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ORIGIN OF THE MOON AND THE CONTINENTS

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Retired

Abstract

All astronomical bodies originate inside clouds of gas and dust, therefore there should be a common process that leads to their condensation. A galactic cloud normally has some turbulence and therefore a gradient of speeds from point to point. Thanks to it, a vortex originates that rakes the material of the surrounding cloud gradually forming a large gaseous disk, inside which vortices of second order develop which concentrate the matter of their orbits forming smaller and much denser disks, within which third order vortices further concentrate the matter. The dense cores of these vortices finally condense in massive bodies: sun, planets and satellites. The result should be a well ordered planetary system with no "debris" around and where both planets and satellites obey to a precise rule of the distances from their central body.

The solar system complies with these conditions with three main exceptions. First, in an orbit where a large planet should be there is only a huge number of scattered asteroids. Second, Earth and its moon with all evidence were not formed in the same vortex, which means that Moon originated somewhere else. Third, Neptune's satellite system has been shattered by the intrusion of a foreign body, Triton, and its largest satellites are missing.

These exceptions seem to be strictly connected to each other and all due to a unique event, that is: Triton has diverted the largest Neptune satellite towards the Sun. The satellite

impacted at high speed against the missing planet, scattering myriads of fragments from its mantle and pushing it towards the sun, where it eventually fell. The planet had at least 4 or 5 satellites some of which remained in their previous orbit, but two of them were dragged towards the sun and were captured by Earth. The largest became its lonely moon while the second fell on its surface giving origin to the continents. Prevailing

This event happened about 3,96 billion of years ago, as it is proven by the ages of the numerous samples brought from the moon, which composition supports the proposed scenario.

The theory of vortices

The current theory about the origin of our moon maintains that it was formed by material removed from Earth by a catastrophic impact with a foreign body. Not a very convincing hypothesis because, among other things, it assumes that our satellite was born as a result of an extraordinary and unrepeatable event not applicable to other similar satellites of the solar system.

No more convincing are the theories about the origin of the other satellites and even less those about the formation of the planets and the stars. For each of them, in fact , different explanations are provided, which seems unlikely.

All astronomical bodies, in the end, originate from clouds of gas and dust rarefied. The process that leads to their condensation within these clouds should be the same regardless of their size.

Let's start from how a star is formed.

Astronomical observations assure that millions of them are still forming in huge galactic clouds of gas and dust, so rarefied that in their comparison the strongest vacuum obtainable on Earth is of an exceptional density. Yet it is from this "vacuum" that stars are formed. Somehow gas and dust dispersed in vast spaces must be compressed until they are reduced to the tiny size of a star.

The current opinion among astronomers is that the cloud contracts under the effect of its own gravitation and starts to rotate until it becomes a huge, flat disk of gas which eventually collapses into a star. This in a nutshell, but it is far from convincing.

The formation of countless stellar gaseous disks inside galactic clouds is due to the fact that gas and dust are not stagnant, but there is always a gradient of velocity between their particles.

Suppose we are at any fixed point in such a cloud. Looking on one side we would see gas and dust "flowing" in one direction with speed increasing with the distance; looking on the other side we will see the particles moving in the opposite direction, also with speed increasing with the distance. Therefore, we would be in the middle of two "currents" of matter that move in opposite directions..

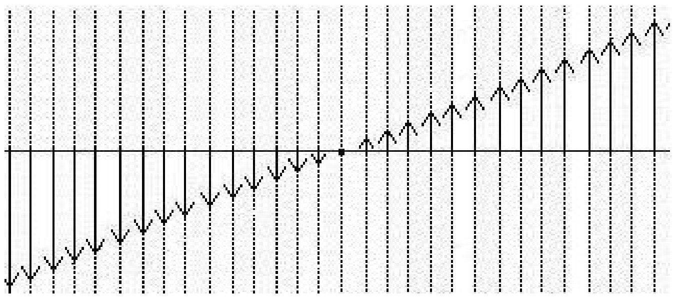


Figure 1 - velocity in a galactic cloud relative to a fixed point

Obviously this is valid whatever the point of the cloud that we take as a reference.

If the cloud were homogeneous and the velocity gradient constant, this situation would remain unchanged indefinitely. There are many causes, however, that can perturb such an orderly movement, like the explosion of a nova, gravitational actions by nearby bodies and so on. Such disturbances can produce local turbulence and cause vortices to arise.

Suppose that in some point of the cloud a thickening of matter has formed, for any reason; it will exert a gravitational action certainly very weak but nevertheless sufficient to divert the slow flow of particles that pass in its immediate vicinity. These instead of continuing in their straight motion begin to rotate around the weak center of gravity, thus creating a vortex. Whichever particle enters the vortex can no longer get out of it and therefore increases its overall mass; and with mass also the intensity of the gravitational force increases, diverting the motion of more distant particles and so on.

The vortex then slowly but steadily expands. It can be seen as a "whirlpool" in which two opposite streams of matter continue to pour. In this way little by little a large, dense and flat disk is formed, the matter of which does not come from a huge spherical volume but from a narrow strip at the most as wide as the diameter of the disk. No problems, therefore, with the angular momentum.

Following the path of a particle captured on the periphery of the vortex we see that, after having completed a quarter of a turn, it begins to collide with the particles which are entering in the opposite side of the vortex, loosing cinetic energy and therefore "falling" towards its centre.

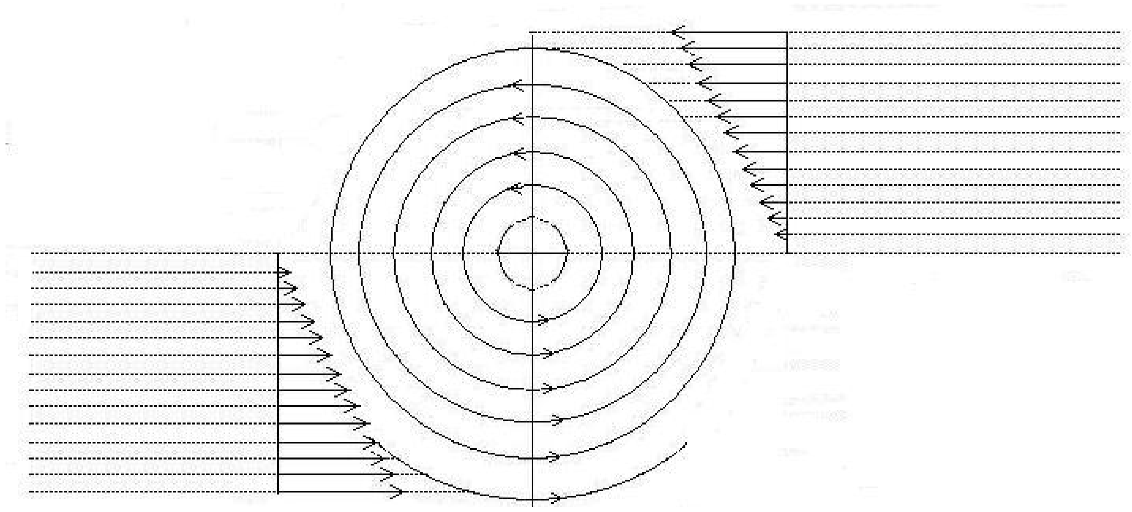


Figure 2 - Development of a vortex in a galactic cloud

In this way there is a slow but continuous transfer of matter and angular momentum from the periphery to the centre of the vortex. Therefore, the final disk of gas will have the maximus density and rotational speed at its centre, gradually decreasing towards the edge. Of course, the mix of gases will be the same of the original galactic cloud everywhere, but the percentage of heavy materials will be increasing from the centre to the edge.

It goes without saying that the final size of the disk depends essentially on the gradient of velocity of the original galactic cloud and on its density. The first determines the size of the initial vortex, which will be larger the lower the gradient, while the density affects the rate of accumulation of the material.

Formation of planets and satellites

The problem now is to understand how the sun, planets and satellites were formed from this large disk of gas. The implicit opinion of the various theories is that their formation takes place in hierarchical order: first the sun, then the planets and finally the satellites. But the process cannot happen in this order. It is not possible that the sun was the first massive body to condense. When the atomic combustion was triggered, in fact, a torrent of light invested the gases of the vortex dispersing them.

Necessarily, therefore, planets and satellites must have formed earlier. How did this happen? The solution to the problem lies in the fact that the gaseous disk grows and rotates on itself always keeping in dynamic equilibrium (the opposite is not possible), il which means that the speed with which the gases move around the center of the vortex respects Newton's law and in particular Kepler's third law, according to which $T^2= K\ D^3$, which translated means: the square of the period of time that the gases take to travel an entire circle around the center of the vortex is proportional to the cube of their distance from the center itself.

This means that there is a velocity gradient increasing from outside to inside of the gaseous disk, a necessary condition for vortices to form. This inevitably happens sooner or later, especially on the periphery of the disk, where there is a continuous accumulation of new materials. Here a first stable secondary vortex is formed that begins to "rake" the gases present in its orbit with the same process of fig. 2, concentrating them in a gaseous disk with the same extension of the satellite system of the future planet. At that point the planetary disk behaves like a massive body and begins to exert gravitational actions on the gases of the solar disk as if it was a solid planet.

These actions consist in "emptying" certain orbits, in particular those that have a period of revolution equal to 1/2 and 1/3 of its own (clear evidence is provided by the so-called "gaps of commensurability" in the distribution of the asteroids because of Jupiter gravitational action).

The gases of these orbits are recalled outwards, therefore close to them there will be thickenings of material that give rise to new secondary vortices, which in turn begin to "rake" the materials of their orbit.

For some good reasons (illustrated by Lagrange in his complex study of the orbits of the planets) two or more independent vortices cannot coexist on the same orbit or on nearby orbits. Inevitably those of the same orbit sooner or later merge into a single vortex. If, on the other hand, several vortices arise in separate but relatively close orbits, the strongest of them exerts on the other gravitational actions such as to dissolve them.

Thus, a single stable vortex is formed, which grows until all the materials present in that orbit are exhausted. This in turn perturbs the inner orbits characterized by a period of $1/2$ or $1/3$ giving rise to a new stable vortex and so on until you get close to the core of the stellar disk. Here the density of the gases is maximum and sooner or later they settle down from the heaviest to the lightest until they form a massive body.

In the solar system, therefore, the first planetary vortex to form was that of Neptune, with a period of revolution of about 165 years, which caused the onset of the Uranus vortex on an orbit with a period of 84 years, just over 1/2. In turn, Uranus caused the onset of Saturn's vortex, with a revolution period of 29.4 years, just over 1/3 of the previous one and so on.

A rule of distances is therefore established that must be respected in all planetary systems that we can formulate in the following way**: each planet must have a period of revolution just over 1/2 or 1/3 of the period of revolution of the outer planet immediately following**.

The process that led to the birth of the planets from the solar vortex is also valid for the formation of satellites, originating from third-order vortices that arose on the periphery of the primitive planetary vortices. The first of them, formed on the outermost fringe, must have caused the onset of a vortex close to one or the other of the two most perturbed orbits and so on up to the innermost satellite. Good last the planet was formed by slow condensation from the dense inner core. It goes without saying, therefore, that the rule of distances established for the planets must also apply to satellites.

The process of formation and condensation of planetary vortices obviously takes a long time. Meanwhile, the process of slow condensation of the materials concentrated in the core of the solar vortex continues and their temperature gradually increases to the point of triggering atomic combustion. It is the moment of the actual birth of the sun, which begins to release a torrent of light and particles that completely disperses all the materials of the original gaseous disk.

The nearest planetary vortices that have not yet completed the condensation process, are depleted of most of the accumulated light materials and also their satellite vortices are dismantled. Only the farthest and therefore oldest planetary vortices retain most of the captured materials and their satellites.

Physical characteristics

This in a nutshell is the process that concentrates the disperse materials of extremely rarefied galactic clouds, step by step through a series of vortices, until they condense into massive bodies from stars to planets and their satellites.

It is evident that the initial size and concentration of the materials of a vortex depend essentially on the density and velocity gradient of the gas cloud in which it forms. Low density means vortices of large diameter and vice versa, while the speed of accumulation of materials depends on the greater or lesser speed gradient.

Once we have known the characteristic parameters of the original galactic cloud, developing a special mathematical model we should be able to determine a priori with good approximation the system that will be born, namely: mass of the central star, extension of the planetary system, number and position of the planets, mass and density of each of them and finally also the consistency of the satellite systems of each of them. In principle, in fact, the primary vortex avrà density and the gradient of increasing speeds from the outside to the inside (apart from local variations, such as at the periphery where new materials are always introduced) and this allows to evaluate the extension of the second-order vortices, those from which the planets will form, in each orbit of the primary vortex and therefore to evaluate the mass and composition of the planet that will originate, taking into account that each vortex "rakes" all and only the materials of a (flat) strip equal to its width along the entire orbit.

Obviously, the reverse is also true, that from physical and orbital characteristics of planets and satellites it is possible to find out the characteristics of the gaseous disk from where they originated, that is extension, density and composition point by point and finally have precise information about the original galactic cloud.

Multiple stars

According to this process stars, planets and satellites are all born in the same way, from the condensation of gaseous vortices. The difference is in the "rank" of these vortices: primary for stars, secondary for planets, tertiary for satellites. This applies to our solar system, whose vortex has raked enough material to originate a medium-size hot star.

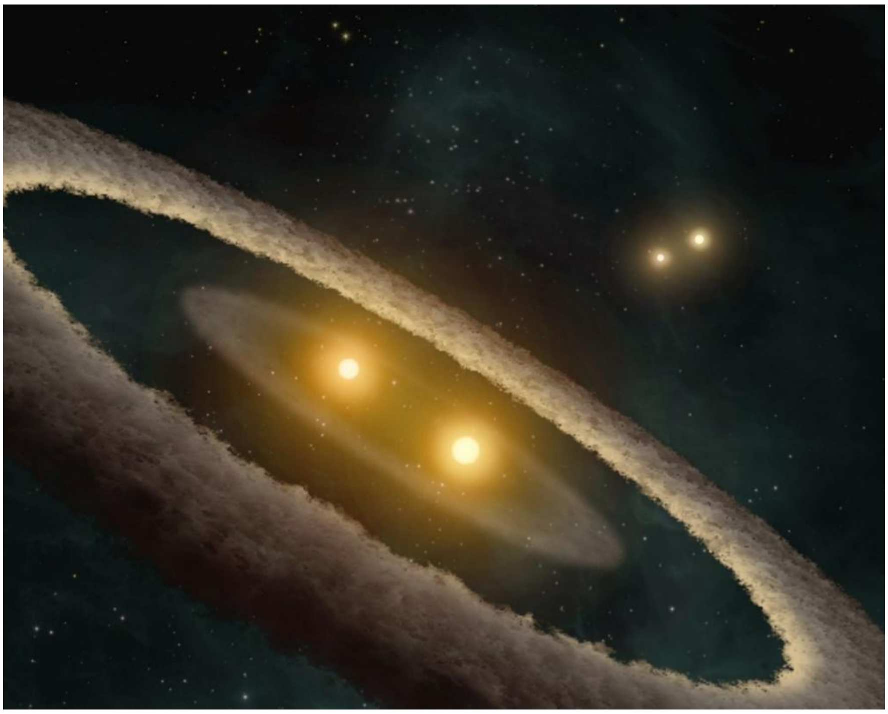
But not all vortices can collect a mass sufficient to trigger the atomic reaction. According to the characteristics of the original cloud, a "primary" vortex can rake a quantity of matter by far smaller than that of a star. The resulting body would be technically a star but being not warm enough it is only an isolated planet with a few satellites around. Large, lonely planets of that kind should exist in great number, but of course they are difficult to be detected being not associated to any hot star. It seems however that clusters of them have been discovered (to their surprise!) by the hunters of exoplanets

On the other hand, if the primary vortex was much larger than that of the sun and had amassed a much larger quantity of materials, at least one of the planetary vortices would be able to rake a quantity of mass large enough to trigger the nuclear combustion. In this case, instead of a giant planet like Jupiter we will have a real star, or even a couple of stars because if they were borne in contiguous orbits, they ended up capturing each other.

Still, they behave like planets rotating around a central star, or maybe a couple of stars because in this case it is likely that the central core of the vortex would be large and flat, and therefore it could condense in two separate stars rotating around each other.

Such systems are far from uncommon in the Universe: it seems that more than 50 \% of the planetary systems of our galaxy have two or more suns. They are the so-called "multiple stars", which originate in very rarefied galactic clouds with a low gradient of velocity and therefore give rise to very large vortices capable of seizing huge amounts of matter.

Nowadays astronomers are engaged in a gigantic hunt for the so-called exoplanets. A mathematical model allowing them to establish a priori the characteristics of the planetary systems would be extremely useful.



Picture 3 - Artistic vision of a quadruple star, HD_98800, in the constellation of Hydra, formed by two peripheral stars, rotating around each other, which together rotate around two central stars in turn rotating around each other.

Verification of the theory of vortices

The theory of vortices is demonstrated in first place by the rule of distances established for both the planets and their satellites. Let's start with the planets. Uranus has a period of 84 years, just over half that of Neptune; Saturn consequently must have a period of revolution just over 42 or 28 years: and in fact it is 29.46 years. The next planet, Jupiter, will have a period of more than 14.75, or 9.8 years; we find that it is 11.86: a value that does not contradict the rule, but that nevertheless is a little bit higher than what one might expect, that is, between 10.5 and 11 years.

We immediately see, however, that this does not contradict the rule, because it is due to an "accident". The planet following Jupiter, in fact, does not exist; in its place we find a myriad of fragments scattered on a very wide belt. condensed

The opinion commonly accepted by astronomers holds that these fragments condensed from the original nebula as they are now. This hypothesis, however, is not compatible with the theory of vortices: it is impossible to imagine a myriad of tiny independent and stable vortices on the same orbit, each of which gave rise to a "mini-planet" whose diameter ranges from the order of centimetres to that of kilometres. Especially since almost all of them are far from spherical. Moreover, their orbits are the most varied and disordered you can think about; many invade the orbits of the major planets, penetrating almost to the height of Mercury or going as far as Saturn and beyond; many come out of the plane of the ecliptic for considerable values.

Not to mention the fact that they are made up of the most disparate materials: some are made entirely of pure metal, others, the majority with about 75% of the total, of carbonaceous rocks and another 15% of silicates. In any case, all rocks and metals that must necessarily have formed inside some massive body at very high pressure and temperature, therefore inside a large massive body.

In the past, the astronomers thought that they were fragments of a planet that had exploded. Then the thesis prevailed that they are pieces of a planet that never formed, because for some reason they could not aggregate. The main reason for this second opinion lies in the fact that the total mass of all known asteroids is very small, probably no more than 5% of the mass of our moon, too little to represent the relics of a planet worthy of the name. The vortex theory, however, leaves no alternative to the hypothesis that between Jupiter and Mars there was a massive planet that later was "ejected" from its orbit due to some accident, that left in place a myriad of its fragments along with some of its former satellites, such as Pallas and Cere

The planet probably fell on the sun, but its disappearance must have caused an imbalance in the system of planets. Jupiter, no longer subject to its gravitational action, moved away from the sun, in the direction of Saturn and slowing down its run. This would explain its period of

11,8 years, instead of 10,5 - 11 as it would be expected. Its displacement must have influenced the remaining outer planets in a gradually decreasing way. On the other hand, Mars moved in the direction of the sun and to a decreasing extent also Earth, Venus and Mercury.

In the end, the disappearance of the 5th planet, which I will call planet X, has provoked an "enlargement" of the remaining planets with respect to its original orbit. Therefore, the solar system is not the ideal model to check the rule of the distances. But despite everything, from the tables 1 and 2 we see that it is well respected both for planets and satellites.

Planet	Revolution Period initial	Revolution Period current	Mass	density	Orbit disturbed
Neptune	164.79 years	164.79 years	17	1,76	1/2
Uranus	84.0 years	84.02 years	14,5	1,30	1/3
Saturn	29.40 years	29.46 years	95	0,70	1/3
Jupiter	10.40 years	11.86 years	317	1,33	1/3
Planet X Asteroids	3,90 --------	--- 3,4 -- 6	20-30 ---	1,5 - 2 ---	1/3 ---
Mars	750 days	687 days	0,107	3,94	1/2
Earth	390 days	365 days	1	5,5	1/2
Venus	230 days	224 days	0,82	5,24	1/2
Mercury	88 days	88 days	0,055	5,43	1/3
sun		24?	333.000	1,409	

Table 1 – Revoution periods, mass and density of the planets

In the second column of table 1 are reported the presumable periods of revolution of the original planetary system, before the disappearance of planet X, in the third column the current periods. A part these small anomalies we see that the rule of the distances is perfectly verified. Further confirmation of the vortices' theory comes from the values of the masses and densities of the planets.

The rule of distances is respected also by the "natural" satellites of the planets, despite the fact that in the past billions of years the irruption of fragments of planet X has caused significant perturbation. Their density and size are also in line with what is predictable according to the theory of vortices, as can be seen from table 2.

THE MAIN SATELLITES OF THE PLANETS				
PLANET satellites	Distance from the planet (103 km)	Period of rivolution in days	Diameter (km)	Density
EARTH moon	 384	 27,32	 3476	 3,346
JUPITER				
V	181	0,50	---	natural
Jo	421	1,77	3.920	3,528
Europe	670	3.55	3.360	3,01
Ganymede	1.069	7,16	5.510	1,94
Callisto	1.881	16,69	5.050	1,83
SATURN				
Mimas	185	0,94	400	natural
Enncedalus	238	1,37	500	1,61
Tethys	295	1,89	1200	0,984
Dione	377	2,73	1300	1,48
Rhea	527	4,51	1800	1,23
Titan	1221	15,95	5000	1,88
Hyperion	1482	21,28	300	0,55
Iapetus	3558	79,33	1500	1.08
URANUS				
Miranda	120	1,3	470	1,20
Ariel	192	2,52	1160	"
Umbriel	267	4,91	1170	1,4
Titania	438	8,71	1580	1,72
Oberon	586	13,46	1520	1,63
NEPTUNE				
Naiad	48	0,29	66	
Thalassa	50	0,31	82	
Despina	52	0,34	150	
Galatea	62	0,43	176	

Larissa Proteus Triton Nereid	73 117 355 5.513	0,55 1,12 5,87 counterrotant 360	194 420 2700 340	 2,06 ?

Table 2 – Distances from the planet, period of revolution, mass and density of the natural satellites supporting the theory of vortices

Anomalies and their explanation

The solar planetary system responds very well to the predictions of the vortices' theory, except for three significant "anomalies" apparently not related to each other.

The first is the existence of millions of fragments of different materials that have invaded the whole planetary system, but are mainly concentrated in a belt between Jupiter and Mars where, according to the theory, there should be only a massive planet with its satellites.

A second anomaly is constituted by the system of satellites of Neptune, the outermost of the planets, which looks disrupted because at least two or three of its largest satellites are missing or displaced like Nereid. Astronomers agree in pointing to Triton as the culprit of this mess, a large body that cannot possibly have originated inside that planetary system because it is counter-rotating with respect to the other satellites and the planet. Triton has the same order of magnitude and same characteristics as Pluto, once believed to be the outermost planet, now recognised as part of a class of bodies called "plutinos", that move outside the orbit of Neptune. For some reason, the "plutino" Triton sneaked inside the satellite system of Neptune, disrupting it and provoking the disappearance of its larger satellites.

A third "anomaly" is constituted by the Moon, the satellite of Earth placed on an orbit not coplanar with the Earth's equator and very far from the planet: Certainly they cannot have formed from the same planetary vortex. A further anomaly is also the existence of the terrestrial continents, that cannot be explained by the slow condensation of the original planetary vortex.

These anomalies seem to have no relation with each other, but we will see that they can be traced back to a single event that happened about 3.96 billion years ago.

When the planetary system of the sun was formed, 4.6 billion years ago, it was ordered as predicted by the theory of vortices: the planets were all at the precise distance provided by the rule of distances, each had a system of well-ordered natural satellites, except the three innermost ones, which had none. All satellites and the planets with a solid crust had a smooth and homogeneous surface. There were no asteroids and stray bolides. Earth under an ocean of hydrocarbons and water had a smooth surface with a composition similar to that of the Pacific seabed, with not the smallest mountain.

Where today there are asteroids there was a large planet, with a mass of 20 to 30 times that of Earth, a diameter of about 30,000 km and a score of at least four satellites. (These dimensions can be evaluated by its position in the sequence of planets, by the fact that the moon was almost certainly its larger satellite and that the next planet, Mars, has a very small mass. The orbit in which it was formed, in fact, must have been depleted of most of its materials by the combined gravitational action of this planet and the giant Jupiter).

Planet X was covered by an ocean of hydrocarbons and water on a thick silicon/magnesium shell and a core of iron and nickel, the materials of most of the asteroids. We cannot think to any possible cause that could justify the explosion of such a planet, so we must assume that it was the object of an impact of apocalyptic proportions by a large celestial body, which scattered around myriads fragments of its mantle and core. The bulk of the planet, however, cannot have been destroyed by the impact; its disappearance can only be explained by the fact that it received a thrust strong enough to expel it from its orbit, eventually causing it to fall on the sun. This explains the existence of the asteroids, the various materials of which they are composed, the disorder of their orbits and also the disappearance of the planet that originated them.

It remains to find out what may have hit planet X, since there were no stray bodies at that time. There is a precise clue that leads us directly to the outermost planet of the solar system, Neptune. The irruption of the plutino Triton has diverted from its orbit at least one of its major satellites, with a diameter that had to be between one thousand and two thousand km. This satellite is not traceable anywhere in the solar system so it must necessarily have precipitated on some planet. Why not planet X?

For a complex of extremely precise interactions the largest of Neptune's satellites must have been directed exactly towards planet X. After a long run during which it acquired a speed of 70 or 80 km / sec when it hit in full the planet, deeply penetrating into its mantle down to the metal core.

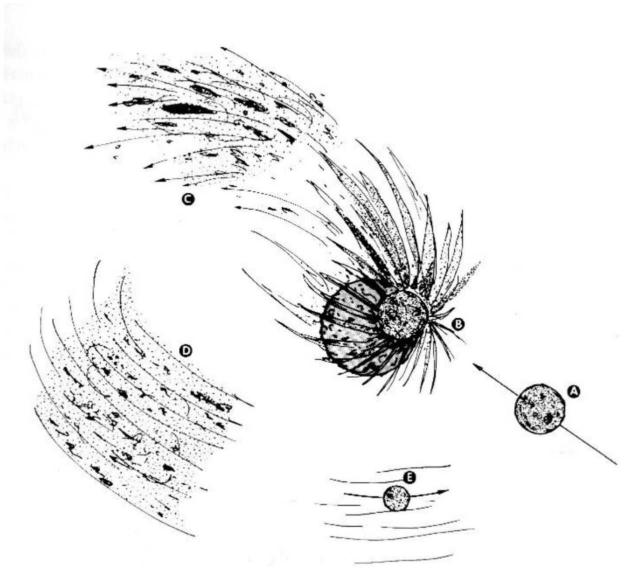


Figure 14 – The impact of Neptune's satellite against the planet Planet X

An apocalyptic explosion ensued that projected myriad of large fragments around. Most of the planet, despite the mutilation, must have remained intact, but the power of the impact was enough to impart to it a speed of the order of hundreds of meters per second in the direction of the sun, causing it to deviate from its orbit and to "spiral" in the direction of its star, where it eventually precipitated. (The speed can be evaluated thanks to the principle of conservation of energy, according to which the kinetic energy, $E_b = ½ M_bV_b^2$ of the bolide must have been entirely acquired by the planet. With the assumed mass of the bolide $M_b = 5.10^{21}$ kg, mass of X: $M_p = 1.5.\ 10^{26}$ kg and speed of the bolide $V_b = 70$ km / sec, we have $V_p = 3{,}3.10^{-3}.7.10^4 =$ 230 mt/sec, that is about 20,000km per day).

Probably planet X had at least four satellites. What happened to them? Obviously, they were very close to it and some were fully invested by large chunks of its mantle. Besides, suddenly the planet deviated from its previous orbit at the speed of around 20,000 kms per day. A couple of them lost contact almost immediately and are now floating amongst the wreckage of their mother-planet in the belt of the asteroids.

The two largest of them, instead, were dragged towards the sun, at least for a while. In the end, however, they also lost contact, invading the orbits of the inner planets and were both captured by Earth. One fell on the planet ending his life as a free aster but starting an extraordinary and perhaps unrepeatable adventure; it broke into four or five large fragments that stuck deeply into the mantle of Earth, beginning all the geological phenomena that characterize its history. Based on the total volume of the mass of the continents it can be estimated that the diameter of this satellite was at least 2,500 km.

The other, the largest of the family, managed to keep a safe distance and today illuminates our nights with its pale light.

The original system of planet X, therefore, had to count at least 4 satellites, in order: Vesta, Luna, then the satellite that originated the terrestrial continents and last Ceres.

	diameter (km)	mass (10^{21} kg)	density (kg/dm^3)
Vesta	530	0,267	3,44
Moon	3.475	73,47	3,34
Continents	2.500	15 – 20	2,7
Ceres	950	0,95	2,12

The density of the continents is around 2,7 kg/dm^3 and that's why they float on the Earth's sima, whose weight is more than 3 kg/dm^3. The mean density of the satellite from which they originated, however, had be a little bit more than 3 kg/dm^3, considering its metallic core that must have sunk into the mantle.

Seas and mountains of the moon

At this point the physicists come into play with their methods of dating the rocks allowing to calculate with relative precision the epoch of the events described in this scenario. The various Apollo and Russian missions have brought to Earth a considerable number of rocks taken in the most disparate locations, so we have a sufficiently large sample to get a precise idea of the various phases of the formation of the lunar soil.

Looking at our satellite we notice that its entire surface is pockmarked by a myriad of craters, produced by the impact of asteroids and meteorites. Originally, however, it was supposed to be flat and smooth: the bombardment began after the impact against planet X. But not all the irregularities of the lunar surface can be attributed to meteorite impacts. In addition to the circular craters, there are large flat and depressed surfaces, the so-called "seas", and mountainous areas with peaks that rise for thousands of meters.

Several hypotheses have been put forward to explain the origin of seas and mountains, without reaching any definitive conclusion. Not even the numerous lunar missions have been able to dissipate the mystery; however, they have led to unforeseen and important discoveries.

First, when the Russian satellites photographed for the first time the other side of the Moon, whose vision had always been denied to man, we were faced with a real surprise: on the other side there are no seas and no mountain ranges, but only an immense expanse of meteorite craters.

Why so much difference? And again, is it a coincidence or is there a very specific reason why the Moon presents this second face to Earth and not the first? The answer to these questions is probably linked to the preventive solution of another problem, that of the origin of the so-called lunar seas.

There are significant differences between the rocks of the seas and those of the highlands. The latter consist of rocks like the terrestrial anorthosites, while the seas of basalt-like rocks. Both rocks are classified as plutonic, that is, originated by the cooling of a molten magma. But while anorthositic rocks, at least on Earth, were formed by very slow cooling of magma in depth, basalt rocks are essentially eruptive.

Another big difference is the density: about 2.9 kg/dm^3 for the former, 3.3 for the latter. Since the average density of the Moon is 3.34, it is to be excluded that it is formed mainly by rocks such as those of the seas, which at great depths would assume a density of about 3.7, too high to be compatible with the average density of the Moon. The satellite, therefore, must be made up mainly by rocks like those of the highlands.

Finally, the age of the rocks of the highlands are about 4.6 billion years, the same of the oldest rocks in the solar system, while those of the seas have an age between 3.9 and 3.2 billion years. Add to this the fact that the seas are located only on one face of the moon. What do these data tell us? Let's try to go back in time and reconstruct the vicissitudes of our satellite during its existence.

The Moon was born 4.6 billion years ago from one of the peripheral vortices of planet X, in a completely normal way: its surface had to be smooth and uniform and have the same composition everywhere. Since there were no meteorites in the solar system, for hundreds of millions of years there was nothing that could change its face.

Then suddenly planet X exploded. The Moon was hit in full by large masses of oceanic liquid and large fragments of its mantle. Only the side of the satellite that was facing the planet, however, was hit. The other, being behind, was necessarily spared.

The liquids projected on the Moon soon evaporated, leaving no obvious traces and residues, or almost. Not so for solid fragments, which stuck to the surface, opening wide wounds. They were obviously made of heavier material than that of the lunar surface and probably they melted down immediately once freed from the pressure of the layers above.

Stuck on the lunar surface, they created huge basins of molten lava, which began to solidify; but volcanic phenomena with massive surface lava spills continued for a long time, for hundreds of millions of years (at least 600 judging by the age difference between the various seas), until the entire mass of the individual fragments cooled and solidified completely. First the smaller fragments must have solidified, those that gave rise to the smaller seas, and then the larger ones.

Since the seas are made of heavy rocks, their surface has sunk below the lunar average, but to do this they had to compress and move the surrounding original rocks sideways; so tall mountain ranges were formed at the edges of the seas.

In conclusion, the seas are formed by rocks from the mantle of planet X while the highlands are made of the original lunar rocks.

This explains why seas and mountains exist only on one side of the Moon and why they have different densities and different chemical and morphological characteristics and above all different ages. It also explains why the Moon always presents this face to Earth; the seas are made up by rocks much heavier than the rest of the surface and therefore they undergo to a greater extent the Earth's gravitational action. It was inevitable that the initial rotational motion of the Moon was slowed down and the satellite stopped with the heaviest side facing Earth.

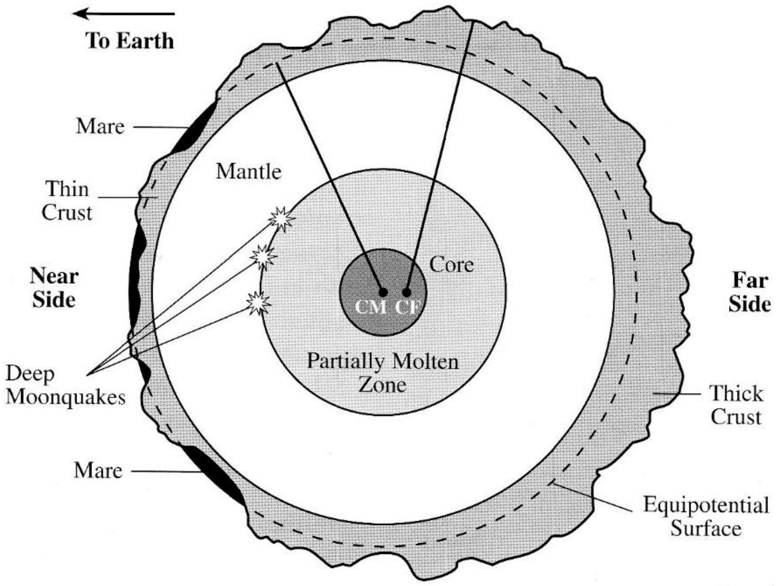


Figure 5 - Schematic section of the moon showing its internal structure. The "seas" are found only on the face facing the Earth and have a density higher than that of the original crust. As a result they settled at a level at least two km lower than the crust of the opposite face, which has a homogeneous composition similar to that of the "high lands" that are located around the seas. The difference in density of the seas appears in all evidence from the equipotential surface (in hatching) determined by gravimetric surveys.

Epoch of the explosion of Planet X

The conclusions we have reached are important to understand the characteristics of our satellite; at the same time they allow us to establish the epoch of the impact against planet X.

The moon was hit by large fragments of Planet X on the very day of the impact. From that moment the satellite was subject to an incessant bombardment of meteorites and asteroids. That event can be dated with precision. Let's start with the meteorite bombardment. It was particularly intense in the early days and quickly formed a layer of breaches, consisting of fragments of the ancient lunar surface crumbled by impacts. The oldest breaches have an age of about 3.9 billion years; the meteorite bombardment started a short time before that date.

The dates provided by the rocks of the lunar seas are consistent with this reconstruction. The oldest rocks are those from the Sea of Nectar, the smallest of the lunar seas, and have provided a date of 3.92 billion years. Plutonic rocks are becoming more and more recent in the other seas, depending on their size. The most recent are 3.2 billion years old. At this date all volcanic activity on the lunar surface ceases.

The explosion of the planet, X therefore, must have occurred sometime before 3.92 billion years ago. How long before it depends on the time it took the fragment that originated the sea of Nectar to solidify and completely cease all volcanic activity. Time that, judging by what has happened in the neighboring seas, should be of the order of millions of years.

Greater precision can be achieved by returning to Earth. The continents on which we live are made by the materials of a satellite of planet X. Falling on Earth it must have split into four or five large fragments, which stuck into the mantle of the planet. From that moment on, erosion and sedimentation phenomena began that gave origin to the first sedimentary rocks of our continents.

Well, the oldest known continental sedimentary rock is about 3.96 billion years old, just 40 million more than the oldest effusive rock on the moon. Earth captured the satellite not too long after the impact, presumably in the order of thousands of years, and soon after that started the formation of the first continental sedimentary rocks. It is concluded that the explosion of Planet X must have occurred approximately 3.96 billion years ago, million plus million less.

Conclusion

The mechanism proposed for the formation of astronomical bodies, from stars to planets and satellites through vortices seems consistent and able to predict the characteristics of whatever planetary system once the characteristics of the gaseous cloud in which it originates are known. The theory is verified by the orbital and physical data of both planets and satellites of our solar system, with some notable "anomalies" apparently not related to each other. A close analysis, however, reveals that they have been provoked by a single event happened about 3.96 billion years ago, when the plutino Triton deviated a Neptune’s satellite, which impacted at high speed against a planet between Jupiter and Mars.

The impact produced millions of debris that spread throughout the solar system and pushed the planet towards the sun, where it eventually fell. As for its original satellites, the two largest were dragged towards the sun and were captured by Earth, one becoming its actual satellite, the other crashing on its surface giving origin to the continents.

It's a simple scenario, perfectly coherent and able to provide a comprehensive explanation to a long series of problems and to reconstruct in a plausible way the history of our solar system.

Is it realistic? Mr Occam would probably have no doubts.