THE UBIQUITY OF THE DIVINE (GOLDEN) RATIO AND FIBONACCI NUMBERS THROUGHOUT THE HEAVENS AND THE EARTH

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KEYWORDS:

Fibonacci Numbers, Divine Proportion or Golden Ratio, Phi, Golden Spiral, Golden Angle.

ABSTRACT

In this paper I first discuss the spiral shape that is commonly found in nature. I then relate how the Fibonacci numbers and the divine ratio are an inherent part not only of this spiral shape, but also of other phenomena in nature. We then take a short look at the historical origin of the Fibonacci numbers. We then observe that the divine ratio, the golden rectangle, and Fibonacci numbers make their appearance in many areas of life such as art, music, architecture, the human body, items used in normal life, and so forth. These factors are then considered in the structure, design, and function of plants. The evolutionary explanation for their origin and prevalence in nature is discussed. A comparison is then made between the small world of atoms and the solar system. Lastly I discuss how this information serves as yet another proof for scientific creation is discussed.

INTRODUCTION

The purpose of this paper is to reveal that there exists in the universe a combination of shapes, numbers, patterns, and a ratio, whose existence and relationships are a grand testimony to the creator. Their ubiquity – existing in the smallest to the largest parts, in living and non-living things – reveals the awesome handiwork of God. At the same time God’s interest in beauty and form is examined. The evolutionary explanation concerning their origin and existence is also presented.

In Romans 1:20, we read that it is ‘the things that are made” that reveal the attributes of God (that He exists). But what should we think concerning the existence of an object that in itself is not an object, yet is observable in living and non-living things throughout all of creation? Of itself, it has no weight, takes up no space, is invisible, and yet is visible. It is a part of many objects but cannot be separated from them without losing its existence and identity. What is this “made” but “nonexistent”, measurable object? It is the spiral (a curved line that winds itself around a central point and recedes from it). In its most beautiful and common form it produces an angular, logarithmic growth pattern whose ratio of growth is such that, as it gets larger, its shape does not change. It “is the only type of spiral that does not alter its shape as it grows” as noted by Gardner [4, p. 128]. It is commonly referred to as the “golden spiral” (the Archimedes spiral will not be considered in this article; see Appendix A). Its ratio of growth, being proportionate, was originally called the “divine proportion” as stated by Gardner [3, p. 128]. This ratio is commonly referred to as the “golden section,” “golden ratio, “golden mean,” or “Phi” (named after Phideas, the Greek sculptor, and represented by the Greek letter Φ). This ratio and the golden spiral, as we shall see, are ubiquitous throughout creation.

The golden spiral is most commonly observed in shells (the chambered nautilus is probably the clearest example). This spiral is visible in things as diverse as: hurricanes, spiral seeds, the cochlea of the human ear, ram's horn, sea-horse tail, growing fern leaves, DNA molecule, waves breaking on the beach, tornados, galaxies, the tail of a comet as it winds around the sun, whirlpools, seed patterns of sunflowers, daisies, dandelions, and in the construction of the ears of apparently all mammals.

This spiral follows a precise mathematical pattern. We will first look at this pattern in sunflowers. By looking carefully at a sunflower you will observe two sets of spirals (rows of seeds or florets) spiraling in opposite directions. When these spiral rows are counted in their opposite directions, you will discover that in the overwhelming number of the cases that these numbers, depending upon the size of the flower, will consistently be of the following ratios:

if small, 34 and 55; if medium 55 and 89; if large 89 and 144.

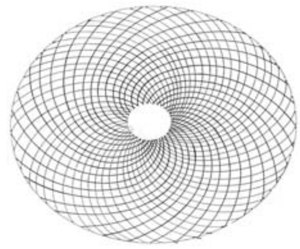

Figure 1. Sketch of sunflower consisting of 34 and 55 spiral rows.

These numbers are part of the Fibonacci sequence. In this sequence the numbers are: 1,1,2,3,5,8,13,21,34,55,89,144,233, ad infinitum. *Each succeeding number is the sum of the two preceding numbers.* Leonardo Fibonacci, alias Leonardo of Pisa, who was born around A.D. 1180, discovered this sequence. It is described in his famous book, *Liber Abaci.* He discovered these numbers by setting up a hypothetical problem of rabbit populations. In this problem, beginning with one pair of rabbits, it is supposed that for each month thereafter, that another pair will be produced, and that this pair and every pair thereafter will become productive each second month after their birth. In this situation the number of rabbits that are produced each month follows the Fibonacci sequence. Although described as an idealized genealogy with rabbits, this genealogy actually occurs with minor variations in male bees (drones) as described by Huntley [10, p. 160]. Several hundred years would pass before this sequence would be discovered in nature.

Inherent in the Fibonacci numbers is the "golden proportion." For example, when the smaller number of this pattern is divided into the larger number adjacent to it, the ratio will always be close to 1.61803; if the larger one adjacent to it divides the smaller number, the ratio will be very close to 0.61803.

Illustration:	55 ÷ 34 = 1.617647	34 ÷ 55 = .618181
	89 ÷ 55 = 1.618181	55 ÷ 89 = .617977

This ratio is only true for this set of numbers. This ratio - 1.618 - is an approximation of its true value of [$1+\sqrt{5})/2$]. This ratio has served mankind in three ways: it provides beauty, function, and reveals how wise, good, and powerful the Creator is. Let us see if we can learn why Johann Kepler called this ratio "a precious jewel." [7, p. 112].

BEAUTY

Why did Phideas, the Greek sculptor, and many others in ancient Greece and Egypt use this ratio in creating their works of art and architecture? Because this ratio has been found to be remarkably pleasing to the human eye for it produces what is called a Golden Rectangle. This most "beautiful" rectangle satisfies the following property: "The longer side is to the shorter side as the sum of the two sides is to the longer side," or stated another way, if the short side of the rectangle is 1, the long side will be 1.618. Mathematically: $x/1 = (x+1)/x$ (See Figure 2)

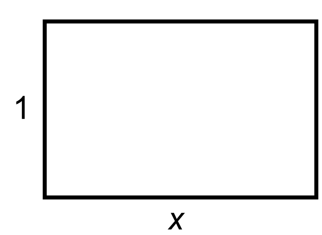

Figure 2. Golden Rectangle

Here, we assume the shorter side is 1 unit long. The above equation yields $x^2 - x - 1 = 0$, one of the roots of the latter being $x = (1+\sqrt{5})/2$ = *length of longer side*. Thus *x is 1.618* (an approximation of its true value [$1=\sqrt{5})/2$]) times the length of 1, produces a "golden rectangle."

This "Golden Rectangle" has another interesting property: If we "chop off" a square from one end, the remaining (smaller) rectangle is also a golden rectangle (See Figure 3), i.e., the ratios of the sides remain the same. Continuing this process of "chopping off" squares, we obtain a "nested" sequence of golden rectangles, with the "golden spiral" fitting perfectly (See Figure 4).

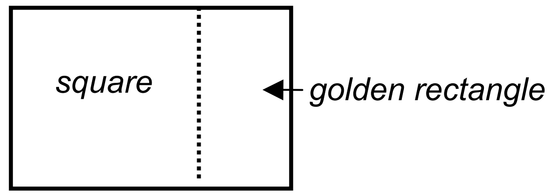

Figure 3. "Chopped off" golden rectangle

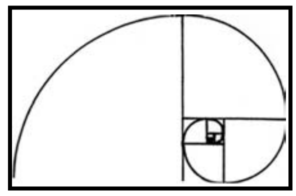

Figure 4. A "nested" sequence of Golden Rectangles

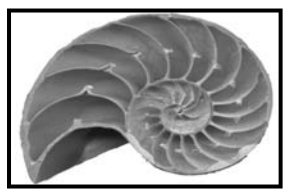

Figure 5. A Nautilus shell closely fits the golden rectangle

This pleasant rectangular shape was used in the designing of the Parthenon in Greece and as the basic shape for many of their numerous pictures, vases, doorways, windows, statues, etc. It appears in the Great Pyramid of Egypt. The United Nations building is a golden rectangle. Many of the things you use are (approximately) patterned after the golden rectangle—credit cards, playing cards, postcards, light switch plates, writing pads, 3-by-5 and 5-by-8 index cards, etc., as Garland has described [6, p. 19]. It is used in advertising to sell products since this shape, more than any other, is generally more attractive than other shapes to the eye of the potential user or buyer.

Artists such as Leonardo da Vinci, Van Gogh, Vermeer, John Singer Sargent, Monet, Whistler, Renoir, Mary Cassatt, Giotto, Durer, and others employed the golden proportion in their works of art. As noted by Garland [6, p. 34,36] they would "take a blank easel and divide it into areas based on the golden proportions to determine the placement of horizons, trees, and so on" Why the golden proportion? Art forms can be either of static or dynamic symmetry. In static symmetry the lines have definite measurements whereas in dynamic symmetry it is the proportioning of the areas that is given emphasis. As Runion explains [16, p. 84,85], dynamic symmetry means "growth, power, movement. It gives animation and *life* to an artist's work . . . rather than the effect of stillness and quiet" of static symmetry. This is an appeal of the golden ratio. Can we then assume that this "divine" ratio is one of God's unique ways of displaying His love for beauty throughout His creation?

Let's consider a piano keyboard and its relationship to the Fibonacci numbers and beauty in music. The black keys are in groups of 2 and 3 (Pentatonic scale). An octave is composed of 8 white keys (diatonic scale). These 8 and the 5 black keys, or 13 all together, make up the Chromatic scale. Many musicians believe that the most beautiful chords found in music are the major and minor sixths, as explained by Garland [5, p. 118]. The major sixth (consisting of C and A) have vibrations per second of 264 and 440 respectively, which is a ratio of 3:5; the minor sixth (consisting of E and high C) have vibrations per second of 330 and 528 respectively, producing a ratio of 5:8. Musicians such as Bach, Beethoven, Bartok, and others (like artists with their palette), as Garland describes [6, p. 36] would "divide musical time into periods based on the same proportion (golden) to determine the beginnings and endings of themes, moods, texture, and so on." Garland [5, p. 119] continues by saying the "numbers themselves and the proportion they define not only look good to the eye and sound good to the ear, but also feel right aesthetically, are exact mathematically, and appear to be omnipresent." This is one reason that much of what is considered great art and music has maintained its appeal over time. Why? They were following God's mathematical proportion in creating works of enduring beauty. Should we then also consider that we could bring more glory to God by producing music and art based upon this golden or "divine ratio"?

There are golden proportions found in the human body. If you measure from your feet to your navel, and multiply that measurement by .618, and add it to your feet-to-navel measurement, you will be very close to your actual height. Your foot-to-knee measurement when multiplied by 1.618 will be very close to the distance to your navel. By measuring your navel to your chin, and then multiplying by .618, you will get the approximate length of your face. These factors work very well except for most young adults who are in a rapid growth period.

The human face exhibits numerous golden proportions. Some measurements such as chin to lips, lips to tip of nose, tip of nose to pupils, pupils to top of head, and others, when multiplied by either .618, or 1.618, will give you the predicted distances between these facial parts. If fact persons who have numerous golden proportions among their facial features are often considered very beautiful.

The Fibonacci numbers, the golden spiral, rectangle, and triangle, and the divine or golden ratio or proportion, and their intertwining relationships are several facets of God's method for producing objects of great and lasting beauty, including many facets of the human body. Since the human body is made in His image, I think we should expect Him to design it with pleasing harmonious proportions. Gardner [4, p.130] captures the essence of this thought by citing Adolph Geising who says:

> *The golden ratio is the most artistically pleasing of all proportions and the key to the understanding of all morphology (including human anatomy), art, architecture and even music.*

These discoveries about Fibonacci numbers, the golden ratio, the golden rectangle, and so forth, have revealed unto us a portion of God's wisdom that He has displayed to show us His love for beauty and harmony.

ORDER AND FUNCTION

Another area of great interest that shows order and functionality is the occurrence of Fibonacci numbers in the spiral arrangement of leaves around a plant's stem (called phyllotaxis). This spiral pattern is observed by viewing the stem from directly above, and noting the arc of the stem form one leaf base to the next, and the fraction of the stem circumference which is inscribed. In each case the numbers are Fibonacci numbers. Examples: In an elm the arc is 1/2 the circumference; in beech and hazel, 1/3; apricot, oak, 2/5; in pear and poplar, 3/8; in almond and pussy willow, 5/13; and in some pines either 5/21 or 13/34. Why did God arrange them this way? This spiraling pattern of leaves around the stem by these numbers assures that each leaf will receive its maximum exposure to sunlight and air without shading or crowding from other leaves.

T. Anthony Davis [3, p. 237,239] conducted an extensive study on the arrangement of leaves on a large variety of palm trees in India. He discovered that "different species of palms display different numbers of leaf spirals, and the numbers always match with Fibonacci numbers. . . . Palms bearing 4,6,7,9,10,11, or 12 obvious leaf spirals are not known."

Karchmar [12, p. 64], said that "In an overwhelming number of species (434 species in the Angiospermae and 44 species in the Gymnospermae were found by T. Fujita in 1938) the parastichy [spiral arrangement] numbers fall in the Fibonacci sequence, the most common pairs of numbers being 2:3 and 3:5." Karchmar also stated "The most accurate method for studying plant phyllotaxis is by transecting the apical bud and making observations on the cross-section. When one examines such a cross-section, the most striking feature to meet the eye is the spiral appearance of the arrangement of leaf primordia. . . . There is a definite, heritable spiral arrangement of leaf primordia." How incomprehensible is the omniscience of God to place in the genes of each of the large variety of plants studied by Fujita, this singularity of spiral arrangement, yet each plant being of its own unique kind!

Not only do we discover this pattern in leaf arrangements, but also we consistently find this arrangement in flower petals. Examples: a lily has 3 petals, yellow violet 5, delphinium 8, mayweed 13, aster 21, pyrethrum 34, helenium 55, and michaelmas daisy 89. To those persons who like to pull off flower petals to decide if someone loves them or not, if they know these petal numbers and others, they can mathematically place the odds in their favor!

Such a great variety (of spiral ratios in leaf and petal arrangement) illustrates the incomprehensible extent of the creativity of God. Surely those who take the time to consider God's use of this ratio in nature will find such a study pleasurable and never boring (Psalm 111:2). Hoffer [7, p.117] cites the following quote by C. Arthur Coan:

> *Nature uses this as one of her most indispensable measuring rods, absolutely reliable, yet never without variety producing perfect stability of purpose without the slightest risk of monotony.*

When rows of bracts are counted on pinecones and pineapples, they exhibit Fibonacci numbers. On pine cones there are two rows to count, 8 and 13 (to observe, use cones soaked in water). On a pineapple, there are three rows of bracts. Their numbers will be 8, 13, and 21. Humanly speaking, it is hard to imagine how God was able to plan so precisely the intertwining of these three sets of numbers into one object.

How does the Fibonacci sequence provide for the development of two sets of spiral rows of seeds in sunflowers, daisies, dandelions, and other members of the *Compositae* family? And why? When comparing studies from several sources, the overall conclusion is that this numbering system produces between the rows of seeds the optimum divergence angle of 137.5º (called the golden angle, golden Phi angle, golden divergence angle, golden section angle). Stewart explains why this golden angle number is significant [18, pp. 138] in relationship to the Fibonacci sequence:

> *Take two consecutive numbers in the Fibonacci series: for example, 34 and 55. Now form the corresponding fraction 34/55 and multiply by 360º, to get 222.5º. Since this is more than 180º, we should measure it in the opposite direction round the circle – or equivalently, subtract it from 360º. The result is 137.5º.*

The golden ratio of 34/55 is 0.61818. By multiplying 360º by 0.61818 we get 222.5; subtracting from 360º we get 137.5º, the golden angle.

Why this golden angle? As Knott states [13] and other sources confirm, that

> *The golden section angle produces the best packing.*

Why is this pattern the best way to pack seeds? Knott explains that any rational system of numbers (any number which can be written as an exact ratio) will produce long and slender flower heads, inefficient use of space in the seed head (producing gaps), and seeds in long straight lines. Therefore he asks,

> *What is "the best" irrational number? One that never settles down to a rational approximation for very long. The mathematical theory is called CONTINUED FRACTIONS.*

For plants the best numbers would be Fibonacci fractions: 1/1, 1/2, 2/3, 3/5, 5/8, 8/13, etc. As Knott explains:

> *Any number which can be written as an exact ratio (a rational number) would not be good as a turn-per-seed angle*. . . . *Which is why you see the Fibonacci spirals in the seed heads!*

Furthermore, another reason for packing seeds in the Fibonacci ratio, Knott states that:

> *A circular seed head is more compact and would have better mechanical strength and so be better able to withstand wind and heavy rain*. . . . *Phi gives the best value for all sizes of flower head.*

What is the source of this marvelous design that we have just considered? Stevens [17, p. 166] gives us a naturalistic viewpoint by saying:

> *Although the special angle 137.5° is important to laying out the two-dimensional array of points, and although the relations of that angle to terms in the Fibonacci series give rise to 1, 2, 3, 5, 8, 13, etc., groups of spirals, the plant itself makes no use of the angle or the precision of growth implied by the angle*. . . . *The plant is not in love with the Fibonacci series; it does not seek beauty through the use of the golden section; it does not even count*. . . . *All the beauty and all the mathematics are the natural by-products of a simple system of growth interacting with its spatial environment.*

Simple system of growth? It is a marvel of mathematical design, construction, engineering, and wisdom! It governs the growth of numerous seed plants that provide food for God's creatures! What a wonderful display of God's goodness in creating sources of food whose design and complexity still test man's ability to understand the dynamics that have produced these phenomena.

To summarize these fascinating facts at this point – leaf and seed spirals, flower petals, rows of bracts – all functioning according to the Fibonacci numbers, what wonder does this speak to us when we realize that the information for these various phenomena is stored in the DNA? Should we 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, are both Fibonacci numbers? In essence the DNA molecule, as Wahl noted [19, p.10] is literally one long stack of golden rectangles.

What answers do evolutionists provide to explain these examples of such incomprehensible design in plant life, not to mention their presence in other phenomena? Here are a few of their comments regarding phyllotaxis in plants.

> *It can only be concluded that the plant is somehow biased from the first in favor of members arranged one by one in a Fibonacci sequence.* [12, p.65]

> *Leaf arrangement in terms of Fibonacci numbers . . . is the proof that they are aiming at the utilization of the Fibonacci angle.* [2, p. 88]

> *The flowers genes [Fibonacci petal patterns] specify all such information, and that's really all there is to it.* [16, p.135]

> *Regarding the origins of phyllotactic patterns. . . .We simply have to go back to the evolutions of minerals and of chemicals. . . . The properties of space-time itself, of which branching is a manifestation, appear as a . . . key for understanding phyllotaxis.* [9, pp. 324,325]

> *We learned from Einstein about the control exerted by curved space. The paper pleads for the general idea that the patterns and function we are concerned with in phyllotaxis do not come from the gene: they are properties of space-time.* [9, p. 347]

> *I suggest that when successful patterns have been discovered by nature, then genes become responsible for the fixation and rapid repetition of these patterns.* [9, p. 348]

"Biased plants *. . .*" "Leaves aiming *. . .*" "Genes specify *. . .*that's really all there is to it." "Simply go back *. . .*" "Properties of space-time *. . .*" "Nature discovers successful patterns and genes fix them *. . .*" This is science? Or is it "The grace of the fashion of it [flower]" by the Designer of the universe? (James 1:11)

There are scientists who are attempting to determine the origin of spiraling patterns and the rules that govern them [9, see entire book]. In one of the articles in this book the author suggests that one purpose of phyllotaxis may be to overcome the problem of entropy in plants, for, Jean says [9, pp. 325, 326]:

> *Given that almost nothing is known about the intimate processes of evolution, about the space-time responsible for it, and about the ontogenetic mechanisms inside shoot apices, the answer has been inferred in terms of the ultimate effect phyllotactic patterns are considered to achieve, that is, the minimization of the entropy of plants. . . . The model (Jean's minimal entropy) . . . proposes a formula for entropy that allows us to compare the various structures and to order them according to increasing entropy costs, given that evolution is concerned with thermodynamics and entropy, a fundamental way to attack all biological phenomena.*

He obviously realizes the problem that entropy bears upon the hypothesis of evolution, for creationists use it as a formidable tool against evolution. Later on in his paper, we see his hope for this hypothesis, for he states [9, pp. 346,348]:

> *Models (of phyllotaxis) . . . have been presented. . . . They are able to generate phyllotactic patterns from initial configurations. And what sets the initial configuration is the necessity that some rhythm starts sometimes during a growing process, and that entropy be minimized, order be increased, or fixed, and maximum energy be canalized, at that time, to give a chance to that*

initial pattern to continue to exist and to develop. . . . Phyllotaxis is the tip of an iceberg resulting from the Big Bang.

The author has pinpointed his hope. Since the laws of thermodynamics have never been overcome his hope for some rhythm to result by chance to overcome entropy is without any true scientific merit. God's laws will forever reign supreme and squash any hope of entropy ever being overcome until His new creation.

It might make more sense to trust in a mythical approach for the origin of spirals such as suggested by Hoffer [6, p. 117]:

> *Legend has it that the mollusks originated from the earthworm. One day the worm, rendered frisky by the sun emancipated itself, brandished its tail and twisted itself into a corkscrew for the sheer fun of it. If that is the case, there were frisky worms in abundance that twisted themselves into a wide and pleasing variety of logarithmic spirals.*

The frisky worm hypothesis? Phyllotaxis to overcome entropy? To further challenge those who want to believe in such unpromising thoughts is the discovery of the Fibonacci numbers, spirals, and divine ratio in the smallest and largest of phenomena. Let us begin with the small and then move to the large.

According to Wlodarski [18, p.61], in the world of atoms there are four fundamental asymmetries (structure of atomic nuclei, distribution of fission fragments, distribution of numbers of isotopes, and the distribution of emitted particles) and that "the numerical value of all of these asymmetries are equal approximately to the 'golden ratio,' and the number forming these values are sometimes Fibonacci or 'near' Fibonacci numbers." Huntley [8, pp. 523,524] observed that in the changing states of a quantity of hydrogen atoms, as the atoms gain and lose radiant energy at succeeding energy levels, the changing proportion of the histories of the atomic electrons form Fibonacci numbers.

Does a relationship exist between the elements of the periodic table and the logarithmic spiral? According to some research done in 1888 by Dr. G. Johnstone Stoney, and later studied by Lord Rayleigh in 1911, there appears to be positive evidence that this may be true. Cook comments [1, p. 413] on Dr. Stoney's paper and Lord Rayleigh's clarification:

> *In 1888 Dr. G. Johnstone Stoney submitted to the Royal Society a memoir on the "logarithmic law of atomic weights". . . . After many fruitless efforts . . . it happily occurred to Dr. Stoney to employ the volumes proportioned to the atomic weights. When this was done the resulting figure (see Appendix D) at once suggested a well-known logarithmic spiral. . . . The relations of all the known elements to each other could almost exactly be expressed by the logarithmic spiral. If this held true of what was known already, it became apparent that it would also hold true of what was to be discovered later on; and that if new elements were discovered after 1888, they would find their right places in the gaps indicated in Dr. Johnstone Stoney's spiral diagram. This remarkable process had already occurred in Mendeleeff's Periodic System since the year of its publication in 1869; and the fact that it also occurred in the spiral system (which includes the Mendeleeff system and gives it an additional confirmation) is one of the most convincing proofs that the spiral system is not merely a correct hypothesis, but a fundamental law.*

Whether this phenomena should be considered a fundamental law will require further research, although it is interesting that Lord Rayleigh said [13, p. 473], that the diagram was:

> . . . *Representing in a telling form many of the leading facts of chemistry.*

I find it of interest that in the diagram the curved line starts out as a logarithmic spiral and then changes into a narrowing Archimedean spiral (see Appendix A).

Having now observed some evidences for the existence of the Fibonacci sequence and spirals in small things, are they also observable in the realm of very large phenomena? A great number of the galaxies are of a spiral configuration. As for our planetary system, when the time period of each planet's revolution around the sun is compared in round numbers to the one adjacent to it, as described by M. Willson [17, p. 216], their fractions are Fibonacci numbers! Beginning with Neptune (rather than Pluto, see Appendix B) and moving inward toward the sun, the ratios are 1/2, 1/3, 2/5, 3/8, 5/13, 8/21, 13/34. These are the same as the spiral arrangement of leaves on plants!

Table 1. Revolution of the planets in days and their correlation to Fibonacci numbers and spiral arrangement of leaves on plants

	Observed	(theoretical)	Ratio	Plants
(Pluto)	90,000		(2:3 Neptune)	---
Neptune	60,193	62,000		---
Uranus	30,688	31,000	1:2	Elm
Saturn	10,670	10,333	1:3	Beech
Jupiter	4,332	4,133	2:5	Apricot
Asteroids	1200-2000	1,550	3:8	Pear
Mars	687	596	5:13	Almond
Earth	365	366 8/13	8:21	---
Venus	225	277 13/21	8:21	Pine
Mercury	88	87	13:34	Pine

There are creationists who have theorized that some cosmic force, probably in relation to the day of Noah's flood, altered the solar system, especially from Venus to the asteroid belt. This may account for the only significant theoretical adjustments in the chart: Mars (687 to 596), and Venus (225 to 277); the rest are very close to reality. Even with these two adjustments, the correlation of the Fibonacci pattern to the periodic times of the planets is far more than just a chance arrangement. It is one more example of God's marvelous mathematical arrangement of His creation. The fact that it is not perfect reveals that although Adam's sin affected the whole creation (Romans 8:22), yet God in His goodness has not allowed sin to overcome all the marks of His great handiwork (Psalm 19:1).

A most interesting divergence in the chart is that of the Earth. As the next planet in the series after Mars, its number should be 8:21, but it isn't. This number "skips" over Earth and connects to Venus. Even with this divergence we find that the Earth's period compared to Mars and Venus are Fibonacci numbers (8/13, 13/21). It is my opinion that this anomaly is evidence of God's showing the uniqueness of planet Earth in relationship to the whole cosmos. It also accomplishes another fact, for this "anomaly" shatters the big bang and nebular hypothesis, for if all the planets formed from a whirling cloud of dust and atoms, this feature would not be present. To think that the times of revolution of the planets around the sun correlates with the arrangement of leaves around stems on plants is also an amazing phenomena.

CONCLUSION

Since the heart of science is based on observable and repeatable evidences, I believe that the information presented in this article qualifies on this basis and is another excellent proof for scientific creation. Let us evaluate what has been described in this article. We are faced with observing throughout the entire universe - the golden or logarithmic spiral, the golden rectangle, the divine ratio, and the Fibonacci numbers - and also that all of these facets are related to one another. It takes knowledge and wisdom of the highest order to produce such interrelated phenomena. How could a Big Bang or chance evolutionary processes ever produce such interrelated order and beauty in the universe? And how could they be the product of natural laws? For example, consider the formation of this line [___]: did the “natural” laws of gravity and adhesion attach the ink to this paper to form it in a straight line? And if they did, what moved these laws to form it? The same question could be asked about a spiral on the same piece of paper and of its ubiquitous occurrence throughout the universe. In addition the fact that the spiral and the other phenomena we have studied cannot be isolated as separate entities without their ceasing to exist, makes it impossible for them to have been produced by evolutionary processes or natural laws. **T**he only rational answer for their presence everywhere is that an intelligent personal being first *thought* the visible nature of these “invisible entities” into existence. As said by James Orr [12, p. 122]:

> *. . . this inference [the universe has a wise and intelligent author] . . . bespeaks . . . order, plan, arrangement, harmony, beauty, rationality in the connection and system of things. . . . is the proof of the presence of **thought** in the world.*

In a footnote relating to this statement, Orr adds this quote by Principal Shairp:

> *. . . penetrate into nature wherever he [the scientist] may, thought has been there before him.*

Orr then sums up his position by saying:

> *The assumption on which the whole of science proceeds - and cannot but proceed - in its investigations, is that the system it is studying is intelligible. . . . It admits of being reduced to terms of thought. There is settled and established order on which the investigator can depend. Without this he cannot advance one step.*

Scientists are faced with the fact that their ability to *think* about what they are investigating requires that they presuppose that what they are studying will yield its “thoughts” (information) in an orderly pattern so that they can understand it. They also cannot describe any scientific fact without using thoughts (words) stated in a logically coherent pattern in order to intelligently communicate to others and themselves what they have learned from nature. They *prove* what Orr just stated.

Truly mankind is made in the image and likeness of God and is therefore able to “think God’s thoughts” after Him! And all of nature is the result of God’s *thoughts.* Nature is a visible fingerprint of God’s invisible, yet personal existence. How great it is that we can also know what He is like through His written thoughts as revealed in Holy Scripture. And we can also know Him *personally*. How? By *believing* on His Son, the Lord Jesus Christ, as savior for our sins. “Believe on the Lord Jesus Christ, and you shall be saved” (John 3:16). The universe and all of the phenomena we have studied were created by Jesus Christ, who is also the Savior of all who believe in Him (Colossians 1:14-17).

> *Great things He does, which we cannot comprehend. (Job 37:5)*

> *Thou art worthy O Lord, to receive glory and honor and power: for thou hast created all things, and for thy pleasure they are and were created. (Revelation 4:11)*

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APPENDIX A. ARCHIMEDES SPIRAL

Although observable in some parts of nature, from what is presently known, it is not as ubiquitous as the Golden Spiral. The following information about this spiral was gathered from Anton [1, p. 710].

Spirals: *A curve that "winds around the origin" infinitely many times in such a way that r increases (or decreases) steadily as θ increases in called a* ***spiral****. The most common example is the* ***spiral of Archimedes****, which has and equation of the form,*

$$r = a\theta \quad (\theta \geq 0) \tag{1}$$

or

$$r = a\theta \quad (\theta \leq 0) \tag{2}$$

In these equations, θ is in radians and a is positive.

r = is the radius vector
a = is an arbitrary constant
θ = is the angle of the radius vector from some initial direction.

It is the kind of spiral you observe on a phonograph record.

APPENDIX B. AN EXPLANATION FOR BEGINNING THE FIBONACCI SEQUENCE IN THE PLANETARY SYSTEM WITH NEPTUNE AND NOT PLUTO.

Although my purpose in this paper is not to get into the debate on whether Pluto is a planet or not, I do suggest that based upon what is presented in this paper about the orientation of the Fibonacci numbers and their relation to the planets, that this information is not favorable in declaring that Pluto is a planet. Here are my reasons for coming to this conclusion.

1. "Eight" is one of the numbers in the Fibonacci ratio, not "Nine."
2. Although the sequence between Pluto and Neptune fits the Fibonacci ratio, it is in the opposite direction (by my reference, 2:3).
3. When making the comparison of the periods of revolutions of the planets with the leaf arrangement of plants, as far as I know there are no plants with a leaf arrangement of 2:3 (three leaves in two turns on the stem) as is evident with many other plants.

It is because of these reasons I began with Neptune instead of Pluto. In the two sources that I discovered the Fibonacci sequence in the planetary system, both were written before Pluto was discovered.

Two new small planets have been discovered beyond Pluto. As to how they will be classified will depend upon further research.

I assume this will add more fuel to the debate.

APPENDIX C. SOURCES OF SUPPLEMENTARY INFORMATION

Trudi Hammel Garland, Fascinating Fibonaccis, Dale Seymour Publications, Palo Alto, CA 1987. Available: www.bbhomeschoolcatalog.com or 800/260-5461. A very good handbook for any one interested in this subject.

Marl Wahl, A Mathematical Mystery Tour, Zephyr Press, Tucson, AZ. 1988. Mark Wahl gives many kinds of exercises for teaching math using the golden ratio and Fibonacci numbers. Other than its ending where he discusses the origin of these things in nature (which I consider is New Age in philosophy) it is useful.

Fibonacci Quarterly. Available in your local library. You will have to go back to the early issues for the appearance of these numbers in nature. The recent issues are highly mathematical.

Knott, Ron, Fibonacci Numbers and the Golden Section, www.mcs.surrey.ac.uk/personal/rknott/fibonacci/fib.html (Over two hundred pages of very good information, including art, architecture, music, math, etc.; written from a teacher's perspective.)

APPENDIX D. LOGARITHMIC SPIRAL OF THE ATOMIC SPHERES

This is the copy of the spiral from Plate III of the original paper written by Dr. Johnstone Stoney in 1888. This was copied from:

> Rayleigh, Lord, **On Dr. Johnstone Stoney's Logarithmic Law of Atomic Weight,** Proceedings of the Royal Society of London, Series A, Vol. LXXXV, (1911) p. 472.

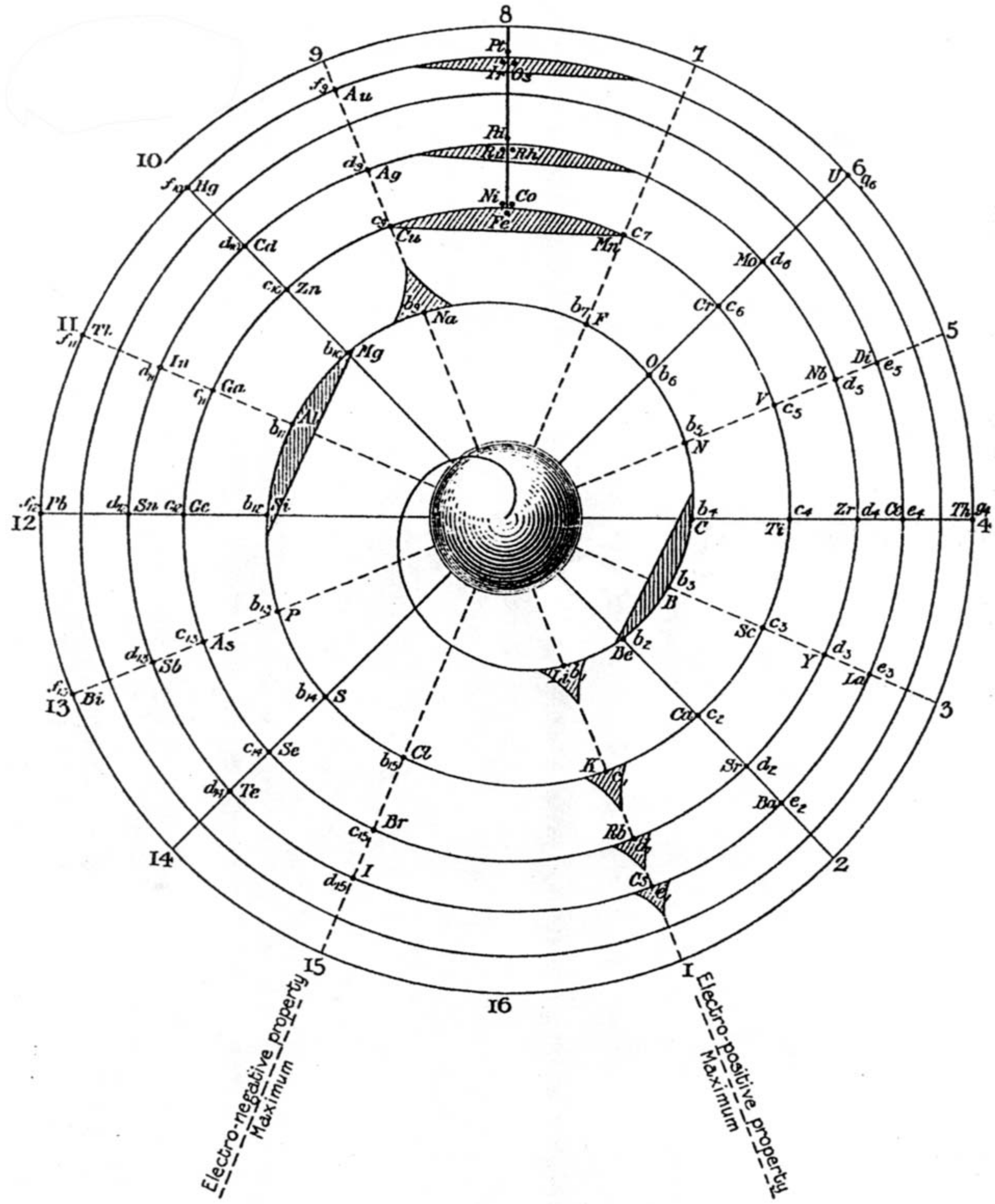

Figure D1. Logarithmic Spiral of the Atomic Spheres.
[Reduced from Plate III of original paper]