Time-Interval Ratios of the Napierian Logarithmic Base "*e*" Revealed in the Genesis Creation and Flood Accounts

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Abstract

In the last 6 decades of modern Young-Earth Creationism, researchers have held fast to the literal interpretation of Genesis 1 Creation account as an historical account of a seven literal day work of a creator God. In addition, many of these same researchers have done excellent work bringing awareness to the myriad examples of mathematical patterns found throughout nature, such as the Napierian logarithmic base "*e*", and the harmonic series, attributing their existence to a designer God. However, no connection has been made between these observed arithmetical entities and the 7-day creation pattern. To form a better view of the Creation account as a rotating, increasing pattern of a periodic nature, the harmonic series was assessed for suitability as a potential mathematical model for the Genesis 7-Day creation pattern. We found that the step-wise output of seven rotations of the harmonic series generates a numerical pattern that produces time-interval ratios of the number "*e*". Additionally, an analysis of the Flood dates as reported in Genesis rendered similar time-interval ratios of the number "*e*". This suggests that these two major events in Genesis may be connected in a way previously hidden. When we can associate a known numerical pattern to the Biblical Creation and Flood accounts, it may help us focus a more thorough investigation of the world and the scriptures to achieve a Creation Model of Origins.

Introduction

With the advent of modern creationism owing much to the communications and activities of the Creation Research Society original "Team of Ten", in 1963, these men agreed upon a statement of belief "All basic types of living things, including man, were made by direct creative acts of God during the Creation Week described in Genesis" (Rush, 1982). Over the last 57 years, the Creation Research Society has held true to its statement of beliefs by fearlessly conducting scientific research providing evidence of a recent special Creation. In particular, two such scientists, Dr. Don DeYoung and the late Dr. Glen Wolfrom published a book "Mathematics: The Language of Creation" in which many examples of mathematical patterns are given to illustrate a Creation imbued with inherent order giving credence to the existence of a Designer. With these, DeYoung states that "we are observing the Creator's fingerprint on his world" (DeYoung and Wolfrom, 2017). The mission of the Creation Research Society is that it "pursues and supports original research verifying the creation model of origins as a means to reveal the Creator." The purpose of this article is to offer a mathematical basis for the Genesis seven literal day Creation account. We believe that this work is important because it recognizes that the Genesis Creation account as a historical record as well as a verifiable creation model of origins.

Modern young-Earth creationism depends upon a literal interpretation of the word "Day" as what can be referred to in modern times as a "24-hour" day. As will be discussed, much scholarly work has been done establishing this fact. With very detailed genealogical chronologies and an equally detailed Flood account given in calendar days, coupled with scientific evidence, we conclude that the Earth is thousands of years old. In addition to this, we observe an orderly creation with periodicity and systems which obey laws, all of which we can express mathematically. We have observed mathematical patterns repeated throughout creation, and examples have been well-documented in creation science with their existence attributed to a creative God. This work seeks to point out that the mathematical patterns we see in Nature are also seen in the Bible, specifically those which correlate to the Napierian logarithmic base "*e*". And although the one known appearance of this fundamental constant "*e*" exists in Genesis, as we will examine, this special number has not yet been connected to the Genesis Creation account. To realize a seven-day creation pattern with the same mathematical basis as seen in Nature itself would be a valuable step forward in Young-Earth Creationism. It would create a new map overlay allowing a deeper understanding of recent origins.

This work brings together of some the current secular and creationist research on the topic of exponential and logarithmic patterns seen in nature, as well as providing two examples of time-interval ratios of the number "*e*" found in the Genesis Creation and Flood accounts. The ubiquity of this very specific and reoccurring fundamental constant in nature strengthens the case for Creation when it can be shown that instances of the number "*e*" are also abundant in Genesis, the book of origins.

We begin with a brief review of the exponential growth formula and provide a creationist and secular example of how human population has increased exponentially since the Flood. We follow these with a similar review of the exponential decay formula and present the results of a recent creationist study describing how patriarchal ages followed an exponential decay model after the Genesis Flood. We continue with a short review of Napierian base "*e*" logarithmic function ln(x) and how it is applied to the graphing of data containing large variations of quantities. We follow this up an example of the logarithmic scale of variations that is present in creation when one surveys the various demarcations of existence from atoms to galaxies. We present the idea that perhaps God employed an orderly mathematical system during the creation event, because we observe that many systems of nature correlate to a base "*e*" logarithmic and exponential model. We then discuss the direct mathematical connection between the base "*e*" logarithmic function ln(x) and another well-known arithmetic series, the harmonic series.

We provide an example of how the harmonic series is seen in everyday life and how this mathematical pattern exhibits a qualitative relationship to a potential creative process. Then a quantitative analysis of the harmonic series is presented and applied to the Genesis creation account. It is shown how the harmonic series correlates with the seven-day creation account by producing a base "*e*" logarithmic spiral pattern that makes 7 full rotations, just like 7 days is seven full rotations of the Earth. We report our findings that the step-wise numerical output of the harmonic series produces time-interval ratios of the number "*e*" with greater and greater precision with each turn. Additionally, a quantitative analysis of the Flood dates as reported in Genesis rendered similar time-interval ratios of the number "*e*". These findings strengthen our position that Genesis is an historical account by showing that the same Napierian base "*e*" exponential and logarithmic patterns exist from the present-day through the 7 literal days of Creation.

Finally, we offer refutation of the possibility that the step-wise sequence of integers obtained from the harmonic series equation is arbitrary by showing that this unique set of numbers exhibits a high correlation to the Fibonacci Series, a well-known sequence of integers also observed in nature's design. Also, time-interval ratios of Fibonacci numbers seen in plant phyllotaxis and planetary orbits appear to be very similar to the time-interval ratios of the number "*e*" we investigated in the Genesis creation and flood accounts.

Human Population Growth: An Example of Exponential Growth with the Natural Base "*e*"

Luke 3:23-38 is a genealogy, showing the lineage of Christ. When God instructed Adam to "be fruitful and multiply" the Creator set into motion a process that we can now model mathematically. We count 77 people in the ancestry from God to Christ inclusive. The precise number of generations from the Heavenly father to the birth of Christ may suggest that God uses the power of exponential growth. In his article *Thoughts on Half-Life*, Dr. DeYoung states that change is "geometric or exponential in nature" when a particular group of objects have an equal probability of undergoing spontaneous change (DeYoung, 2017). The base of natural or "Napierian" logarithms is most commonly referred to as "e", or Euler's Number. This fundamental constant is an irrational number, and carries the approximate value $e \approx 2.7183$. According to DeYoung, "Several intriguing physical constants are embedded in nature…One might suggest that these numbers were selected by God to shape the fabric of creation" (DeYoung and Wolfrom, 2017). The equation for modelling exponential growth by means of Euler's number "e" (Blitzer, 2003). It is noted here that exponential growth can involve any base number whose value is greater than 1. Consider equation (1):

(1) $f(t) = Ae^{kt}$

Where,

A is the original population at $t = 0$

k is the growth coefficient

t is time (Days, Years, Seconds….)

An example of exponential growth is the robust way in which the human population has increased since the Flood. A common question posed by evolutionists is how the world's human population could have grown to billions of inhabitants over the course of a few thousand years. It has been shown that a population only needs to double 32 times to achieve a population of 8.6 Billion people (White, 2006). White compares his model to the world population at the time of his writing, the Beginning with a population of 2, and ending in 2006 with a population of 6.5 Billion people (White, 2006). To double a population every 150 years over a total 4800 years is a 0.46% per year continuous exponential growth rate. Using (2):

(2) $f(4800\ years) = 2 * e^{(0.0046*4800)} = 7.8\ Billion\ People$

Where,

A = 2 people

k = 0.46%

t = 4800 Years

In population study of ancient Australia focusing on a similar time period of 5000 years ago, researchers compared the exponential growth model to their radiocarbon dating of rock shelters. They were able to fit their exponential "5 KA Acceleration Model" with a 97.3% correlation suggesting a noteworthy population explosion in Australia over the last 5000 years (Johnson and Brook, 2011).

Patriarchal Age Decay: A Biblical Example of Exponential Decay with the Natural Base "e"

The Bible states that pre-Flood humans lived to be nearly 1000 years old. The oldest man, Methuselah, lived to a great age of 969 years, while Noah, the builder of the Ark, lived to be 950 years old. But then something curious happens to the life-span of post-Flood humans. As generations directly after the flood were propagated, the individual lifespans of these early individuals were decaying. Charles A. Glatt Jr. studied this lifespan loss and found that it followed an exponential decay model based upon the natural base e with a correlation coefficient of -0.850. Glatt's equation (3) for modelling the exponential decay of patriarchal lifespans:

(3) $lifespan = 6664 * e^{-dob/\tau}$

Where,

A = 6664 years= the constant obtained from the regression formula:

(4) ln (*lifespan*) = 8.804 – 0.00177· *dob*

dob = patriarch's date of birth since Adam in years

τ = exponential time constant = 563 years.

Glatt summarized his findings in this excerpt from his Creation Research Society Quarterly paper "*Patriarchal Life Span Exponential Decay*":

> "This single correlation between Genesis life spans and the years following the Flood is of interpretable value to report again to review the work that has been done on this subject since 1948, to incorporate RATE project results, present the time-based analysis's correlation coefficient, express the natural (Napierian, base e) curve as part of the family of the universe's most common curve, the logarithmic curve…(and) explore anomalies in relation to space expansion…" (Glatt, 2016).

In several places in his article, Glatt used Napierian base "*e*" models to make his case, including an electrical engineering model comparing patriarchal lifespan decay to the rate in which a capacitor discharges.

The Logarithmic Functions, Log(x), Ln(x)

Although the generalized logarithmic function may carry any number as its base whose value is greater than 1. Common bases, such as 2, *e*, and 10 are used with this function for most applications in engineering and science. This function is the mathematical opposite of the exponential function, and is commonly used to express or standardize quantities which exhibit large variations in range as part of their normal cycle. A good example of using the common, or base-10 logarithmic function is the decibel (dB). In electrical engineering, a ratio of voltages V_{out}/V_{in} of a notch filter can be characterized by taking the base-10 logarithm of the ratio and multiplying the result by 20. If the V_{out}/V_{in} ratio of the filter is 0.01, it will then be referred to as a -40dB filter for its rated notch frequency (Hambley, 2002).

From atoms to galaxies, the entire cosmos appears to have been expressed exponentially when surveyed from a mass to size ratio standpoint. Figure 1 is a scatter plot that illustrates each demarcation of existence from atom to DNA to bacteria to insect to Man to planet to Star to galaxy. When the base-10 logarithm is taken for both the mass (m) and size (r) data on the $\log_{10}$(mass) and $\log_{10}$(r) axis, the plot is linear with a correlation coefficient of 0.93 (Batarseh, 2008). This plot suggests that the big-picture, "God's Eye" view of Creation is one that proceeds in scale with an unmistakable exponential character.

For our investigation, we are interested in logarithms employing the Napierian base "*e*", known as the natural logarithm or ln(x). Batareseh could have easily prepared his mass and size data for the plot by taking the base "*e*" "natural" logarithm (i.e. ln(x)) of both, and realized a linear relationship between the data points. The only differences would be the terms of the linear regession, and relative values of the axes. And, where Figure 1 shows log(r) encompassing approximately 30 orders of magnitude, a ln(r) plot of the same data would have a range of approximately 70 orders of *natural* magnitude, with the Napierian base "*e*". It is purely anecdotal for this writing but we anticipate that expressing these large values using the Napierian logarithmic base "*e*" will be instructive in future research, and this general idea will be made somewhat clearer as our current investigation proceeds. One more interesting feature of the ln(x) function is its instantaneous rate of change, otherwise known as its differential. The back cover of my differential calculus text lists this value, as

$$(5)\ \frac{d}{dx}\ln(x) = 1/x$$

We will be using this "1/x" form from the differential of ln(x) in the sections to follow to help develop a Genesis creation model using the harmonic series. Then, we will see that this harmonic series is directly related to the Napierian logarithmic base "*e*" via the ln(x) function.

The Harmonic Series and Sequence

The harmonic series is defined as the sum of an infinite series of constants $1/n$, where $n =$ 1, 2, 3… and as such may be expressed in summation notation, as in equation (6):

$$(6)\ \sum_{n=1}^{n} \frac{1}{n} = \left\{\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n}\right\} = S_n$$

If the sequence of partial sums, S_n, tends to a limit as n goes to infinity, it would be considered convergent (Edwards and Penney, 1994). The proof that the harmonic sequence diverges to infinity is accomplished by showing that its partial sum S_n will always be larger than an integration of 1/n over the same interval (Hughes-Hallet, et al., 1998).

$$(7)\ S_n = 1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n} > \int_1^{n+1} \frac{1}{x} dx = \ln(n+1)$$

In equation (7), the heights of rectangles of area $1/x$ each may be used to approximate the area under the curve of ln(n+1). However, there will always be a portion of the rectangle that will appear above the same curve, implying that the combined area of S_n will always be greater. As the value of n is passed to x via the integral operator, ln(n+1) gets arbitrarily large as n approaches infinity. And since $S_n > \ln(n+1)$, S_n leads n as they both approach infinity, and the sequence diverges.

A harmonic sequence of wavelengths is created when one plays a note on a piano. The hammer inside the piano case is striking a metal string that is under a precise amount of tension. This impulse of energy from our hand is transmitted to the piano string and causes it to vibrate and impart this energy to the soundboard. It is the vibration of the soundboard that we hear and the fundamental frequency of that vibration is determined by the length, linear mass density, and tension of the string (Serway et al, 2000). But what many do not realize is that what is heard is actually many wavelengths mixed together in what is commonly referred to as harmony. All of these wavelengths may exist together at the same time on the same piano string, without cancelling each other out, unless the string is overdriven, which may cause distortion.

The Progression of Seven Literal Days and Nights in Succession: A Qualitative Analysis

There has been spirited theological debate for generations on whether or not the "Days" of Creation were literal 24-hour days, and those who study the Word of God have never gained a consensus as to the meaning of the days of Genesis (Lewis, 1989). In recent times, the Young Earth Creation movement has solidified around the literal meaning of "Day" and for good reason. An in-depth literary analysis was done by the late Dr. Gerhard Hasel, of Andrews University, and he concluded that these were indeed literal days.

> "The author of Genesis 1 could not have produced more comprehensive and all-inclusive ways to express the idea of a literal "day" than the ones that were chosen. There is a complete lack of indicators from prepositions, qualifying expressions, construct phrases, semantic-syntactical connections, and so on, on the basis of which the designation "day" in the creation week could be taken to be anything different than a regular 24-hour day." (Hasel, 1994).

One ideology that gained traction many years ago is the "Day-Age" theory, that attributes arbitrarily large periods of time for each "day" of creation. This is popular because of the belief in theistic evolution and the confusion over the age of the Earth. Theistic Evolution is easily refuted by the Bible itself when it states in Romans 5:12 that "through one man sin entered the world, and death through sin…", while evolution requires death to further its process of selection well before humans could evolve. James Stambaugh of the Institute of Creation Research makes an interesting point about the semantics of the Creation account passage. It could be argued that God Himself foreknew that this confusion would exist and He phrased the Creation account in a repetitive, almost laborious manner on purpose:

> "God, through the 'pen' of Moses, is being redundant for redundancy's sake. God is going out of His way to tell us that the 'days' of creation were literal solar days. He has used the word yôm, and combined this with a number and the words 'morning' and 'evening'. God has communicated the words of Genesis 1 in a specific manner, so that the interpreter could not miss His point. God could not have communicated the timing of creation more clearly than He did in Genesis 1." (Stambaugh, 1991).

These solar days are important because they imply physical rotation relative to a light source. There is no better definition of a "day" than one complete physical rotation of the Earth. And since the focus of the entire Genesis 1 creative act is the Earth, we suggest that the seven days were seven rotations of Creation. This view allows there to be seven discrete literal days, but also takes into account that each step of Creation must take into account all of the other past steps and make room for the next steps. In Henry M. Morris' work *Scientific Creationism*, he states that "each stage was an appropriate preparation for the succeeding stage and for all of them the ultimate purpose of providing a suitable home for man" (Morris, 1985). We suggest that creation proceeded without disturbing what had been done already and summed together to form and inhabit the ultimate creation, human beings, with the latter being perfectly suitable to exist alongside and have dominion over the former. We know that each step of the Creation was good at the time it occurred and continued to be good up until, and after the Creation process was completed. This is truly harmony in nature, characterized at each step by the statement "it was good".

There were actually 12 steps to Creation, each "day" actually being comprised of a night and a day, or half-rotations of the Creation. Next, we will apply the harmonic series equation to this 12-step process to see if there is any more correlation to other mathematical patterns or fundamental constants observed in Nature.

The Harmonic Series and Sequence Creation Pattern: Time-Interval Ratios of the Natural Base "e"

The usual reading of the Genesis Creation account places emphasis on what was created on a particular Creation day. These details are of utmost importance, but do not represent all of the information that may be gleaned from the story. We focus here on the mathematical pattern of twelve half-days of active Creation. We have established that a day is a rotation of Earth, which implies that days can be divided in half and the whole active process may be analyzed as a sequence of twelve half-rotations. And with rotational periodicity, we can graph the harmonic sequence and show that with each rotation, the step count n increases by a factor of e the natural exponential base, creating a logarithmic spiral pattern, and time-interval ratios.

The exponential character of equation (6) is shown in Table 1. Under a step-wise analysis, very time S_n increases by 1, n will have increased by a factor approaching "*e*". We see for small n the error is large, but in 7 iterations the ratio n_{step}/n_{step-1} is within 0.9997 of natural base *e*. With all of the exponential evidence from the present-day through the 7-day Creation Fibonacci correlation, we obtain a complete exponential model of the

We have already seen in Table 1 that it can represent 7 steps for 7 days and within that time period, it develops time-interval ratios of the natural logarithmic base "*e*". In Table 2, we apply the harmonic sequence to 12 half-days. The table features several columns of information as the 12 steps proceed, beginning with an initial uncounted step we refer to as "Day Zero". The Day Zero concept is not the focus of this paper, but it is included to illustrate how purely the harmonic series may be applied to the Creation Pattern, and also how it provides potential new clues as to the nature of the Creation Act. And a desirable feature of a Creation Model of Origins is not only one that matches up with what we can see now, but inspires new ideas which promotes new research.

We will go through one iteration of the Creation Process. Referring to Table 2, the "Step" column of the first row begins with the basis of Day Zero. From there, the second row of the table represents the first step, Night 1.0, during which the "n_{step}" column variable "2" is passed to the "harmonic series" equation. The equation output, known as the partial sum, S_n, is tabulated in the "S_n Step Finish" column, which in this case equals the partial sum "1.5". With this, the sum was increased from 1.0 to 1.5, or a half-rotation, by the harmonic series equation. The next two columns "Step Range" and "Fibonacci Compare" will be explained in the next section. The new partial sum "1.5", sets the process up for the next half-rotation represented in the third row of the table, Step "Day 1.5", passing the next "n_{step}" of 4 into the next harmonic series equation. This repeating process continues in the same fashion through Step "Day 6.5" the last half-day of the active portion of Creation. The set of "n_{step}" numbers tabulated in (8) is important, because these are the numbers that create the complete half-rotations of Creation.

(8) {1, 2, 4, 7, 11, 19, 31, 51, 83, 137, 227, 373, 616}.

This repeating, expanding process creates the logarithmic spiral pattern seen in Figure 2. We already have shown that the harmonic series can be applied to the study of sound which is periodic in Nature and therefore may be expressed as a sine-wave or a superposition thereof (Serway et al, 2000). With this in mind, we graph the harmonic series using trigonometry and parametric functions. Using the harmonic series equation (6), we graph parametrically for n = 1 through 31:

(9) $(x, y) = (\text{n} \cos[2\pi \, mod \; 1[S_n]], n \sin[2\pi \, mod \; 1[S_n]])$

We take the modulus of S_n to isolate the remainder which increases periodically from 0 to 1 and we multiply it by 2π to obtain an angle in radians. Now we can view the harmonic sequence as a succession of divisions of a polar plot with the magnitude of (x,y) increasing with n, creating the spiral pattern in Figure 2. We arbitrarily limited the plot to n = 31 for the sake of clarity and simplicity. The set of integers (8) we tabulated from harmonic series equation (6) originates from every time the spiral plot touches or crosses the x-axis or "DAY/NIGHT" line. With this plot, we obtain a rotating, increasing pattern, which as an equiangular, logarithmic spiral pattern, keeps its proportion as it grows (Thompson, 1961). This is vitally important for growing organic systems as such could be suitable for a continuous 6-day Creation process with living organisms in existence while the creation process is occurring.

To begin to understand exactly what a "time-interval ratio" is, we must analyze its three aspects. First, the time-interval must represent a period, cycle, or rotation as in, for example, the period of "Day 3 of Creation." Day 3 of Creation is such a period, but an investigation of Figure 2 also shows it to be a cycle and rotation. Secondly, the ratio must be comprised of values of time or a completed sequence, as in, for example, the ratio ($n_{step} = 31$)/($n_{step-1} = 11$) represented by Step 3 in Table 2. In this example, the ratios are those of completed sequences, because the discrete unit of time we understand as "Day" had not as yet been defined until the end of the Genesis Creation account. Lastly, the ratio must closely correlate to an important fundamental constant, such as the Napierian logarithmic base "*e*", as does the aforementioned Step 3 with its approximation of 2.818 compared to "e", 2.718. Therefore, the n_{step}/n_{step-1} ratios featured in Table 1 are regarded here as *time-interval ratios* approximating the number "*e*".

The Genesis Flood Dates: Time-Interval Ratios of the Natural Base "e"

It could be argued that the time-interval ratios of "*e*" generated by the harmonic series are arbitrary, because the relationship established thus far between the harmonic series and the Genesis Creation Account is mostly qualitative, with only a few quantitative and linguistic similarities. We counter this by presenting that there are direct, concrete numerical examples of these time-interval ratios of "e" in the Genesis flood account. Bodie Hodge of Answers in Genesis published an article "Biblical overview of the Flood Timeline" in 2010. He tabulates the Jewish calendar dates referenced in in Genesis chapters 7 and 8 and also reports the duration of each Flood stage (Hodge, 2010). We have introduced his data to our own Table 3. Since these are integer values that are subject to inclusive, exclusive, start, and ending considerations, we abide +/- 1-day discrepancies between our tables, as they do not affect the conclusions of this work greatly. Also, the instances of durations given that are not explicitly associated with a calendar datum are not incorporated. Arguments for or against Hodge's description of how the Flood proceeded are not discussed, because the Jewish calendar dates present a clear beginning, middle periods and ending to the Genesis Flood.

Referring to Table 3, the first date given is 2/17, the 47th day of the first year of the Flood. Our research has found it significant to include the first day of that year 1/1 in the table because it is implicit with the assertion of a date in a calendar-like fashion. The significance will be revealed as the data are presented. The second calendar date given in 7/17 of the same year, and a 150-day period is mentioned specifically in the account. Hodge states that the 150-day period is "including the initial 40 days" (Hodge, 2010). Since the 40 days itself is not explicitly associated with a calendar date, I place it in a separate column along with the 110-day period implied by Hodge. These 150 days are a ramp-up period of the Flood. We know this from the context of the story, but also noticed that the ratio of 110 Days to 40 Days is a close 98.8% match to the natural base, *e*, implying that this ratio may also be of the *time-interval* variety discussed earlier. If you include the 47-day Ark assembly and loading period from 1/1 to 2/17, we obtain a 197-day period of total ramp-up.

The next calendar date given is 10/1 of that same year. Again, the context of the Genesis 8 account at this point suggests that these 73 days represent a ramp-down period of the Flood. We noticed that the ratio of 197 Days ramp-up to this next period reported of 73 Days given of is a close 99.3% match to the natural base, *e*, implying that this ratio may also be of the *time-interval* variety discussed earlier. The next two calendar dates given is 1/1 and 2/27 of the following year, respectively. We establish that the ratio of 90 Days of receding waters to this next period of 57 Days given of is a close 97.7% match to the Golden Ratio, phi, *φ*, implying that this ratio may also be of the *time-interval* variety discussed earlier, but with phi, *φ*, instead of "*e*". The Golden Ratio, phi, is also regarded in creationist literature as an important fundamental constant (DeYoung and Wolfrom, 2017) This raises the question of why this single time-interval ratio of phi, φ, appears among all the examples of the natural base "*e*". We believe there exists a Genesis Flood-related transition from time-interval ratios of "*e*" to similar ratios related to *φ* that requires further investigation.

That final Jewish calendar date given was 2/27 when God called Noah, family and the animals that remained with him out of the Ark. Hodge shows that the Noah/bird period lasted 21 days, and may have occurred in the final month of that first year, yet concurrently with our 90-day period (Hodge, 2010). We establish that the ratio of 57 Days to this previous period reported of 21 Days, is a very close 99.7% match to the natural base, *e*. This period of 21 days of Noah interacting with his Birds to 57 days of God drying the Earth for inhabitation implies that this ratio may also be a *time-interval* ratio of the number "*e*". Taken together, multiplying the correlations of each step of the Flood account to its respective fundamental constant figures to a correlation of 95.6%.

The Harmonic Sequence Parallels the Fibonacci Sequence

One could argue that the elements of sequence (8) generated by the harmonic series are in themselves arbitrary, meaning that any series of numbers with a different seed number could generate another sequence also forming time-interval ratios of the number "e". To answer the possibility that sequence (8) is merely an arbitrary set of numbers, we refer again to Table 2. For each "Step" there is a "Step Range" defined by subtracting the current n_{step} from the preceding n_{step-1}. An example would be Night 3.0 with its Step Range of 8. To visualize this, we refer to Figure 2, and we count the number of data points along the spiral that are on the DAY side of the x-axis, beginning with n_{step-1} 11. We count the following points {11, 12, 13, 14, 15, 16, 17, 18} a total of 8. Another example would be Day 3.5 with its Step Range of 12. We count the number of data points along the spiral that are on the NIGHT side of the x-axis, beginning with n_{step-1} 19. We count the following points {19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30} a total of 12.

From all of the "Step Range" entries in Table 2, we obtain a new sequence of integers:

(10) {1, 1, 2, 3, 4, 8, 12, 20, 32, 54, 90, 146, 243}

If we compare this set of numbers with that of the "Fibonacci Compare" column

(11) {1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233}

we find a 99.9% correlation. The numerical sequence (11) is commonly referred to as the Fibonacci Sequence or "Fibonacci Numbers", described by Italian mathematician Leonardo Fibonacci is his 1202 book *Liber Abaci* (DeYoung, 2018). The Fibonacci Series creates an infinite sequence which is generated by adding two consecutive numbers in the sequence to get the next number. Even though this is a self-defined mathematical construct, we do see these individual numbers or pairs and triplets of these integers in nature, as in the populations of breeding rabbits, phyllotaxis of plants, sunflower seed heads, and in finance (DeYoung, 2018). In addition, these numbers are seen from the atomic scale through the astronomical scale. Fundamental electric charges are Fibonacci based, with values of 1/3, 2/3, 1 (Thornton, 2002). Fred Willson, of the *Good Science* program, said of DNA:

> "When we realize that the information to produce these spirals and numbers in living things is stored in DNA, should we then be surprised to find that the DNA molecule is 21 angstroms in width and the length of one full turn in its spiral is 34 angstroms, both Fibonacci numbers?" (Willson, 2002).

With the harmonic sequence strong correlation to the Fibonacci sequence, we submit that the harmonic series' numerical output does not appear to be an arbitrary sequence of integers. However, we cannot state that there exists one-to-one correspondence between sequence (10) and (11). So, one could inquire why the step-wise output of the harmonic series is not exactly one-to-one correspondence to Fibonacci sequence. Dr. Harry Wiant, in his CRSQ article *Relation of southern pine cone spirals to the Fibonacci sequence*, said that "*almost* without fail, counts may be observed which are adjacent numbers in the Fibonacci sequence (e.g., 5 right, 8 left)" (Wiant, 1973). This indicates that not all phyllotaxis of plants in which we expect Fibonacci spiral counts feature Fibonacci-based parastichy. A study was done by the Royal Society to determine how common the Fibonacci spiral counts were in the well-known Sunflower seed head. It was determined that majority of the seed heads were indeed Fibonacci, but there were significant examples of Fibonacci +/-1 (Swinton, et. al, 2016). The existence of Fibonacci +/-1 in a viable plant may suggest that the set of harmonic sequence (10), with its Fibonacci +/-1 character could offer a more fundamental basis for the progression of nature.

It is well-known that not all plant phyllotaxis feature Fibonacci numbers (Jean, 1994). There exist other known sequences of numbers involved in plant phyllotaxis that exhibit Fibonacci *structure*, such as the Lucas Sequence:

(12) $\{1, 3, 4, 7, 11, 18, 29, 47, 76, 123, 199, 322\}$

For a given sequence to have Fibonacci structure, it must develop its sequence by adding together the first two numbers to obtain the third in the order, even though the starting conditions of said sequence is different. However, any sequence which exhibits Fibonacci structure that one examines, they all develop ratios approximating the Golden Ratio, φ (Swinton, et. al, 2016). And, in those relatively few cases of non-Fibonacci plants in which the phyllotaxis angles depart from the Golden Angle of 137.51°, (i.e., $360°/\varphi^2$), the angle can be estimated by adding to $\varphi = 1.618$ the amount by which the sequence departs from that of Fibonacci. For example, in the Lucas sequence (12) the *limit divergence angle* is 99.5° (Okabe, 2015). These, and similar angles can be estimated using equation (13):

(13) $360°/(\varphi + \alpha)$ = *limit divergence angle (*LDA*)*,

Where, (after values from (Jean, 1994, Table 2.1))

$\varphi = 1.618$, the Golden Ratio
$\alpha = 2$ for Lucas Sequence, a normal (1,3) Sequence: LDA = 99.5°
$\alpha = 3$ for normal (1,4) Sequence: LDA = 78.0°
$\alpha = 4$ for normal (1,5) Sequence: LDA = 64.1°
$\alpha = 5$ for normal (1,6) Sequence: LDA = 54.4°
$\alpha = 6$ for normal (1,7) Sequence: LDA = 47.3°

Although this article is not meant to be an exhaustive investigation of plant parastichy, it is felt instructive here to note that all of the “normal” phyllotactic sequences noted in Jean, 1994, Table 2.1 are directly related to φ, either via equation (13) or by taking the half-angle of its result. Therefore, as satisfying of a mathematical model the literal Fibonacci Series (11) presents, it is more impressive that these ratios and angles of adjacent elements of sequences with Fibonacci structure all correlate to the Golden Ratio, whether they are exactly Fibonacci or not.

Fibonacci Numbers in Tree Phyllotaxis and Planetary Orbits Produce Time-Interval Ratios of $\varphi^2 = 2.618$

The phyllotaxis examples in DeYoung and Wolfrom's *Mathematics: The Language of Creation* are interesting when compared to how the harmonic series is brought forth in Figure 2. In phyllotaxis, angular leaf placement around an axis is determined by taking the ratio of two Fibonacci numbers, such that after a certain Fibonacci number of leaves, a complete 360° rotation around the axis is completed. In Table 4, with the phyllotaxis data, we also tabulated the ratios of planetary orbital periods. Each planet's orbital period around the Sun from Pluto to Mars is a Fibonacci fraction of its neighbor (Willson, 2002).

But, do these Fibonacci ratios in Table 4 represent *time-interval ratios*? To determine this, we must investigate these data to ascertain whether or not they fulfill the three aspects of time-interval ratios listed earlier. First, the time-interval must represent a period, cycle, or rotation. Phyllotaxis is the manner in which leaves or seeds are positioned around a stem. In table 4, leaves complete one rotation around the branch, or in the astronomy example, planets complete an orbit around the Sun, thus fulfilling the first condition. Secondly, the ratio must be comprised of values of time or completed sequence. In this example, the ratios are those of completed sequence and time, because it is the completed sequence of leaves we are counting to make one rotation of the stem, or in astronomy, the number of days required for a planet to orbit the Sun. Lastly, the ratio must closely correlate to an important fundamental constant. In Table 4, the ratios listed approximate $\varphi^2 = 2.618$, similar to the manner in which our previous examples approximate "e" = 2.718. Therefore, the phyllotaxis ratios featured in Table 4 are regarded here as *time-interval ratios* approximating the number $\varphi^2 = 2.618$.

Summary

In this work, we have briefly reviewed the current state of creationist mathematics as they relate to the idea of designer God whose mathematical fingerprint is evident throughout Creation in the form of fundamental constants such as the Napierian logarithmic base "*e*" and the Golden Ratio, phi, φ. In addition, we illustrated common mathematical relationships observed in Nature and in the Bible such as exponential growth, decay, harmonics, and the Fibonacci Series. We developed a Genesis literal 7-Day Creation model using the harmonic series, from which we obtained time-interval ratios of the number "*e*", and found them to be very similar to the time-interval ratios of "*e*" found in the Genesis Flood account. We contested several potential claims that the numerical output of the harmonic series model is an arbitrary sequence of integers by showing that this same series not only parallels the Fibonacci sequence, but also how plant phyllotaxis and planetary orbits based upon Fibonacci also exhibit time-interval ratios of the fundamental constant phi, φ. Therefore, we conclude that the reason that we observe common, universal mathematical patterns in Nature is because these same mathematical patterns are evident in the Genesis Creation and Flood accounts.

As indicated earlier in the text, it is believed that the harmonic series and its development of time-interval ratios of the fundamental constants will be instructive in future investigations of the Genesis Flood account and Noah's Ark. Also, further research is recommended to investigate the reason why that single phi, φ term is found among the three instances of the number "*e*" uncovered in the Genesis Flood accounting.

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Tables

Table 1: The harmonic series Develops Time-Interval Ratios of the Natural Base "*e*"

Step	Harmonic Series Equation	*n*	S_n	Time Interval Ratio n_{step}/n_{step-1}	=	Compare to *e*
0	$\sum_{n=1}^{n=1} \frac{1}{n} = \{\frac{1}{1}\}$	1	1	-	-	-
1	$\sum_{n=1}^{n=4} \frac{1}{n} = \{\frac{1}{1}+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}\}$	4	2.08	4/1	4	2.718
2	$\sum_{n=1}^{n=11} \frac{1}{n} = \{\frac{1}{1}+\frac{1}{2}+\cdots+\frac{1}{11}\}$	11	3.02	11/4	2.750	2.718
3	$\sum_{n=1}^{n=31} \frac{1}{n} = \{\frac{1}{1}+\frac{1}{2}+\cdots+\frac{1}{31}\}$	31	4.03	31/11	2.818	2.718
4	$\sum_{n=1}^{n=83} \frac{1}{n} = \{\frac{1}{1}+\frac{1}{2}+\cdots+\frac{1}{83}\}$	83	5.00	83/31	2.677	2.718
5	$\sum_{n=1}^{n=227} \frac{1}{n} = \{\frac{1}{1}+\frac{1}{2}+\cdots+\frac{1}{227}\}$	227	6.00	227/83	2.735	2.718
6	$\sum_{n=1}^{n=616} \frac{1}{n} = \{\frac{1}{1}+\frac{1}{2}+\cdots+\frac{1}{616}\}$	616	7.00	616/227	2.714	2.718
7	$\sum_{n=1}^{n=1674} \frac{1}{n} = \{\frac{1}{1}+\frac{1}{2}+\cdots+\frac{1}{1674}\}$	1674	8.00	1674/616	2.718	2.718
8	$\sum_{n=1}^{n=4550} \frac{1}{n} = \{\frac{1}{1}+\frac{1}{2}+\cdots+\frac{1}{4550}\}$	4550	9.00	4550/1674	2.718	2.718
9	$\sum_{n=1}^{n=12368} \frac{1}{n} = \{\frac{1}{1}+\frac{1}{2}+\cdots+\frac{1}{12368}\}$	12368	10.00	12368/4550	2.718	2.718

Table 1 Illustrates the stepwise output of the harmonic series. As the steps proceed, the ratio between the day-adjacent values of n_{step} approximate the Napierian logarithmic base *e*, and by the 7th step the approximation is within 99.9%. These ratios of n_{step} form time-interval ratios of the number *e*.

Table 2: The Harmonic Series Equation Applied to 6-Day Active Creation

Step	n_{step}	Harmonic Series Equation	S_n Step Finish	n_{step}- n_{step-1} Step Range	Fibonacci Compare
Day Zero	1	$\sum_{n=1}^{n=1} \frac{1}{n} = \{\frac{1}{1}\} = Sn$	1	1	1
Night 1.0	2	$\sum_{n=1}^{n=2} \frac{1}{n} = \{\frac{1}{1} + \frac{1}{2}\} = Sn$	1.5	1	1
Day 1.5	4	$\sum_{n=1}^{n=4} \frac{1}{n} = \{\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \frac{1}{4}\} = Sn$	2.08	2	2
Night 2.0	7	$\sum_{n=1}^{n=7} \frac{1}{n} = \{\frac{1}{1} + \frac{1}{2} + \cdots + \frac{1}{7}\} = Sn$	2.59	3	3
Day 2.5	11	$\sum_{n=1}^{n=11} \frac{1}{n} = \{\frac{1}{1} + \frac{1}{2} + \cdots + \frac{1}{11}\} = Sn$	3.02	4	5
Night 3.0	19	$\sum_{n=1}^{n=19} \frac{1}{n} = \{\frac{1}{1} + \frac{1}{2} + \cdots + \frac{1}{19}\} = Sn$	3.55	8	8
Day 3.5	31	$\sum_{n=1}^{n=31} \frac{1}{n} = \{\frac{1}{1} + \frac{1}{2} + \cdots + \frac{1}{31}\} = Sn$	4.03	12	13
Night 4.0	51	$\sum_{n=1}^{n=51} \frac{1}{n} = \{\frac{1}{1} + \frac{1}{2} + \cdots + \frac{1}{51}\} = Sn$	4.52	20	21
Day 4.5	83	$\sum_{n=1}^{n=83} \frac{1}{n} = \{\frac{1}{1} + \frac{1}{2} + \cdots + \frac{1}{83}\} = Sn$	5.00	32	34
Night 5.0	137	$\sum_{n=1}^{n=137} \frac{1}{n} = \{\frac{1}{1} + \frac{1}{2} + \cdots + \frac{1}{137}\} = Sn$	5.50	54	55
Day 5.5	227	$\sum_{n=1}^{n=227} \frac{1}{n} = \{\frac{1}{1} + \frac{1}{2} + \cdots + \frac{1}{227}\} = Sn$	6.00	90	89
Night 6.0	373	$\sum_{n=1}^{n=373} \frac{1}{n} = \{\frac{1}{1} + \frac{1}{2} + \cdots + \frac{1}{373}\} = Sn$	6.50	146	144
Day 6.5	616	$\sum_{n=1}^{n=616} \frac{1}{n} = \{\frac{1}{1} + \frac{1}{2} + \cdots + \frac{1}{616}\} = Sn$	7.00	243	233

Table 2 illustrates the stepwise output of the harmonic series along with the total and comparison to Fibonacci Series. As the Day 6.5 Step Range diverges from Fibonacci 233, this is the step where the natural base "e" becomes within 99.8%. The author is unaware of any Fibonacci Spiral Count of 233 that occurs in Nature.

Table 3: Time Spans Between Calendar Flood Events as Reported

Reference	Date Noah	Days	Total Days	Comment
Gen 7:11	**1/1/600**	**0**	**0**	**Ark Assembly**
Gen 7:11	**2/17**	**47**	**47**	**Flood Begins/Rain/Fountains**
Gen 7:24, 8:3,4	**7/17**	**150**	**197**	**Ark Comes to Rest**
Gen 8:5	**10/1**	**73**	**270**	**Drying, First See Mtn. Tops**
Gen 8:13	**1/1/601**	**90**	**360**	**Remove Hull, See Dryness**
Gen 8:14	**2/27**	**57**	**417**	**Earth is Dry. Noah Disembark**
Gen 7:12,17,8:6		**40**		**Active Flood Time, (Noah sees)**
Gen 8:6		**21**		**Bird Wait/Drying Time**
Gen 7:24		**110**	**150-40**	**150 Days includes the 40 Days**
Activity	**Time Interval Ratio**	=	**Actual**	**Comment**
Fountains/Rain	**110/40**	**2.75**	**2.718**	**Napierian Log Base *e***
Flooding/Drying 1	**197/73**	**2.70**	**2.718**	**Napierian Log Base *e***
Drying 2/Drying 3	**90/57**	**1.58**	**1.618**	**Golden Ratio φ**
Drying 3/Bird Dry	**57/21**	**2.71**	**2.718**	**Napierian Log Base *e***

Table 3 shows the Flood account Dates. There are three periods of the Flood that show time-interval ratios of the number "e", based upon the ratios of the numbers of days of the respective periods. There is also an instance of a time-interval ratio of the number φ (phi), also known as the Golden Ratio during the second drying phase. All of data participate in a ratio close to known mathematical constants.

Table 4: From Planets to Plants, Time-Interval Ratios are Observed

Fraction of a circle between adjacent leaves on a stem	***Angle between adjacent leaves***	***Periodicity of leaves (one rotation around branch)***	***Plant Examples***	***Planetary Orbit Time Interval Ratio***	***Inverse of Fraction, compare to φ^2 (2.618)***
1/2	180°	2	Elm, lime, linden, mulberry	Neptune: Uranus (2/1)	2
1/3	120°	3	Alder, beech, birch, blackberry, hazel	Uranus: Saturn (3/1)	3
2/5	144°	5	Apple, apricot, cherry, holly, oak, plum	Saturn: Jupiter (5/2)	2.5
3/8	135°	8	Pear, poplar, rose, sunflower, sycamore	Jupiter: Asteroids (8/3)	2.67
5/13	138.5°	13	Almond, white pine, willow	Asteroids: Mars (13/5)	2.6

Table 4. The influence of the Fibonacci numbers is seen on an astronomical scale as well as that of the plant world. Ratios of Fibonacci numbers determine the angle in which leaves are arranged around the axis of a branch. Phyllotaxis Data exhibit time-interval ratios of the number φ^{-2}. Planetary data exhibit time-interval ratios of the number φ^2. Phyllotaxis after DeYoung and Wolfrom. Planetary ratios after Willson.

Figure 1: Logarithmic Scale of Variations

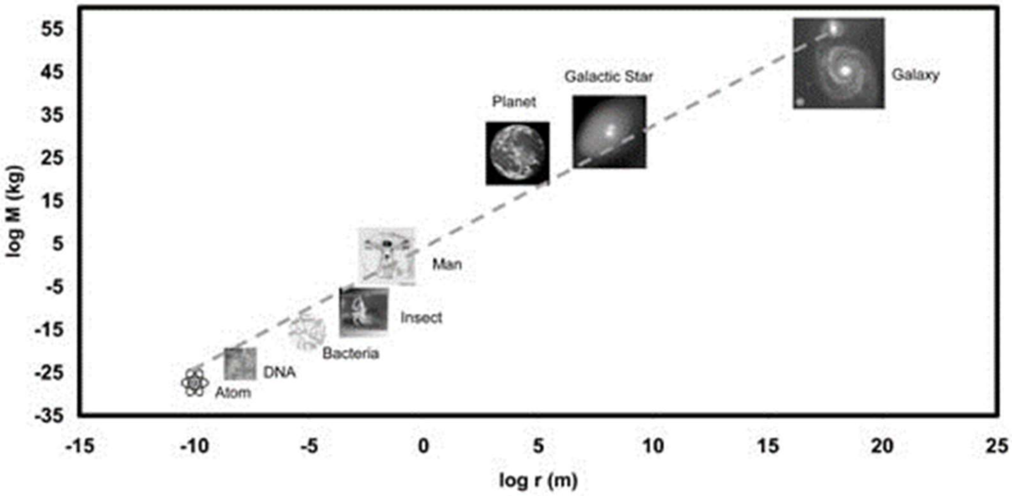

Figure 1 Logarithmic scale of variations of some of the structures found in our universe in terms of mass (M) and size (r). Despite the vast differences of mass and size between these structures, this figure demonstrates the logarithmic correlation that exists between mass and size in the universe. From (Batarseh, 2008).

Figure 2: Harmonic Sequence Spiral

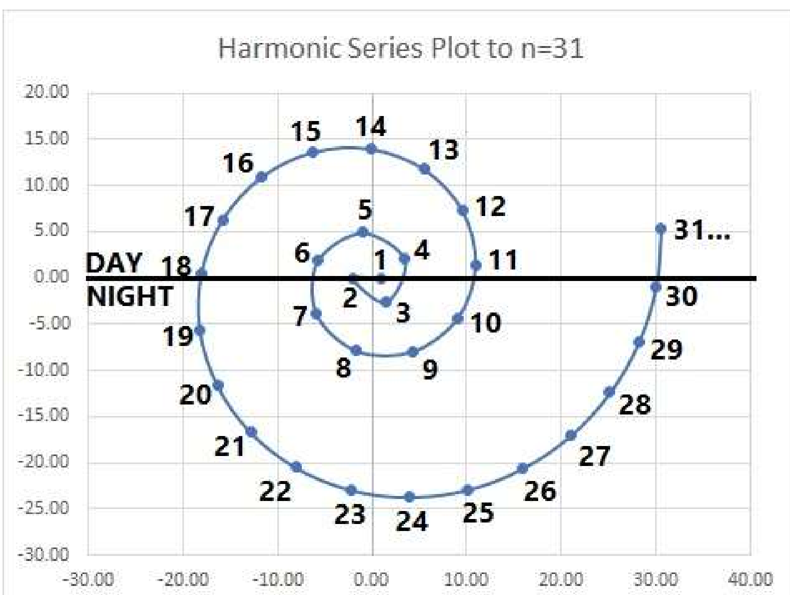

Figure 2 shows the harmonic sequence data to n=31. The harmonic sequence data is plotted parametrically on the x (DAY/NIGHT) and y (up and down) axes. The amplitude of the spiral increases with n as the spiral turns around z-axis (pointing into the page). Every time the spiral makes 1 complete rotation, representing one creation day, n increases by a factor approaching 2.718. These are time-interval ratios of Napierian logarithmic base, e.