

# HOW THE EARTH RAN AWAY WITH THE MOON

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## HOW THE EARTH RAN AWAY WITH THE MOON

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### INTRODUCTION

Faithfully suspended in every night sky, the Moon hangs as a perfect example of grace and beauty, pervading the darkness with a hero's cause -

TO ILLUMINATE.

An elusive cosmic mystery, lain in plain sight, the Moon serves as a tantalizing reminder of both that which we think we know, and that of which mankind remains unenlightened.

There is a great deal of speculation on the varied effects which the Moon causes and creates here on Earth (ever heard of werewolves?). However, it may surprise many to discover that there is still no broadly acceptable, concrete consensus in the scientific community for just EXACTLY HOW the Moon formed; certainly none free of discrepancies.

The most widely accepted idea today explaining how the Moon formed is known as “Giant Impact Hypothesis” (GIH).

GIH is currently favored because it does the best job of explaining the majority of features observed in the Moon and the Earth-Moon orbital system.

Still, its framework remains flawed and there are some major difficulties with its ideas that have yet to be resolved, GIH is openly referred to as “the best idea we currently have”, and as so, stands waiting to be improved upon.

The “Capture Hypothesis” (CH) is another Lunar Origin theory which posits that the Moon formed elsewhere in the solar system and was later captured by Earth's gravitational field. Its ideas speak more to how the Moon came to be in orbit around the Earth, as opposed to how it actually formed.

As such, it too remains somewhat limited in scope. CH is yet largely unexplored and I believe it is a powerful missing piece of the puzzle.

While GIH explains many aspects of lunar data sets, I believe, as a whole, it remains unfulfilled and ultimately “captures” only a portion of the lunar origin story (no pun intended - ok, maybe just a LITTLE...).

Many people, myself included, believe any Lunar Origin process would be much more dynamic and complex than is currently recognized today, and that it requires a deeper focus on

the Solar System's story as a WHOLE AND INTEGRATED FABRIC as opposed to a history comprised of a series of isolated events.

It is with this perspective that we put forth the ideas in this article. This new, more comprehensive hypothesis we are developing borrows elements from GIH along with others from CH; to expand the scope of some already existing ideas, present some new ones and apply the alternative in a cohesive way in order to try to better understand the history of the Moon, the planets and their relationships with each other.

Being that GIH is the currently held theory governing the origin of the Moon, a brief synopsis is as follows...

### GIANT IMPACT HYPOTHESIS

1. A Mars-sized object collides with the embryo/proto-planet, heating and deforming both bodies and spewing ejecta into space.
2. The impactor rebounds and hits the planet again, WHERE MOST OF THE IMPACTOR'S CORE BECOMES INCORPORATED INTO THE PLANET'S CORE.
3. An orbital ring of very hot ejecta (very little of it metallic/volatile material) eventually cools and condenses into discrete particles.
4. As particles accrete, they sweep up the disk of ejecta. The largest body sweeps up the remaining debris/particles; becoming the Moon.

### ALTERNATIVE RESPONSE

To begin, I believe an event somewhat similar to that described in GIH did in fact occur to produce the Moon. However, I differ in belief as to where it occurred and exactly what it occurred with.

I believe that this Mars-sized planetoid (commonly referred to as "Theia") collided with MERCURY - NOT WITH THE EARTH.

After this "Giant Impact" with Mercury, an orbiting ring of debris was formed around the planet, lacking in volatiles, that eventually accreted into the Moon in much the same way as described in GIH.

In this way, I believe the Moon FIRST orbited Mercury, and as this article will attempt to convey, came into its present day orbit around Earth in a sort of planetary transfer, or concerted capture, involving primarily Mercury, Venus, Earth and MOST IMPORTANTLY - the Sun.

Such a hypothesis is obviously a variation of the already existing concept of a “planetary/lunar capture event”, and its merging with the general concept of a giant impact event.

In this case, we specifically believe that the Moon formed in a giant collision with Mercury, and in simple terms (which will be further detailed and supported later in this article) eventually escaped Mercury’s gravitation, was captured first by that of Venus’ and still, AGAIN later, escaped Venus to finally be captured by Earth’s gravitational field, where it obviously resides in orbit today.

We believe there is an abundance of evidence to support this event’s occurrence, which this article will attempt to put forth, while also attempting to address some of the MAIN COUNTER-ARGUMENTS against such an idea’s viability.

While this is an understandably radical concept for the sensibilities of many people, some of the concepts that will be explored we obviously feel have TREMENDOUS MERIT, and beg for further context and deeper understanding.

Though this isn’t the forum to analyze each facet in EXHAUSTIVE academic detail, it can be used to outline a general framework of thought and to bring attention to some very solvable problems.

These are, of course, VERY BIG IDEAS which we are introducing, that will no doubt be met with some level of skepticism (and appropriately so). It wouldn’t be science if there were not questions asked and many more answered. The simple fact is that if it is TRUTH, then it will stand. But, in regards to the origin of our Moon, the time for diligence is due...

I believe the effects of this Lunar Capture event can be found in everything from the formation of Earth’s tectonic plates and Earth’s inclined axis of 23.5° (responsible for the seasons), to the catalyzation of the Cambrian Explosion (which was the rapid increase of complex life found in the fossil record beginning 540 mill. yrs. ago). To begin our search for supporting evidence we turn our focus first to Mercury...

## SUPPORTING EVIDENCE FOUND IN MERCURY

### MERCURY’S MANTLE

If this large impact event which produced the Moon really did occur with Mercury, you would expect to be able to find some sort of notable geologic evidence within the planet to support it.

One of the major problems that GIH in its current form has is that the Earth bears no evidence of a global surface melting event that such a giant impact of that nature would produce; at least non as yet discovered and accepted.

HOWEVER, the amazing thing is that MERCURY DOES!...

The surface of Mercury itself bears the evidence of a cataclysmic event in its past which resulted in the literal SHATTERING and loss of much of its crust. Its mantle/crust is now only about 400 km thick.

With as abnormally large as Mercury's iron core is, its crust is equally as abnormally thin/small, with as much as HALF of the planet's original mantle now missing.

It would seem extremely likely that this fact would somehow be related to a large impact event of SOME KIND. At the VERY LEAST, the possibility without question exists. That alone should warrant further aggressive study. Yet, scientists seem content leaving it unresolved. This is especially troubling since this is by no means the only evidence supporting a giant impact occurrence on Mercury.

#### MERCURY'S INTERNAL STRUCTURE

As would be dictated in a Giant Impact scenario, the Moon is iron-poor, lacking in volatiles, and has an extremely SMALL iron core.

In contrast, Mercury is iron-rich and has an abnormally LARGE iron core, accounting for nearly 70% of the radius of the planet (the largest ration of any in the Solar System).

These facts and this relationship between the two objects is important when considered in the context of a Giant Impact event, how it unfolds and what is left behind.

Mercury's LARGE iron core, in relation to the moon's SMALL one, is a significant characteristic that would exist of a Giant Impact occurred between the two. It fits the narrative more than nicely - with the key being that the impactors core (MOON'S) becomes incorporated into the planet's core (MERCURY'S) on impact and rebounded impact.

It seems unlikely that Mercury would have such a LARGE iron core in relation to all of the other planets (most especially Earth if you believe in GIH as it stands) if it was not impacted by another differentiated planetoid, whereby that object's core was "injected" into Mercury's; causing such an abnormal and unique ratio found within Mercury's internal structure today.

## THE LOBATE SCARPS

The surface of Mercury also bears what could be possible further evidence of a global surface heating event in the planet's history, in what are known as Lobate Scarps.

These long, curving ridges are up to 3 km high and up to 500 km long. The scarps even cut through craters, indicating that they formed AFTER most of the Heavy Bombardment: making them unlikely to be a by-product of the planet's initial formation process.

The Lobate Scarps are the kind of faults that form by compression, which suggests that the entire crust of Mercury was compressed long ago.

I believe they are evidence of a global surface heating event and the consequent cooling of the planet; which would occur over many millions of years thereafter.

After this giant impact experienced by Mercury, its surface began to cool around a now much LARGER iron core and, as the planet lost internal heat, the core contracted and its crust was compressed, breaking to form the Lobate Scarps (much as the peel of a drying apple will wrinkle).

The Lobate Scarps were once thought to be unique to Mercury; but recently astronomers have detected faint ones on the Moon as well. This only further connects the two objects and lends even stronger support to the idea that they may be a consequence of a giant impact event experienced between each other.

## MERCURY'S ECCENTRIC ORBIT

Mercury has the most eccentric orbit of ALL of the planets. Its eccentricity is 0.21 with its distance from the Sun; ranging from 46,000,000 km to 70,000,000 km.

Mercury's higher velocity when it is near perihelion is clear from the greater distance it covers in each 5-day interval.

In simple terms, Mercury's orbital path around the Sun resembles more of an "oval" shape than do the rest of the planets, which trace a path that is more "circular".

I believe this characteristic can be considered supporting evidence for Mercury having experienced a giant impact in its past. With the idea that Mercury once held a more traditional, or "circular" orbit. I believe AT LEAST 2 things could have changed this...

1. The Giant Impact itself knocked Mercury a bit "off course", slightly affecting its orbital path.

2. Once the debris ring around Mercury accreted into the Moon, a more dynamic set of circumstances developed with a 3-way “network” of tidal forces now in play between the Sun, Mercury and the Moon. The Sun’s massive gravitation at these distances would wreak havoc on such an orbital system, causing any orbiting Moon to fall into an increasingly more eccentric/elliptical orbit over time; such as to escape Mercury’s gravitational field to possibly be recaptured again. However, the tidal forces exchanged between the 3 objects (and possibly Venus as well) would not only affect the Moon’s orbit, but MERCURY’S ORBIT AROUND THE SUN ITSELF as well, with similar eccentric consequences.

Tidal forces produce some of the most surprising and dramatic processes in the Universe. They can pull gas away from stars, rip galaxies apart and move oceans as they flex planets. We will explore this all important concept later in the article, as it plays a central role in every orbital system in the universe.

It is in these ways that I believe Mercury’s orbital path is evidence of not only a Giant Impact event, but the retention of an orbiting Moon (which we believe was our Earth Moon) for some period of time thereafter. Much more on these concepts will be discussed later in this article.

## MERCURY CONCLUSIONS

There seems to be a preponderance of evidence at least SUGGESTING that Mercury has experienced a Giant Impact event in its history. It seems irresponsible to rule it out without having at least thoroughly analyzed PHYSICAL GEOCHEMICAL SURFACE SAMPLES of the planet - something we have as yet failed to do.

I believe that Mercury’s geochemical composition will bear some of the same isotopic similarities found in Lunar and Earth rocks. A determination will have to be made about how much of Mercury’s original surface, and how much of its interior, was responsible for creating the Moon, in order to TRULY UNDERSTAND any isotopic evidence.

Nevertheless, I believe there will be some sort of connection supporting the idea that Mercury was the “donor” planet which “birthed” the Moon - NOT THE EARTH. Already, recent studies of these isotopic signatures of Lunar rocks have been shown to most closely match that of “aubrite” meteorites, which are, of course, most loosely associated with Mercury by many scientists.

It is within the geochemical composition of Lunar rocks and Mercury material that the deciding factor rests, and it is where we turn our attention next...

## THE GEOCHEMICAL COMPOSITION OF EARTH AND LUNAR ROCKS

Possibly the most IMPORTANT piece of evidence relative to this Giant Impact-Lunar Capture hybrid event we have proposed may be, quite poetically, what currently exists as the “strongest” ARGUMENT AGAINST its viability: that is, the geochemical properties/ composition of Earth and Lunar rocks when compared.

Specifically, it is the ESSENTIALLY IDENTICAL isotopic matches of elements like oxygen and tungsten most often cited as the reason why such an event (or ANY Capture theory) is deemed “impossible”. Because perspective is EVERYTHING, things are not always what they seem, and we believe there may be an answer to this problem.

While very different in many ways, analyses of Lunar rocks brought back by the Apollo astronauts, as we previously mentioned, have shown that these rocks have an ESSENTIALLY IDENTICAL isotopic composition of elements like oxygen and tungsten as do rocks found on Earth.

The isotopic signature of elements such as these found within a rock offer us a vast amount of information ABOUT that rock. One of the things it can tell us is where in the Solar System that rock formed.

The simple idea is that, if a rock (or planet) formed even a small distance from Earth (for example) in the initial solar nebula, it would have a measurably different isotopic composition of these elements (oxygen & tungsten) than would a rock which formed on Earth.

This is because they would have each formed at different distances from the Sun; and in different “patches” of the solar nebula.

The conundrum that this set of facts presents us with is nothing less than fascinating: and has proven to be a difficult hurdle for any Lunar Origin model to overcome as of yet. This data set seemingly poses a huge problem for the plausibility of any sort of “capture” scenario (which we will soon address); and it poses just as great a problem for GIH as well.

According to GIH as it stands, the Moon should still contain at least a PORTION of the original “Theia” object/material embedded in its composition, since “Theia” would have had to

originate at least SOME small distance from Earth to be able to impact it in the first place. Yet, the isotopic similarities such as those which are found cannot be reconciled by the events that GIH describes. Analyses of Lunar rocks does not support the presence of any Theia-like material.

In this case, the identical isotopic matches found confusingly suggest that the Moon and the Earth formed in the SAME EXACT AREA of the solar nebula, and that they are essentially the SAME EXACT MATERIAL.

While this contradicts the ideas put forth by GIH, on the surface it also presents a major difficulty for any sort of Lunar Capture scenario as well.

The problem which this poses for a “capture” event is obvious. If the Earth and the Moon formed of the same exact material, and in the same exact part of space, then the Moon never would have - NEVER COULD HAVE - formed or reside far away from Earth to later be captured.

It would have had to ALWAYS BE right near the Earth to have such an identical isotopic composition of oxygen and tungsten in its rocks when compared.

The key component which people are missing in this scenario is the understanding that just because the Moon and Earth rocks have these identical isotopic signatures DOES NOT necessarily mean that the WHOLE of the planets/objects themselves each HAD TO HAVE FORMED IN THE SAME EXACT PART OF SPACE - IF OTHER FACTORS ARE CONSIDERED which we will now present, and, until now, seem to have been ignored.

This brings us to maybe the MOST important aspect of the Lunar Origin story and the way to unlocking its secrets.

I believe a MAJOR component of this process, and a possible answer to the puzzle which this isotopic evidence presents, lies in the understanding of what is known as the “Late Veneer Hypothesis” (LVH).

I believe this theory and the events it describes is being overlooked as it applies to Lunar Origin theory in general and could potentially provide us with some real answers...

### THE LATE VENEER HYPOTHESIS

According to LVH most of the original “iron-loving”, or siderophile elements (gold, platinum, palladium and iridium) that bond most readily with iron, would have been drawn down

into Earth's core over tens of millions of years when the planet was initially forming, and thereby would be removed from the Earth's crust and mantle.

According to our understanding of planet forming processes, these elements should not and could not be found present in the surface layers of a planet in abundance (as they are on Earth) AFTER the planet had formed because they simply would not have "survived" the intensely hot temperatures.

As so, the amounts of these siderophile elements that we see today present in the outer layers of Earth, would have had to be supplied by meteorite bombardment - AFTER the core of Earth had already formed.

In simple terms, this posits that, at some point after much of Earth and its core had already formed, it was bombarded/covered by a heavy cosmic rain of rocky meteorite material, creating a sort of "candy shell" around the Earth, like an almond being dipped into milk chocolate.

However, what doesn't seem to be discussed much is exactly WHERE could all of this meteorite material, which bombarded Earth for tens of millions of years, have come from?

Well, we don't believe it was just a random batch of space debris. WE DO BELIEVE that this massive bombardment of meteorite material SPECIFICALLY ORIGINATED from a Giant Impact event that occurred between a large planetoid and Mercury; that also produced the Moon.

### SOLVING THE ISOTOPIC "PROBLEM"

When this "Theia" object collided with Mercury, a massive amount of debris exploded into space. Much of it formed a "ring" around Mercury, and slowly accreted into what became the Moon.

However, not ALL of this material was swept up by the newly forming Moon. I believe a substantial amount was dispersed into space, with much of it eventually reaching Earth, to provide the material necessary for a "late veneer" addition of chondritic material to the upper mantle, following the cessation of core formation.

The reason WHY Earth and Moon rocks have an essentially identical isotopic composition is because the rocks themselves ARE IN FACT IDENTICAL MATERIAL, originating from the same source.

I believe the outer layers of Earth originated from Mercury in this way, and we are essentially standing on the surface of what used to be Mercury, parts of its interior, and the planetoid “Theia” which it collided with.

This Giant Impact event created not only the Moon, but the material which would later bombard Earth and become Earth’s rocky mantle/crust - and THIS IS WHY AND HOW THEY HAVE SUCH AN IDENTICAL ISOTOPIC COMPOSITION!

The truth is, we still don’t know the isotopic composition of the isolated lower mantle of Earth itself, as well as no isolated samples of the surfaces of Mercury or Venus. The Moon is the ONLY extraterrestrial body for which we possess samples with a known geologic context (excluding Mars). It is for this reason that the weight which this isotopic “evidence” holds is overestimated, misunderstood and certainly premature. As so, we look elsewhere in the Solar System for further support...

### COMPARATIVE PLANETOLOGY

I believe ANY Lunar Origin theory, and certainly our Giant Impact Planetary Capture Hybrid version, requires a look at our Solar System in a greater context; focusing on the connectivity of its components and common threads of its very fabric.

A SIMPLE BIT of comparative planetology can reveal some of these similarities and give insight into the history of our Solar System’s backyard.

One of the most revealing data points relevant to our ideas are the simple RATES OF ROTATION that each of the planets exhibit. With each data point in the table representing 1 full rotation of the planet (in respect to the Sun) each planet’s rate of rotation is as follows:

<b>PLANET</b>	<b>RATE OF ROTATION</b>	<b>CLASS</b>
NEPTUNE	16.11 HOURS	1st Class
URANUS	17.23 HOURS	1st Class
SATURN	10.57 HOURS	1st Class
JUPITER	9.92 HOURS	1st Class
MARS	24.62 HOURS	1st Class
EARTH	24.00 HOURS	1st Class
VENUS	243.00 DAYS	2nd Class
MERCURY	58.60 DAYS	2nd Class

## THE TWO CLASSES

When analyzing these numbers we recognize 2 distinct classes, identified by a common characteristic.

The 3rd planet from the Sun (Earth) all the way through the 8th planet (Neptune) all complete one full rotation in a matter of HOURS. As so, they represent the 1st class.

Jupiter, which is so massive that it could contain 1000 Earths, STILL completes one rotation at a majestically fast pace of 9.92 hours.

Representing the 2nd class are Mercury and Venus, the 1st and 2nd planets from the Sun. Both complete one full rotation in a matter of DAYS - not hours - with Venus rotating once at the sluggish pace of 243.0 DAYS, and in a uniquely retrograde (backwards) direction.

The stark contrast between these 2 groups tells us that the inner 2 planets are rotating at a much drastically slower pace than are the 3rd through 8th planets.

What this says to me is that ALL of the planets at one time in the beginning of the Solar System rotated at a rapid, and possibly more uniform, rate (matter of hours).

At some point SOMETHING not only changed, but **DRASTICALLY SLOWED** both Mercury and Venus' rates of rotation.

The question this presents is two-pronged: 1) What specifically slowed the rotations of the 2 inner planets? 2) Why did the rest of the planets not experience this same change?

The obvious and most relevant factors in answering these questions are the **LOCATIONS** and **DISTANCE** from the Sun of both Mercury and Venus.

The 2 closest planets experienced a drastic slowing of their rates of rotation - the rest did not. To understand what specifically could cause such a thing, we find the answer in a paralleling common thread.

## THE SOLAR SYSTEM'S MOONS

With another bit of comparative planetology, we now will look at the other moons in our Solar System, and try to understand their relevance in the context of these questions.

There have been over 170 observed moons around the classical and dwarf planets. The moons in our Solar System are not distributed equally and it is suspected there may be many others in its far reaches that have yet to be discovered.

Pluto, Neptune and Uranus each have 5 or more known moons. Saturn has nearly 50 known moons. Jupiter has 4 large moons and at least 60 known smaller ones.

Mars has 2 known moons and Earth, obviously, has 1 moon. The fascinating fact is revealed when we see that NEITHER Mercury, nor Venus retain ANY orbiting moons! MERCURY AND VENUS ARE THE ONLY PLANETS WHICH HAVE NO MOONS!

This has always been a question for astronomers, as our understanding of the Solar Nebula hypothesis would lead us to believe that all of the planets formed in a similar way; with the terrestrial planets forming in a more similar ENVIRONMENT than the Gas Giants (as far as temperature), and thus each should share the characteristic of having developed/retained an orbiting moon as well. If Earth and Mars have at least one moon, why do Mercury and Venus have NONE?

### TWO PLUS TWO EQUALS YES

I believe the answer to all of this lies in the paralleled commonality in the 2 data sets we have analyzed. Mercury and Venus, the 2 closest planets to the Sun, are the only planets which have no moon. Yet, as we have previously noted, they are also the only 2 planets to complete one rotation in a matter of DAYS, not hours.

These two data points MUST be connected, and it seems almost OBVIOUS when we consider the only known phenomena (other than a giant impact) that could slow the rotation of an entire planet, which is OF COURSE, quite poetically, the presence of an orbiting moon.

### TIDAL FORCES

As we all know, the Moon principally governs the Ocean's tides here on Earth, due to the simple force of gravity. While the mathematical minutiae are not important here in this forum, the fact is that in our Earth-Moon orbital system, BOTH bodies exert different degrees of tidal force on each other.

When Earth's gravitation exerts a tidal force on the Moon, although there are no bodies of water on the Moon, friction within the flexing rock has slowed the Moon's rotation to the point that it now keeps the same face toward Earth, which is a quality known as Tidal locking.

Conversely, while to a much lesser degree due to the fractional total mass of the Moon, the Moon still exerts a tidal force of its own on the Earth. The friction of the tidal bulges with the ocean beds slows earth's rotation and makes the length of a day grow by 0.0023 seconds per century.

Fossils of ancient tide markings confirm that only 900 million years ago, Earth's day was 18 hours long.

Here we have a recognized phenomena and confirmed cause for the slowing of a planet's rate of rotation (ours), and that cause is the presence of an orbiting moon and its resistant tidal forces.

Tidal forces, however, can also affect orbital motion. Earth rotates eastward, and friction with the ocean beds drags what are known as Tidal Bulges, slightly eastward out of a direct Earth-Moon line.

These tidal bulges are massive, and their gravitational field pulls the Moon forward in its orbit. As a result, the Moon's orbit is growing larger by about 3.8 cm a year. So, not only is the Moon slowing Earth's rate of rotation, it is moving away from the Earth as it does so.

## CONCLUSION

All of these observations lay a factual foundation for hypothesizing that if the presence of a moon could slow the rate of Earth's rotation, then a similar event could be responsible for the drastically slow rotations of Mercury and Venus. The only difference is that the Earth probably hasn't held the Moon for as long as Mercury and Venus did; and more importantly, Mercury and Venus are closer to the Sun and its massive gravitation, which would only make these processes more extreme. We believe the Sun's intense tidal forces with such a proximity as Venus or Mercury would be too great over time for either to retain an orbiting moon for any indefinite period. This is why neither of them retain any moons. Still, if they lost Earth's moon in the past, just how did it happen?

## THE PLANETARY LADDER

The physics and specific mechanics of such a Lunar Capture event as the one we have proposed are extremely technical and complex in their nature, and much too comprehensive an undertaking to fully detail in an article such as this. Yet, we can still point to some characteristics which we feel are relevant and leave the math up to the smart people.

It may help in this case to view the planets as steps on a ladder, and the Moon's journey to Earth as a trip up that stairway (or down, depending on whether you're a glass half full or half empty person).

If we know that the Moon initially impacted Mercury, it is safe to assume it first orbited there. Because of the Sun's tidal forces, the Moon's orbit became ever more eccentric around Mercury over time.

Because Venus is the planet in between Earth and Mercury, it would serve as the next step on the stairway. With the Moon in a more eccentric orbit, it would be moving closer to Venus with each pass. Venus would be the first to engage in a sort of "planetary tug-of-war" for the Moon with Mercury, both while it still held the Moon in orbit and after it escaped.

Soon the Moon would be putting a more forceful tidal drag of its own on Venus with each passing orbit, with both planets competing for gravitational control. Over many millions of years, this further affected both planet's rates of rotation.

When Venus actually began its capture of the Moon, the network of tidal forces between The Sun, The Moon, Mercury and Venus more forcefully slowed Venus' rate of rotation over many MORE millions of years, presumably to NIL.

When the Moon's orbit around Venus became more and more eccentric and elliptical Earth's gravitation then came into play and engaged Venus in yet another "planetary tug-of-war" for the Moon in the same way as Venus first engaged Mercury.

This eventually pushed Venus' direction of rotation BACKWARDS, from NIL, into a retrograde (clockwise) direction. Venus is the ONLY planet which rotates in this direction and I believe it is directly due to this Lunar-Transfer/Capture event. It took the initial capture event and the ensuing orbit of the Moon to slow its rotation to Zero, and the second transfer event to Earth to fully push it backwards.

As a side note, Venus' 583.92 day interval between successive close encounters with Earth is equal to 5.001444 Venusian solar days; making approximately the same face visible from Earth at each close encounter. This sort of planetary-tidal-locking relationship between Earth and Venus may have arisen from their orbital interactions during this transfer/tug-of-war for the Moon. With close inspection, I assume there may be many other orbital relationships between the planets that have yet to be recognized as relevant to this event.

## OTHER POSSIBLE EVIDENCE

I believe this event is also a better explanation for the formation of Earth's tectonic plates. As it stands now, untold "gravitational interactions" between Venus and Earth THEMSELVES are held responsible for the massive, global network of fractures in Earth's crust that make up the tectonic plates.

Yet, if you imagine a Moon-sized body placed somewhere in between the planets, you get a much more dynamic series of forces and counter-forces with two planets and their gravity competing for one Moon. The stress imposed on the Earth's crust while FIGHTING Venus' gravity for the Moon is seemingly a more reasonable causation for these deep fractures which are the tectonic plates, and an exciting area for further study.

Another possibly related phenomenon is how Earth rotates on its axis at an angle tilted 23.5° from its ecliptic. This is obviously the reason why Earth experiences seasons. Well, I believe as our planet was capturing the Moon, and still competing for it with Venus, Venus' counter-force while pulling on the Moon made the Moon exponentially more forceful on the earth than the Moon would be "on its own", so to speak.

With every passing orbit, the Moon tugged ever so gently on the Earth, as a sort of tidal drag, akin to dragging your hand through water. With each tug, Earth's axis tilted ever so much more. Most of the planets spin on a somewhat tilted axis, and this may be a better explanation for its cause. Again, this would be another exciting area to further study.

However, the most EXCITING piece of this beautiful cosmological puzzle may be what happened when the Moon arrived here, at its HOME on Earth. In another dazzling connection, about 500 million yrs ago, Venus' crust and interior appears to have gone dead; with essentially no geologic activity having occurred since that time. This is almost simultaneous with the BEGINNING of an equally momentous event here on Earth; the Cambrian Explosion. The essential "death" of Venus and the "coming to life" of Earth happening at basically the same time is definitely no coincidence. It's all in the Moon...

## THE CAMBRIAN EXPLOSION

The Cambrian Explosion was a seminal moment in Earth's history, where the fossil record begins to reveal a massive increase/evolution of complex life forms on Earth, in a seemingly sudden and rapid manner.

There are many thousands of factors/changes which scientists feel may have aided this process, yet, we still don't know what **PRINCIPALLY CATALYZED** it.

Any explanation must not only explain the **TIMING** of the event, but its magnitude as well. So the question is, again, two-pronged: 1) Why did the Cambrian Explosion begin 540 Million yrs ago? And 2) Why did it **NOT** occur for the first 4 Billion yrs of Earth's history?

The complex nature of this event, and the massive amount of data required to most adequately support any claim of its causation, is unfortunately too great of an undertaking to detail in an article such as this. Still, we can't resist putting forth the general idea that we believe Earth capturing its Moon in the ways we have described will in fact, one day, be shown to be a principal catalyst of the Cambrian Explosion and its timing.

If Earth had no Moon for a while, or possibly a different Moon which now resides around Mars, the effects of it capturing one the size of our present day Moon would be felt worldwide, with a trace being seen in the rock strata.

That is exactly what we feel the "Pre-Cambrian/Cambrian Unconformity" represents - at least in part. This might be the only geologic feature universally recognized as the record of a world-wide, deep-seated change in the entire environment.

Obviously it is known that the Moon induces tides within the Earth's oceans, which prevents them from stagnating, while also providing a whole host of other ecological effects that help govern everything from animal migration and feeding/breeding patterns to weather patterns. Plain and simple, the Moon is involved with essentially all environmental processes on Earth, and may be more intimately related with both seismic and volcanic activity than is currently thought (a personal belief of mine).

For example, with tectonic plates, a more volcanically active surface, and equally active mid-ocean ridges, **SURGES** of elements like calcium were produced.

With a Moon and its accompanying tides, these and other essential minerals, and the sediments within which they were contained, could more easily be mixed up, introduced to new areas and concentrated in others. This could conceivably help facilitate/generate a whole host of evolutionary processes, like providing the essential mineral compounds for primitive marine animals to begin producing the harder substances necessary to create body parts such as bone/exoskeletons.

This is one of the hundreds of examples in which an environment such as Earth's would benefit from an orbiting Moon, and may be able to generate new evolutionary processes that would not previously have been possible.

I think most scientists would agree that without the Moon, there would be no complex life or ecosystems. The question remains, has Earth's moon always been here, or is it a relatively new arrival?

I believe the LOCATION of the Moon itself speaks to it having SOME sort of involvement with the Cambrian Explosion. The beautiful truth is that because the Sun is about 400 times larger than our Moon, but also, on average it's 400 times farther away, the Sun and Moon have nearly equal angular diameters of about  $0.5^\circ$ , as seen from the surface of the Earth.

This is how the Moon is EXACTLY the right size to PRECISELY cover the Sun and cause a total Solar Eclipse. While this is not only really cool, it is unique among all known orbital systems in the universe.

Such precision calibration is not just for show, and must be intimately related to a precision event such as the Cambrian Explosion was.

### FINAL CONCLUSIONS

In a world full of mystery, and equally full of mis-information, the "truth" can feel obscure and even unattainable much of the time. However, we live in a discoverable universe, and so, we are capable of understanding it in ways much deeper than most may believe.

Einstein said, "The most incomprehensible thing about the universe is that it is comprehensible." Many other accomplished physicists have shared the same sentiment: that it is an almost perplexing wonder that even  $2 + 2$  would equal 4. Einstein also said, "Knowledge is limited, but imagination encircles the world." It is with this most daring human element that the engine of progress is driven.

We say all this to say, that NOTHING is impossible. Whether we hold a degree from Yale or Harvard, or we teach ourselves in the darkness of a prison cell; in the end we are all human, we all have capable minds, and imagination is the great equalizer.

The only thing which should EVER take precedent in science, and yes, ANY area of life, is TRUTH. Because, the purest definition of science SHOULD be "a noble pursuit of the TRUTH".

We believe that the answers are out there, waiting to be found, and if we work together, we will reach them MUCH faster than if we chase after them alone, constantly worrying about WHO IS RIGHT instead of WHAT IS TRUE.

We are under no delusions that the rather simple contents in the body of this text have unequivocally PROVEN ANYTHING. However, we hope that we have presented just enough

evidence, and piqued just enough interest, to inspire our fellow academics to re-engage in a genuine, open dialogue about the different possibilities for the Origin of our Moon. After all, it is very important indeed.

In this case, we may have been so focused on the “Solar” that we may be overlooking the “System” and how that may come together to deepen our understanding of the Lunar Origin story...

*Excerpts of this article were taken from the textbook “Horizons-Exploring the Universe” by Michael Seeds and David Backman.*

*The general ideas of this article are, as far as we know, somewhat original and certainly were constructed COMPLETELY INDEPENDENT of any others which may exist. Any excerpts taken were used purely for factual support.*

*A special thank you to its authors is still due, as this is my favorite textbook ever read, and NOTHING I have done would be possible without it. So, from the bottom of my heart, thank you!*