Appendix 7

The Tychos – Our Geoaxial Binary System

12 December 2018, 2:19 am[1]

The Tychos cures Newton's headache (the Moon)

Dear friends, it is most ironic that the greatest (and still ongoing) astronomical controversy of all times revolved around our own Moon's motions. After all, the Moon is our largest, nearest and thus most intensely studied celestial body: shouldn't our world's scientific community have fully settled the matter by now, after all these centuries? How can the Moon's motions still be such a hotly debated question? Here's what we can read today at Wikipedia:

> *"Lunar theory attempts to account for the motions of the Moon. There are many small variations (or perturbations) in the Moon's motion, and many attempts have been made to account for them."*[2]

Attempts. Just attempts. The "lunar theory" Wikipedia page goes on saying that "*after centuries of being problematic, lunar motion is now modeled to a very high degree of accuracy*." Well, that is simply untrue since modern scientists are still looking to solve the Moon's seemingly inexplicable orbital motions, as this abstract from a scientific study dated 2011 concludes:

> *"Thus, the issue of finding a satisfactory explanation for the anomalous behavior of the Moon's eccentricity remains open."*[3]

As for Newton's stance on the matter, the Moon's motions were notoriously problematic:

> *"The motion of the Moon is very complicated. Sir Isaac Newton is supposed to have told his friend Halley that lunar theory 'made his head ache and kept him awake so often that he would think of it no more.'"*[4]

No wonder the Moon's motions caused pain in Sir Isaac's brain: they stubbornly refused to comply with his gravitational theories!

But let us have a quick look at what the Moon controversy was all about, as documented in the astronomy literature:[5]

The Controversy Surrounding the Secular Acceleration of the Moon's Mean Motion

DAVID KUSHNER

Communicated by NOEL M. SWERDLOW

To many scientists of the eighteenth and nineteenth centuries there was no higher achievement than the theory of gravitation. While its basic laws may be easily apprehended, the intricacies of its development in accounting for the mutual attractions of even three bodies push analysis to its limits, and nowhere is this dichotomy more evident than in lunar theory, on which many of the best analysts have spent considerable effort. Observation has shown a bewildering array of perturbations, from the relatively straightforward annual equation to the more complex secular variation of the mean motion of the nodes. But one of these secular inequalities has particularly engaged the attention—and enraged the passion—of astronomers: the secular variation of the moon's mean motion. Indeed the international controversy which flared up circa 1860 was one of the largest and most active of the century.

There are several interesting and unusual aspects of this debate which distinguish it from others, and these will be the principal subject of this paper. The controversy superficially breaks down into the observational arguments *versus* the theoretical arguments. At another level are bitter disagreements over the theoretical physical principles. And at yet a third level much heat is generated over the mathematical arguments themselves. Oddly enough, there is no secondary account of this important controversy, but there are several contemporary 'eyewitness' descriptions of the various volleys of the debate.[1] These blow-by-blow narratives and analyses require examination. Finally, the introduction of a new, not wholly gravitational cause to explain the disputed phenomenon has important implications. As the debate uses previous results, I begin with a short examination of the researches up to about 1850.

Although theory could in no way account for it, HALLEY in 1695 was the first to suspect there may be such a thing as a secular acceleration of the moon's mean motion, *i.e.* that the moon has gradually been going faster in its orbit.

To be sure, the Moon's motions were (and still are) in serious conflict with Newton's gravitational laws. It is a matter of historical record that Newton's laws were contradicted by the Moon's "inexplicable, renegade behavior", and that this plain fact ignited a humongous, endless controversy among our world's scientific community which, incredibly enough, remains unresolved to this day. Now, don't let any smartass astronomer tell you otherwise (i.e. that "the Moon controversy was eventually resolved") for it would be a bare-faced lie which flies in the face of what has been repeatedly admitted in the earnest astronomy literature, as I am partially documenting here.

What astronomy students are taught today is that the Moon's utterly bewildering motions were successively "resolved" by some of the most revered scientists of our times (e.g., Euler, Horrocks, Lagrange, Laplace, Clairaut, Dunthorne, Mayer, Einstein, to name but a few), all of whom contributed

[1] https://cluesforum.info/viewtopic.php?p=2409064#p2409064
[2] https://en.wikipedia.org/wiki/Lunar_theory
[3] https://arxiv.org/abs/1102.0212
[4] https://www.ias.ac.in/article/fulltext/reso/010/08/0006-0024
[5] https://link.springer.com/article/10.1007%2FBF00348444

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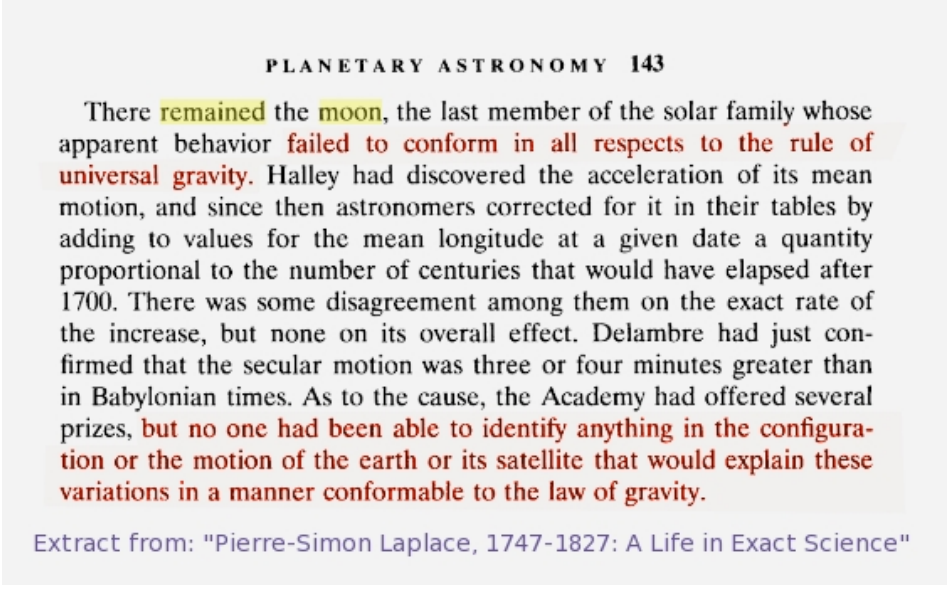
to constructing a vast number of “terms” and “perturbations” that would supposedly account for the Moon’s puzzling motions. Eventually, a veritable hodge-podge of theories were formulated in order to rescue Newton’s “sacrosanct” gravitational laws. Here’s what we can read today on the “lunar theory” Wikipedia page:

> *“The analysts of the mid-18th century expressed the perturbations of the Moon’s position in longitude using about 25-30 trigonometrical terms. However, work in the nineteenth and twentieth century led to very different formulations of the theory so these terms are no longer current. The number of terms needed to express the Moon’s position with the accuracy sought at the beginning of the twentieth century was over 1400; and the number of terms needed to emulate the accuracy of modern numerical integrations based on laser-ranging observations is in the tens of thousands: there is no limit to the increase in number of terms needed as requirements of accuracy increase.”*[6]

As you can see, there is apparently “no limit” to the increase of terms needed to explain the Moon’s motion. The numbers of these terms keep growing year by year. And most assuredly, our modern-day astronomy students are strongly discouraged from questioning the validity of the same. To be sure, it is “scientific heresy” to question the “established science” of our world’s most acclaimed scientists. But let me submit a few more excerpts from the astronomy literature to back up and document my previous assertion (that most astronomers, back in the days, agreed at least upon one thing: that the Moon’s motions gravely contradicted Netwon’s gravitational laws). Here’s an extract from the book “Pierre-Simon Laplace, 1749-1827: A Life in Exact Science”, by Charles Coulston Gillispie (1997):[7]



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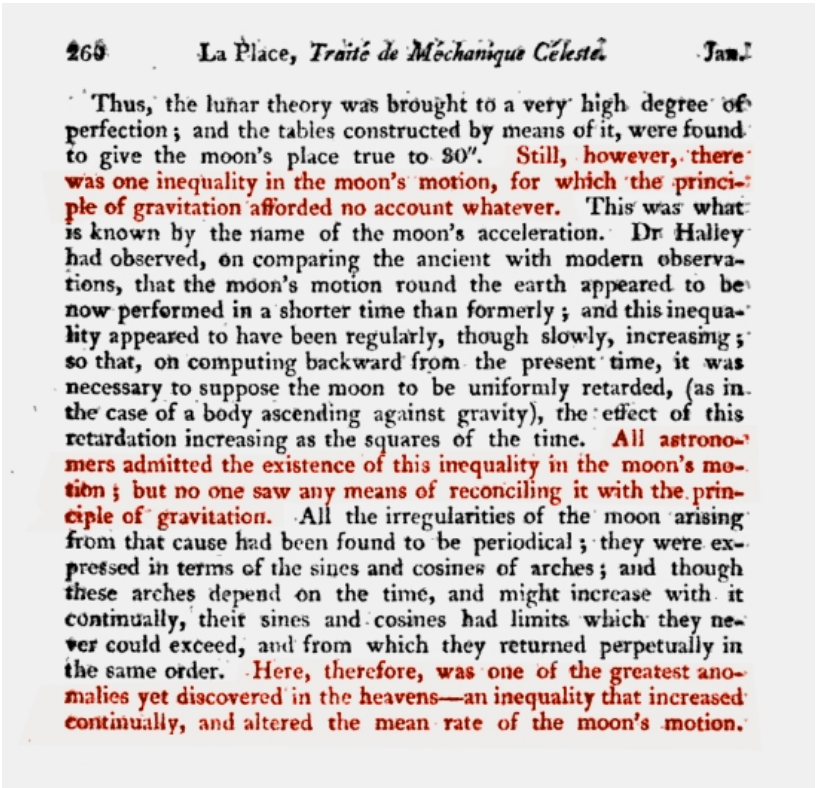
There remained the moon, the last member of the solar family whose apparent behavior failed to conform in all respects to the rule of universal gravity. Halley had discovered the acceleration of its mean motion, and since then astronomers corrected for it in their tables by adding to values for the mean longitude at a given date a quantity proportional to the number of centuries that would have elapsed after 1700. There was some disagreement among them on the exact rate of the increase, but none on its overall effect. Delambre had just confirmed that the secular motion was three or four minutes greater than in Babylonian times. As to the cause, the Academy had offered several prizes, but no one had been able to identify anything in the configuration or the motion of the earth or its satellite that would explain these variations in a manner conformable to the law of gravity.

Extract from: "Pierre-Simon Laplace, 1747-1827: A Life in Exact Science"

And here’s an extract from the “Edinburgh Review or Critical Journal”, again highlighting the fact that the Moon’s observed motions (with its so-called “anomalies and inequalities”) were in stark contradiction with Newton’s gravitational theories:[8]



260 La Place, *Traité de Mechanique Celeste.* Jan.

Thus, the lunar theory was brought to a very high degree of perfection; and the tables constructed by means of it, were found to give the moon's place true to 30″. Still, however, there was one inequality in the moon's motion, for which the principle of gravitation afforded no account whatever. This was what is known by the name of the moon's acceleration. Dr Halley had observed, on comparing the ancient with modern observations, that the moon's motion round the earth appeared to be now performed in a shorter time than formerly; and this inequality appeared to have been regularly, though slowly, increasing; so that, on computing backward from the present time, it was necessary to suppose the moon to be uniformly retarded, (as in the case of a body ascending against gravity), the effect of this retardation increasing as the squares of the time. All astronomers admitted the existence of this inequality in the moon's motion; but no one saw any means of reconciling it with the principle of gravitation. All the irregularities of the moon arising from that cause had been found to be periodical; they were expressed in terms of the sines and cosines of arches; and though these arches depend on the time, and might increase with it continually, their sines and cosines had limits which they never could exceed, and from which they returned perpetually in the same order. Here, therefore, was one of the greatest anomalies yet discovered in the heavens—an inequality that increased continually, and altered the mean rate of the moon's motion.

The problems with the Moon’s motions ranged from its observed periodic (short-term) motions and all the way to its secular (long-term) motions over the centuries. The latter triggered a gigantic (and still unsettled) debate as studies of the ancient solar/lunar eclipses suggested that over time the Moon was continually “accelerating”, although—paradoxically enough—its orbital speed was thought to be decreasing. Other theories proposed that Earth’s rotation was actually decelerating. In short, and to put it bluntly and frankly. it was all a big mess.

> *“Astronomers who studied the timing of eclipses over many centuries found that the Moon seemed to be accelerating in its orbit, but what was actually happening was that the Earth’s rotation was slowing down. The effect was first noticed by Edmund Halley in 1695, and first measured by Richard Dunthorne in 1748, though neither one really understood what they were seeing.”*[9]

I shall start with these supposed secular “accelerations” of the Moon and demonstrate how the Tychos can account for them in the simplest imaginable manner. My two below graphics should suffice to illustrate the matter in easily comprehensible fashion.

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[6] https://en.wikipedia.org/wiki/Lunar_theory

[7] https://books.google.it/books?id=PwBaDwAAQBAJ&lpg=PA138&ots=yrgZAIOU7i&dq=pierre+simon+laplace+inequality+saturn+jupiter&pg=PA143&redir_esc=y#v=onepage&q=Babylonian&f=false

[8] https://books.google.it/books?id=jOxhfGjszM8C&lpg=PA264&dq=inequalities%20jupiter%20saturn%20astronomical%20journal&hl=it&pg=PA260#v=onepage&q=acceleration%20moon&f=false

[9] https://www.tychos.info/citation/134A_Moon-Moving-Away.htm

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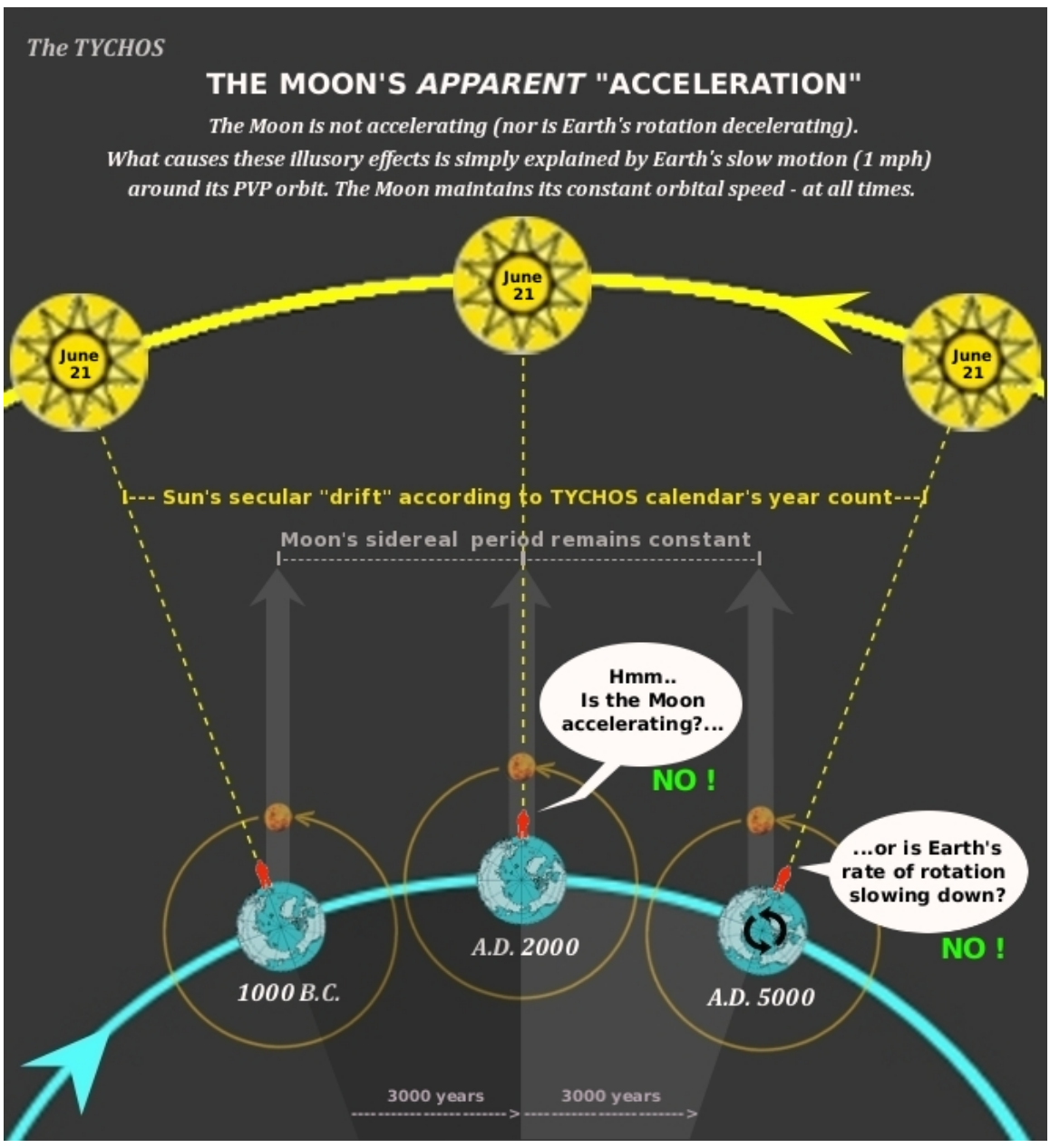
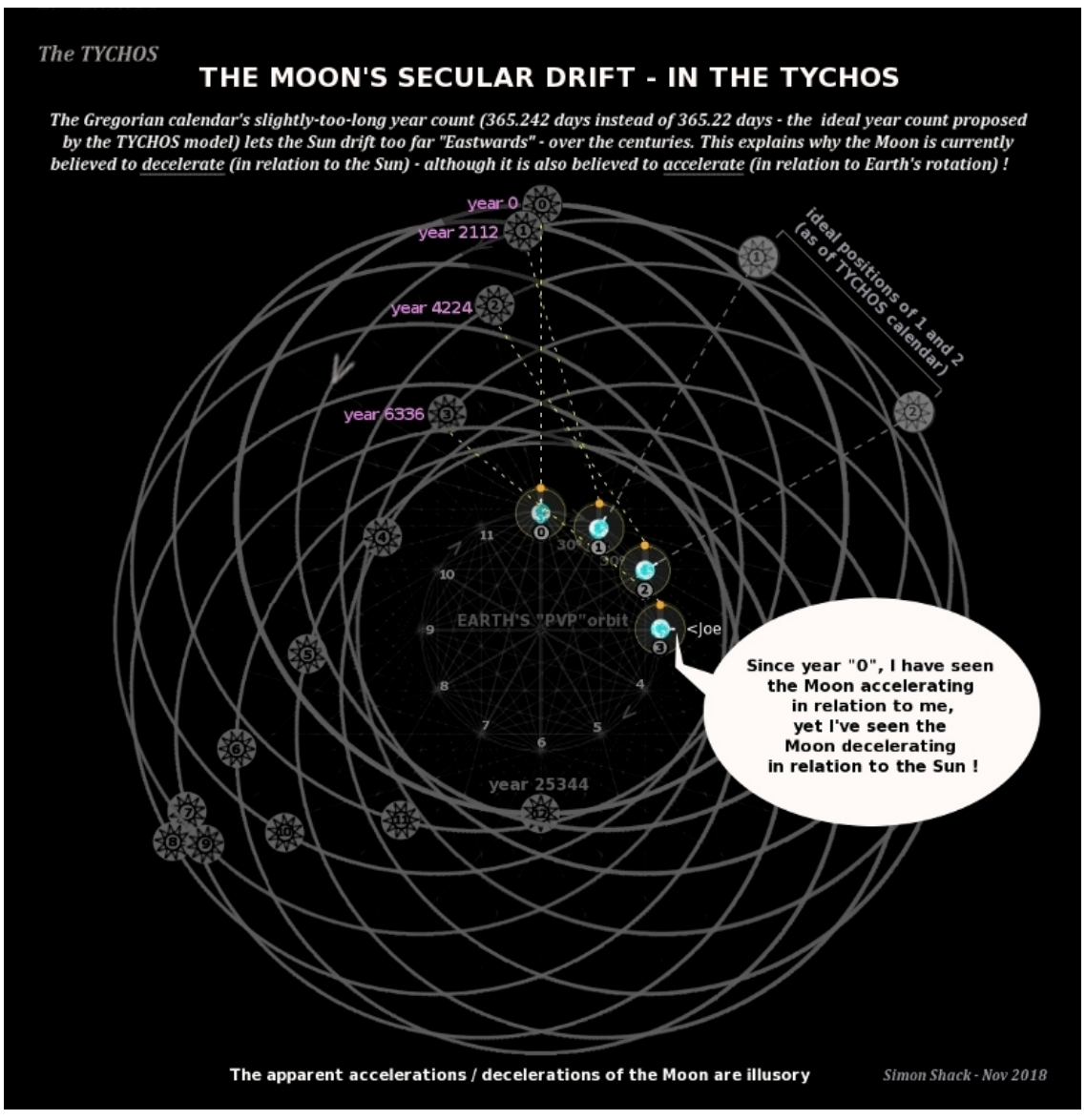
The Tychos and the Moon's apparent secular acceleration

My below diagram illustrates how and why the Moon will *appear* to accelerate over the centuries, yet it is only an illusion caused by what I believe must be the true geometry/configuration of our solar system, as expounded in my Tychos model:



My next graphic shows how the Moon (in the Tychos model) will naturally appear to accelerate in relation to an earthly observer, yet, at the same time, decelerate in relation to the Sun due to the Gregorian calendar's faulty year count, as thoroughly expounded in my Tychos book.[10]



This, dear friends, concludes the Tychos model's explanations for the observed *secular* (long-term) motions of the Moon. In short, the apparent "accelerations" of the Moon and "decelerations" of Earth's rotation are illusory. They are all due to Earth's tranquil yet steady 1.6-km/h motion around its PVP orbit (covering 14,036 km in one year), a motion that the Tychos model has now proven beyond reasonable doubt.

Let us now take a close look at the *periodic* (short-term) motions of the Moon—an issue which has baffled astronomers and mathematicians alike for many centuries.

The Tychos and the Moon's major longitudinal variation (a.k.a. "evection")

The Moon is observed to oscillate (it apparently "accelerates and decelerates" eastwards and westwards against the "fixed" stars) by +/- 1.274° (or 4586.45 arcseconds) with a period of 31.8 days. This is what astronomers call the Moon's "evection", a phenomenon they believe to be caused by

[10] http://www.tychos.info

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"the action of the Sun", and/or by a host of other proposed effects, such as "tidal forces", "core-mantle coupling", assorted turbulences and "planetary perturbations".

All these various gravitational and/or non-gravitational "disturbances" had to be imagined/invented by our most eminent astronomers, physicists and mathema[g]icians since the Moon's observed motions obstinately refused to obey Newton's laws. The theories kept piling up, yet none of them succeeded at attaining any sort of plausible, let alone precise, answer to the puzzling motions of the Moon.

Perhaps the most cringeworthy, *ad hoc* hypothesis ever concocted to save Newton's face was that of Paul Dirac, considered "one of the most significant physicists of the 20th century".[11] Here's what we may read in a paper by F. R. Stephenson published in the Journal of the British Astronomical Association:

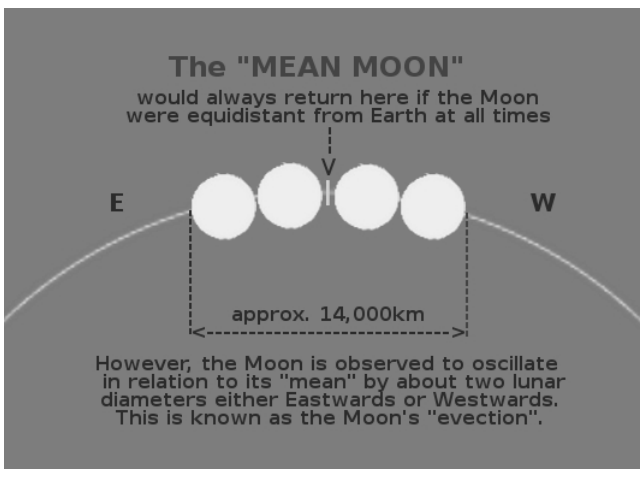
> *"The most plausible cause of a non-tidal acceleration is a possible time rate of change of G, as was first proposed by Dirac. Such a change would affect the planets as well as the Moon, producing accelerations (or decelerations) in the exact ratio of the mean motions."*[12]

Huh? A "time rate of change of G", the so-called "gravitational constant"? Oh, well. So hey, gentlemen, let's just tweak that "constant" and make it a "non-constant", et voilà: Newton wins again! It is almost comical to see how many *ad hoc* "solutions" have been unashamedly put forth by the brightest—or rather, most acclaimed—minds of science with the purpose of "accommodating" the Newtonian principles.

Now, under the Tychos "lens", we shall now examine the largest observed "inequality" (or "anomaly") of the lunar motion: the Moon's so-called evection. In the Wikipedia we read:

> *"In astronomy, evection (Latin for "carrying away") is the largest inequality produced by the action of the Sun in the monthly revolution of the Moon around the Earth. The evection, formerly called the Moon's second anomaly, was approximately known in ancient times, and its discovery is attributed to Ptolemy.*
> *Evection causes the Moon's ecliptic longitude to vary by approximately ± 1.274° [or ± 4586.45" seconds of arc], with a period of about 31.8 days. The evection in longitude is given by the expression +4586.45"\ sin(2D-L), where D is the mean angular distance of the Moon from the Sun (its elongation), and L is the mean angular distance of the moon from its perigee (mean anomaly). It arises from an approximately six-monthly periodic variation of the eccentricity of the Moon's orbit and a libration of similar period in the position of the Moon's perigee, caused by the action of the Sun."*[13]

In simpler words, this means that the Moon's longitude in the sky is observed to vary by as much as +/- twice its diameter (eastwards or westwards of the so-called "mean moon")[14] for a total of more than four lunar diameters (3,474 km x 4), or approximately 14,000 km. Here follows a simple diagram to visualize this fact:



The Moon is observed to move every minute of time (as seen from Earth) by 32.9″. We can therefore express the amplitude of the Moon's observed oscillation (4586.45″) in minutes of time: 4586.45 / 32.9 = 139.4 min.

Hence, the Moon is observed to oscillate back and forth (i.e. it appears to speed up and slow down) by +/- 139.4 minutes of (solar) time every 31.8 days. This is 16.6% more than 27.2848 days, which is the mean value of the Moon's 360° annual revolutions within the time frame of a tropical year, i.e. 365.24219 / 13.386266. The latter little-known value is from a rigorously researched paper by the Binary Research Institute:

> *"Lunar calculations, comparing the delta of the moon's revolutions around the earth in a tropical year, 13.386266, to the number of new moons in a tropical year, 12.368266, apply the same principle and confirm the same thing; the delta of "one" (lunar orbits in this case) occurs in the time frame of the tropical year."*[15]

Now, in 31.8 days the Moon will have moved considerably more than 360°. However, since we wish to know the mean or average amplitude of the Moon's evection over just 360° of its motion, we need to reduce our 139.4 min figure by 16.6%. This gives us a figure of 116.4 minutes of time. In other words, the Moon "accelerates" by 116.4 min of time during one half of its orbit around Earth and "decelerates" by 116.4 min of time in the other half of its orbit (the two halves corresponding "spatially" to the Sun's two six-month periods).

Our celestial sphere's time scale (around which our clocks are calibrated) is of course determined by the Sun's annual 360° revolution around Earth: there are 525,948 min in a 360° solar (or "tropical") year. Hence, we will need to quantify the amplitude of the Moon's evection against our 360° "solar minute scale" since the observed East-to-West longitudinal oscillations this evection induces over a 360° lunar journey around our celestial sphere corresponds to ±116.4 minutes of solar/clock time.

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[11] https://en.wikipedia.org/wiki/Paul_Dirac
[12] http://adsabs.harvard.edu/full/1981JBAA...91..136S
[13] https://en.wikipedia.org/wiki/Evection
[14] The mean moon is an imaginary body which orbits the Earth, in the ecliptic plane, at a steady angular velocity that is equal to the Moon's mean orbital angular velocity.
http://farside.ph.utexas.edu/teaching/336k/Newtonhtml/node133.html
[15] http://binaryresearchinstitute.com/bri/4.0/wp-content/uploads/2016/05/Earth-Orientation-24pg-web.pdf

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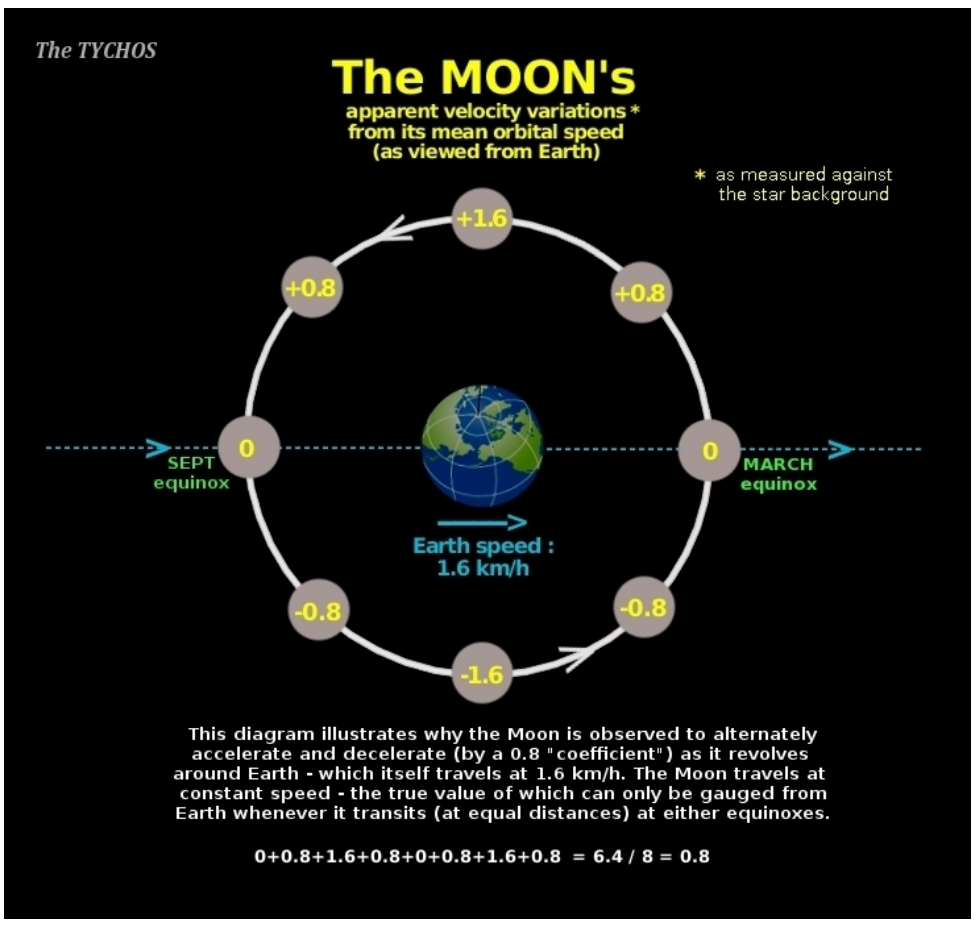
Now, 116.4 min amounts to 0.0221% of 525,948 min (i.e. one solar year).

As of the Tychos, the Moon's "mean" (or actually constant) orbital speed is ca. 3,656 km/h. We see that 0.0221% of 3,656 equals 0.8079 or approximately 0.8. This 0.8 "coefficient" would thus represent the six-monthly speed variation[16] (i.e., the apparent yet illusory acceleration and/or deceleration of the Moon).

In the Tychos, we may illustrate this apparent variation of the Moon's speed like so:



Hence, this 0.8 factor would appear to nicely confirm Earth's orbital speed of 1.6 km/h, as proposed by the Tychos model, as this tranquil speed of Earth would account for the Moon's largest longitudinal inequality known as the "evection". As it is, my proposed 1.6 km/h speed of Earth has already solved many other "mysteries" of astronomy, so this is just yet another confirmation of its qualitative and quantitative exactness.

Let us now perform a last cross-verification of this result (for math geeks and assorted critics) to verify our above figure of 116.4 minutes representing the Moon's observed, six-monthly East-West "acceleration/deceleration":

1.601169 km/h (Earth's orbital speed) is 0.043795% of 3,656 km/h (the Moon's orbital speed).

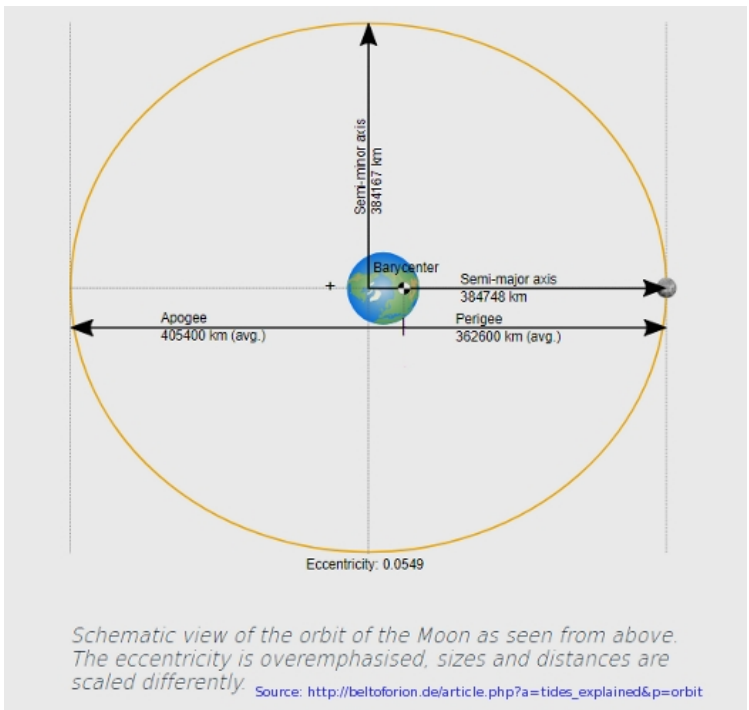
0.043795% of 39,290 min (the minutes contained in 27.2848 days, i.e. the Moon's mean "tropical" period) is 17.2 min.

Now, the full amplitude of the Moon's evection is gauged over a six-month period. In six months, there are 182.625 days, which is 6.6933 x 27.2848 days. In order to verify our above-determined 116.4-min value for the Moon's evection, we should therefore multiply 17.2 minutes by 6.6933. The product of this multiplication is 115.12 min.

Ok, so 115.12 is not exactly 116.4 (a 1.1% discrepancy), but you may agree that it is a reasonably close match and within the margins of probable error. Perhaps further study will clarify this 1.1% discord, conceivably due to periodic variations of the eccentricity (not ellipticity) of the Moon's circular orbit. To be sure, the Moon's motions are quite complicated and the Tychos does not pretend to resolve all their subtle irregularities. However, I have just demonstrated that the Moon's largest longitudinal "anomaly" (the so-called evection) can be plausibly accounted for by Earth's 1.6 km/h motion, as proposed by the Tychos model.

The TYCHOS accounts for the Moon's perigee oscillation

Here is a classic diagram depicting the minimal and maximal Earth-Moon distances (perigee versus apogee):



In simple words, the Moon's orbit is off-center of Earth's barycenter.[17] Now, does using the "barycenter" word necessarily mean that we are still talking Newtonian gravitational physics? No.

[16] Keep in mind the statement from Wikipedia above that the Moon's evection "arises from an approximately six-monthly periodic variation of the eccentricity of the Moon's orbit."

[17] The diagram showing the Moon's orbit strangely talks about "overemphasised eccentricity", whereas what is depicted is a very flat, highly exaggerated ellipse (a senseless yet all-too-common feature in astronomy illustrations). The circular orbits of our solar system's bodies can be eccentric (i.e. offset from the center of the body they revolve around), but need not be ellipitical to be eccentric. As we shall see, in the Tychos the perceived ellipticity of our Moon's orbit (as viewed

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Magnetic forces, as experimentally demonstrable here on Earth, may be at play. The Tychos model is, in any case, primarily focused on determining the correct geometry of our solar system. As long as we Earthlings haven't correctly determined this geometry so as to make it agree with empirical observation, we surely cannot pretend to formulate any valid theories as to the physics regulating the same.

The AstroPixels.com database[18] features annual charts of all the Moon-Earth distances for the lunar perigee (and apogee) passages. It would be interesting to see if those distances might be of interest to the Tychos model. Before we get on, please keep in mind one of the key distance values established by the Tychos model: 14,036 km.

This is the distance that Earth covers every year in the Tychos model as it moves along its PVP orbit at 1.6 km/h. I will henceforth refer to this key value as the "EAM" (Earth's annual motion).

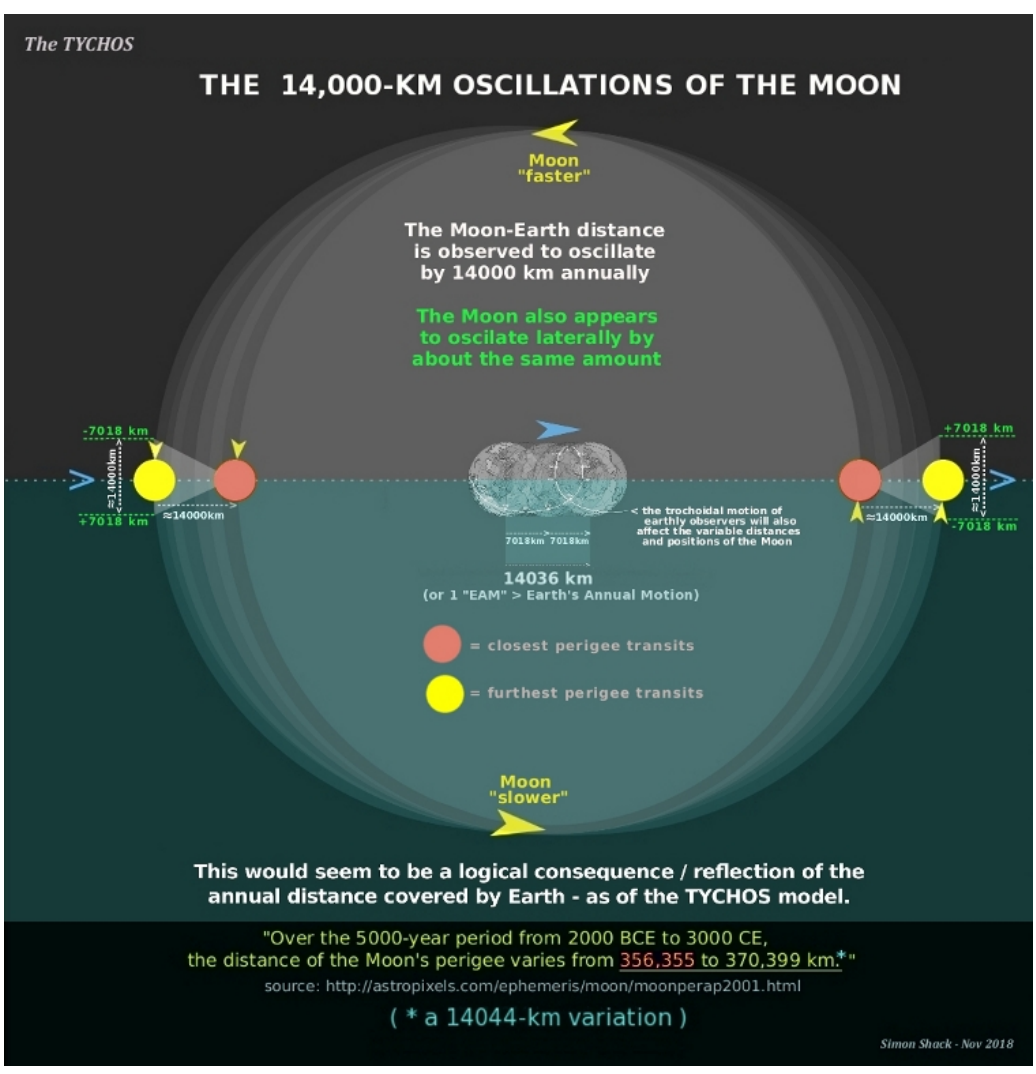
As I consulted that detailed chart of the Moon's perigee transits, my attention was naturally drawn to the long-term (i.e. secular) average minimal and maximal lunar perigee distances:

> *"Over the 5000-year period from -1999 to 3000 (2000 BCE to 3000 CE), the distance of the Moon's perigee varies from 356,355 to 370,399 km."*[19]

So let's see: the difference between 356,355 km and 370,399 km is 14,044 km.

How interesting: this value is only 8 km off the EAM. As it is, by carefully consulting these lunar perigee charts, it can be easily verified that the Moon's perigee regularly oscillates back and forth every solar year by an average distance of approximately 14,000 km.

As we saw earlier, the Moon's longitudinal variations are also in the 14,000 km range. We may therefore intuitively sense the plain logic of it all and conceptually illustrate it with the following diagram:



Thus far we have determined that Earth's annual 14,036 km motion (as of the Tychos paradigm) can nicely account for both of the major lunar variations (i.e. the Moon's so-called "anomalous inequalities"): the ca. 14,000 km oscillation of its perigee, and its ca. 14,000 km longitudinal oscillation (a.k.a. the lunar "evection").

And now comes the cherry on the cake, so to speak: the above diagram only conceptually illustrates the fluctuating behavior of the Moon's perigee. So what about the Moon's apogee? Can we also find a 14,000 km component in connection to its apogee (the Moon's furthest distance from Earth)? Indeed we can! Here's what we can read about the average values of the lunar perigee and apogee:

> *"The Moon's distance from Earth (center-to-center) varies with mean values of 363,396 km at perigee (closest) to 405,504 km at apogee (most distant)."*[20]

So let's see, we have a difference of 42,108 km (405,504 - 363,396). Now, 42,108 is exactly three times the EAM (14,036 + 14,036 + 14,036). Since, as we have just seen, the Moon's perigee oscillates by approximately 1 EAM (14,036 km), the other 2 EAMs would seem to be logically accounted for by its apogee.

As astounding as this may be, this allows me to reasonably conclude that the eccentricity of the Moon's orbit (i.e. the relation between its perigee and apogee) exhibits an exact 2:1 ratio based on the all-important EAM value of the Tychos: the distance covered by Earth each year.

Now, to keep our feet firmly anchored on Earth, let me state what follows, dear friends: I am fully aware that all of this may seem almost too good to be true (for the Tychos), but I am certainly not making it up: I unexpectedly made this discovery while patiently and persistently perusing available observational data. Of course, this same data—especially the key value of 14,036 km—would have meant next to nothing to a Copernican/Keplerian researcher.

To the inevitable naysayers who argue that this is all just a case of multiple coincidences I wish the best of luck computing the odds of this being the case. More likely—and in my honest opinion—the Moon's orbital perigee/apogee variations unequivocally reflect Earth's annual motion and decidedly

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from Earth) is caused by our 1.6 km/h motion around the PVP orbit (see the blue orbit in the Tychosium simulator: https://codepen.io/pholmq/full/XGPrPd)

[18] http://astropixels.com/ephemeris/moon/moonperap2001.html

[19] http://astropixels.com/ephemeris/moon/moonperap2001.html

[20] http://astropixels.com/ephemeris/moon/moonperap2001.html

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concur to corroborate the Tychos model's principal contention: namely, that Earth travels at 1,6 km/h, covering 14,036 km every year.

As ever, more study is needed to determine the exact periodic and secular dynamics of the Moon's motions. Yet I am confident that this is well within reach, given modern computing power and given that we now know what to look for, geometrically speaking.

And thus, my dear friends, the Tychos elegantly "conquers the Moon" (and by the same token cures Newton's headache).

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