽²⁾

Two types of intercalation are possible, the intercalation of a year, or the intercalation or dropping (if the cycle has a lunar-greater-than-solar error) of a month. The eight years' cycle, for example, may be corrected either by the intercalation of a year at the end of seven cycles (i.e. intercalating the 57th year), or by the dropping of a month after 19 cycles (i.e. making the 152 year intercalary).

It is remarkable that the two periods naturally adapted to correct the thirty years' cycle are the periods of 391 and 630 years.⁽³⁾

(1) A cycle somewhat more accurate than the famous octaeteris. See above p. 5 and table 2, p. 14.

(2) See above p. 6.

(3) 630 is one-half of 1260.

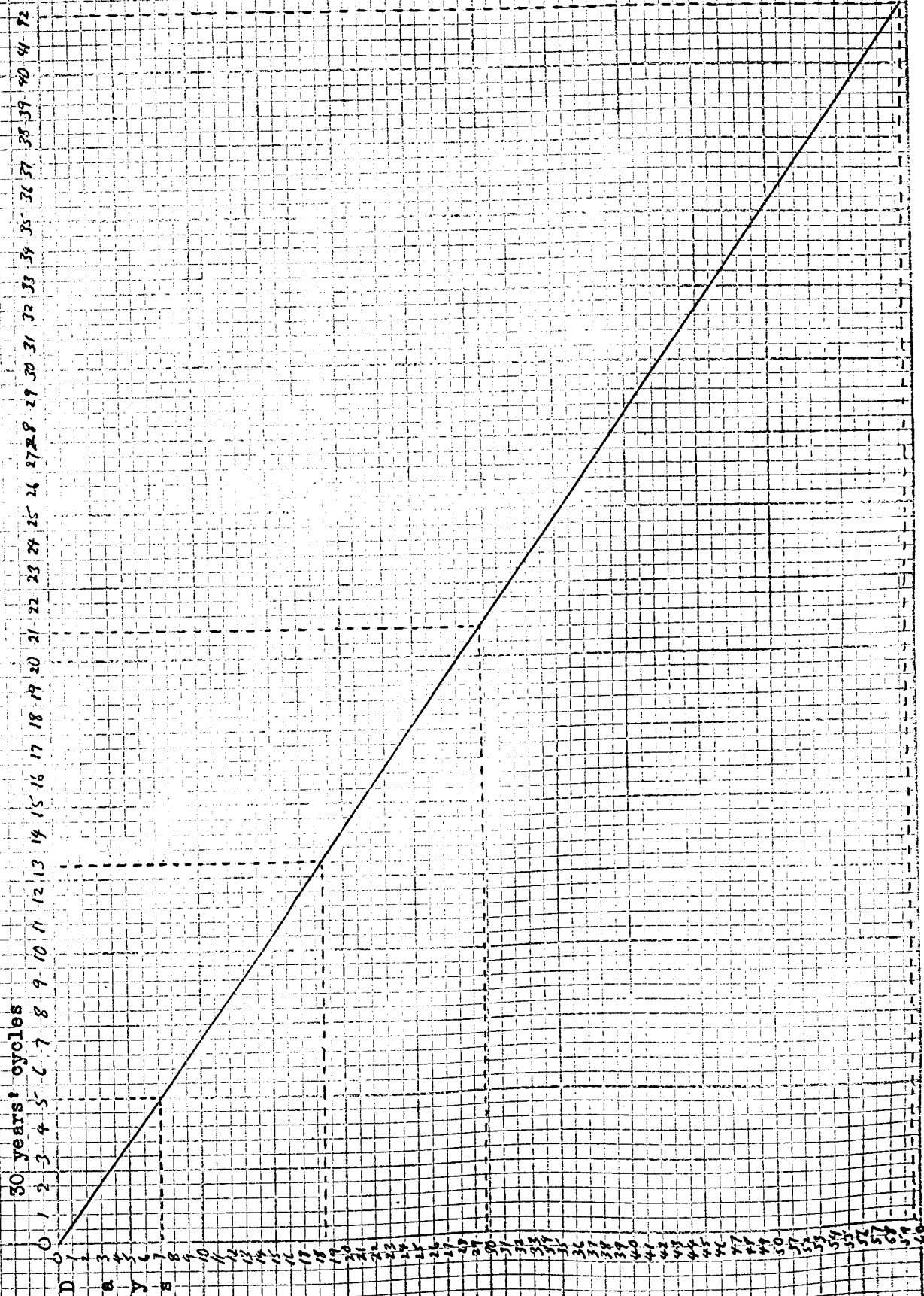
After thirteen 30 years' cycles (390 years) the lunar months have fallen short of the solar years by 18 days. Hence the eleven days' epact of the 391st year combined with these eighteen days make a full lunar month which corrects the cycle. In other words, if after thirteen 30 years' cycles we intercalate 13 lunar months we will have compensated for the accumulated errors of the 30 years' cycle.

On the other hand after twenty-one 30 years' cycles (630 years), the lunar months have fallen short of the solar years by one complete lunar month,⁽¹⁾ thus making this period the period naturally adapted to correct the 30 years' cycle by the intercalation of a month.

These phenomena will be made clearer by the accompanying charts. Chart 1 traces the growth of the error of the 30 years' cycle. It should be noticed not only that the error increases to about 30 days after 21 cycles and to about 18 days (the complement of the 11 days' epact of a single year) after 13 cycles but also that it increases to 7 days or one week after 5 cycles (the 5 months of Rev. 9/5). Chart 2 illustrates how the prophetic hour, day, month, and year of Rev. 9/15 is equated with exactly 391 years.

(1) After 1260 years, by two complete lunar months. Cf. Chambers, Handbook of Astronomy, vol. 2, p.

CHART 1. THE GROWTH OF THE ERROR OF THE 30 YEARS' CYCLE



This plate 10 x 7 inches. Edge of each small square 1/10 inch.

C.C.C.
T.

CHART 2

The hour and day and month and year expanded on
the day-year scale.

The hour	=	1 lunar month
The day	=	12 lunar months
The month = one 30 years' cycle	=	371 lunar months ⁽¹⁾
The year = twelve 30 years' cycles	=	4452 lunar months
<hr/>		
The hour, day, month, and year	=	4836 lunar months
	=	403 lunar years
	=	391 solar years ⁽²⁾

(1) See above table 2, p. 14.

(2) See above tables 1 (p. 12) and 2 (p. 15).

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