

Van Flandern's Fission-Explosion Model (revised version)

The Nebular-Planetesimal Hypothesis

The strongest criticism of the nebular hypothesis was made by renowned 1800s physicist James Maxwell who, in an essay on the rings of Saturn in 1857, showed that if they were to be stable, they had to be comprised of small solid particles--rigid solid rings would have been torn apart by differential rotation, and gas rings would have dispersed quite readily. So he showed that the shear forces from a disk with differential rotation would have prevented the condensation of individual planets. The same argument was applied to the rings of planetary material proposed by Laplace, necessitating that the rings should be hundreds of times more massive than the planets they were to form, in order that they may be durable (Oxley, 1999).

Famous British astrophysicist James Jeans analyzed the breakup of rapidly spinning bodies under the stress of centrifugal force and concluded that the nebular hypothesis was invalid (James Jeans – Britannica.Com, 2008).

In 1900 Forest Moulton had also shown that the nebular hypothesis was inconsistent with observations because of the angular momentum. In 1904 Moulton and Chamberlin originated the planetesimal hypothesis. They suggested that a star had passed close to the Sun early in its existence to cause tidal bulges and that this, along with the internal process that leads to solar prominences, resulted in the ejection of filaments of matter from both stars. While most of the material would have fallen back, part of it would remain in orbit. The filaments cooled into numerous, tiny, solid fragments, 'planetesimals,' and a few larger protoplanets.

The work of Henry Russell in 1935 showed that if the solar material had been pulled away from the sun with the force necessary to account for the angular momentum of Jupiter, the material would have continued out of the solar system entirely.

The temperature issue forms another of the early major objections. In 1939 Lyman Spitzer demonstrated that if sufficient material were to be drawn from the Sun to form the planets, it would have had to originate from the depths of the Sun, where the temperature would be of the order of millions of degrees. Clearly, with temperatures as high as this, no amount of modification to the mass or radius using this model could maintain the plausibility of the fragmentation process under the current interaction assumptions. He also showed that a column of material drawn out from the sun would dissipate rather than condense. Another important objection to planets forming from super-hot solar material, comes from the distribution of the light elements lithium, beryllium, and boron. All these are rare in the Sun, as they are consumed in nuclear reactions, but they are comparatively abundant in the Earth's crust. (Williams and Cremin, 1968)

The Chamberlin-Moulton model received favourable support for about 3 decades but passed out of favour by the late '30s and was discarded in the '40s by the realization it was incompatible with the angular momentum of Jupiter, but a part of it, planetesimal accretion, was, of course and unfortunately, retained.

About planetesimal collisions J. J. Lissauer states, "almost all the previous calculations were wrong." He and David Kary, both of the State U. of NY at Stony Brook, have done more accurate calculations and have done computer simulations of 10s of mlns. of planetesimals encountering a protoplanet. Lissauer states, "We came to the conclusion that if you accrete planets from a uniform disk of planetesimals, prograde rotation just can't be explained." The University of Toronto's Luke Dones and Scott Tremaine have confirmed that conclusion through calculations and another 100 mln. simulations. Lissauer goes on to say the results together are robust and "Prograde rotation from a uniform disk is wrong" (Kerr, 1992). They go on, however, to propose band-aid solutions.

Of course, there are those who contend the disk wasn't uniform, such as Hannes Alfvén (1978),

who claims it had a band structure, but, as Van Flandern points out, bodies in orbit do not collide but librate (oscillate) instead, as we see in the Trojan asteroids, excepting after an explosion and in the same orbit. The nebular disk is considered to be turbulent so that collisions would be probable, however, the grains would fragment on collision and would not stick together nor fuse--the rule in the asteroid belts is that bodies fragment on collision, not aggregate.

Also, when stars condense from a common cloud (nebula), their mutual orbits usually have high eccentricity and are rarely co-planar. As well, the chemical compositions of planets and moons suggest formation under a far smaller range of temperatures than the solar nebular hypothesis would allow (especially striking is the abundance of CO² in the outer solar system, for example, on Triton; it is very difficult to account for this if such an icy body were never much hotter than at present. The volume of space involved also makes the standard model implausible, as it is difficult to imagine the process by which, for instance, Neptune could have accreted hydrogen gas anywhere near its present location. (Van Flandern, 1999).

Migration has been invoked for this last problem with the standard model (in respect to Kuiper Belt resonances with Neptune), but it is contradicted by several facts: the small twotino population, observed inclinations, inclination-size correlation, the edge at c. 50 AUs, detached objects, and a mass loss of 99% (The Kuiper Belt as a Debris Disk, Renu Molhotra, 2005, WebArchive.Org (Wayback Machine)).

Jacot's Solar Fission

Swiss astronomer Louis Jacot in 1981 (but possibly as early as 1962 or even 1951) maintained that planets were expelled, one at a time, from the Sun, and that one of them shattered in this expulsion leaving the asteroid belt. The Kuiper Belt was unknown at the time, but presumably it, too, would be the result of the same kind of shattering. In this model there were 4 phases to the planets: no rotation and keeping the same side to the Sun "as Mercury does now" (we've known, of course, since 1965, that it doesn't), very slow, accelerated, and finally, daily rotation. The moons, like the planets, originated as expulsions, but, of course, from their parent planets, with some shattering, leaving the rings, and Earth is supposed to eventually expel another moon. He also suggested, instead of certain planets shattering on expulsion, that maybe they exploded on expelling a moon.

Jacot opposed Newtonian as well as Einsteinian theory and the Big Bang and believed in a type of continuous creation in which galaxies continually formed, broke up, and were replaced by new ones from the debris, a universe without beginning nor end, a universal ether, and Bode's Law, placed emphasis on continuum, dynamism (motion), and evolution in the Universe, probably supported some kind of LeSage gravity, and held that there was no vacuum. He also rightly protested the tyranny of official science (the soft Inquisition as he also referred to it).

Most of these ideas are demonstrably rational and shared by Van Flandern (and others). The Big Bang, for example, is a fantasy and an absurdity, as it is not even possible, because time cannot have a beginning, nor an end, as there is by necessity always a past, and a future, otherwise there is no time. Furthermore, it is impossible for space to expand, because expansion requires a volume that requires matter and because space is infinite, only matter can expand. In addition, there can be no space without matter, and it is impossible for space to explode, only matter can explode. It is also impossible that there is matter-energy and space-time at one point without anything around it.

The fantasy is based only on background radiation, which can be explained differently and plausibly as well. As Van Flandern (1999, pp. 101-103) states, the phenomenon may actually be either the re-emission of microwaves from the intergalactic environment, or the result of a supernova explosion nearby, or a planetary explosion in our own solar system, while Jaakola (in *Pushing Gravity*, 2000, p. 158) says that it could be the re-emission of energy obtained by gravitons within the red shift effect, that he claims to be a photon-graviton interaction (EM-gravity).

Indeed, a large number of scientists oppose the Big Bang because of its lack of empirical support. In addition, the Higgs particle, supposedly a proof of the hypothesis, was not really found (see *The Higgs Fake*, an exposé by Alexander Unzicker).

Electric Universe Theory

In the Electric Universe model only giant planets emerge, electrically, from the Sun, and singly, with solid planets emerging electrically and singly from the giant planets. There is also the implausible Saturnian myth in its model of solar system evolution, as well as cometary activity plausibly explained electrically, Venus plausibly having its ion tail in glow mode in ancient times making it look like a comet, and the Sun as powered electrically instead of by nuclear fusion.

Storetvedt's Origin of the Earth and Moon

Norwegian geologist Karsten Storetvedt, who has proposed the theory of turning tectonic units, also opposes the planetismal hypothesis, proposing formation of the Earth from a confined nebular sphere expelled from a contracting sun, into condensates that accumulated and consolidated, being initially cold (in the cold of outer space) with the core (possibly still containing significant amounts of hydrogen and other volatiles), remaining as such, and the outer layers becoming hot--the inverse of the standard model. He points out that the global rectilinear fracture network, implanted in the Upper Archeozoic, occurs also on the Moon, Mars, and Venus. And he supports the fission theory of lunar formation, which originated with George Darwin, son of Charles, and promoted notably by Van Flandern. (*Aspects of planetary formation and the Precambrian Earth*, K.M. Storetvedt, NCGT Newsletter, Issue 59, 2011).

The Fission-Explosion Model

Overview

In the FEM (fission-explosion model)(Van Flandern, 1999, 2007a,b, 2008; MetaResearch (metaresearch.org)(defunct since 2015), which combines the EPH (exploded planets hypothesis) with solar and planetary fission, there are 6 pairs of twin planets each fissioned off from the equatorial bulges of an overspinning (outward centrifugal forces exceeding the inward gravitational force) and contracting Sun at different times, so having different temperatures, sizes, and compositions, and having condensed thereafter, with the nebular disk dissipating after some 100 mln. years (a few mln. according to standard estimates), with 6 planets exploding--the Sun thus went into overspin 6 times.

This accords well with Weidenschilling (1981), who stated that a weak asteroid spinning up to a rotational rate of 2 hrs. would deform, first into a Maclaurin spheroid (a figure with an equatorial bulge, formulated in 1742), then into a Jacobi ellipsoid (an elongated, ovaloid figure, formulated in 1834), and finally into a body that splits into 2 parts.

As well, each time the Sun fissioned much of the excess angular momentum would be transferred to the new orbiting planets. Tidal forces operating on the planets from the huge proto-sun would further enlarge their orbits soon after fission, so the first pair to emerge ended up as the most distant and the last as the closest. Four of these original planets were helium dominated and liquid (helium class planets).

And the planets are basically made of photospheric material, the photosphere being the deepest of the outer layers of the Sun, below the chromosphere and the corona. (I calculate that the combined mass of the original planets, c. 5241.2 zettatons, would have been about ¼ of the photospheric mass of the present sun, and the proto-sun would have been more massive). Also, the

material would not dissipate as it was not filamentous.

The exploded planets were designated by Van Flandern as V (standing for the 5th planet, the first 4 including Mercury and Mars; and also called Bellatrix by him), K (standing for Krypton, named by Michael Ovenden), LHB-A, LHB-B, T (for Transneptunian), and X (for the hypothesized Transneptunian planet as designated by Percival Lowell in 1919). Contrary to the popular misconception, X does not signify the 10th planet, as Pluto was unknown at the time, it signifies unknown.

In the case of the helium planets, moons also exploded (because of tidal stresses) leaving the 4 component belts of the 2 major asteroid zones, and Bellatrix was the parent of 2 large twin moons, Bellona and Mars.

Van Flandern reasoned that there must exist some proto-planet initial mass range allowing most of the hydrogen to escape, but not most of the heavier helium. The result will still be a liquid planet, but a helium-dominated one, unlike any planets remaining in our solar system today; and he remarks that we know very little about the evolution or stability of such helium planets, but we do note with interest that, in both places in the solar system where intermediate-mass helium planets might have formed (between Mars and Jupiter, and beyond Neptune), we instead find asteroid belts, which suggests that helium planets might be less stable than other types. (Appendix to Violent History of Mars, MetaResearch Bulletin, 2007b).

Data for the original solar system as proposed by Van Flandern are presented in Table 1.

Table 1. Original Solar System in Flandernian Theory.

| planet | OD | OD3 | OOP | OOP3 | OM | OM3 | CD | CP | CM | T-B | NM | CNM |
|---------|-----|-----|-----|------|-----|-----|----|-----|-----|-----|---------|-----|
| Venus | .4 | .7 | .25 | .6 | .8 | .9 | .7 | .6 | .8 | .4 | 1 | 0 |
| Terra | .6 | 1 | .50 | 1 | 1 | 1 | 1 | 1 | 1 | .7 | 1 | 1 |
| V | 1 | 1.6 | 1 | 2 | 8 | 2.4 | - | - | - | 1 | 2 | - |
| K | 1.6 | 2.5 | 2 | 4 | 10 | 2.8 | - | - | - | 1.6 | several | - |
| LHB-A | 2.5 | 3.7 | 4 | 7 | 130 | 273 | - | - | - | 2.8 | 0 | - |
| Jupiter | 4 | 5.2 | 8 | 12 | 170 | 318 | 5 | 12 | 320 | 5.2 | 8 | 60 |
| LHB-B | 6 | 6.8 | 16 | 17.7 | 40 | 82 | - | - | - | - | - | - |
| Saturn | 10 | 9.5 | 32 | 30 | 50 | 95 | 10 | 30 | 95 | 10 | 23 | 60 |
| Uranus | 16 | 20 | 64 | 84 | 14 | 15 | 20 | 84 | 14 | 20 | 18 | 27 |
| Neptune | 25 | 30 | 128 | 165 | 17 | 17 | 30 | 165 | 17 | - | 13 | 13 |
| T | 40 | 43 | 256 | 280 | 2 | 2.4 | - | - | - | 38 | many | - |
| X | 64 | 68 | 512 | 560 | 3 | 2.8 | - | - | - | 76 | many | - |

Adapted from Van Flandern, 1999, 2008.

OD=original distance (in AUs), 3=3rd and last version (2008), OOP=original orbital period, OM=original mass (in Earth masses), CD=current distance, COP=current orbital period, CM=current mass, T-B=Titus-Bode progression, NM=known native moons, CNM=current no. of moons, CT=compositional type. The figures for distance are in AUs, for orbital periods are in Earth years, and for masses are in Earth masses. In the 1st version (1993) there were 9 planets (Venus, Earth, V, K, Jupiter, Saturn, Uranus, Neptune) plus Planet X; V was 10 earth masses, K was 100, Jupiter 200, Saturn 80, and X 3; X was at a distance of 80 AUs.

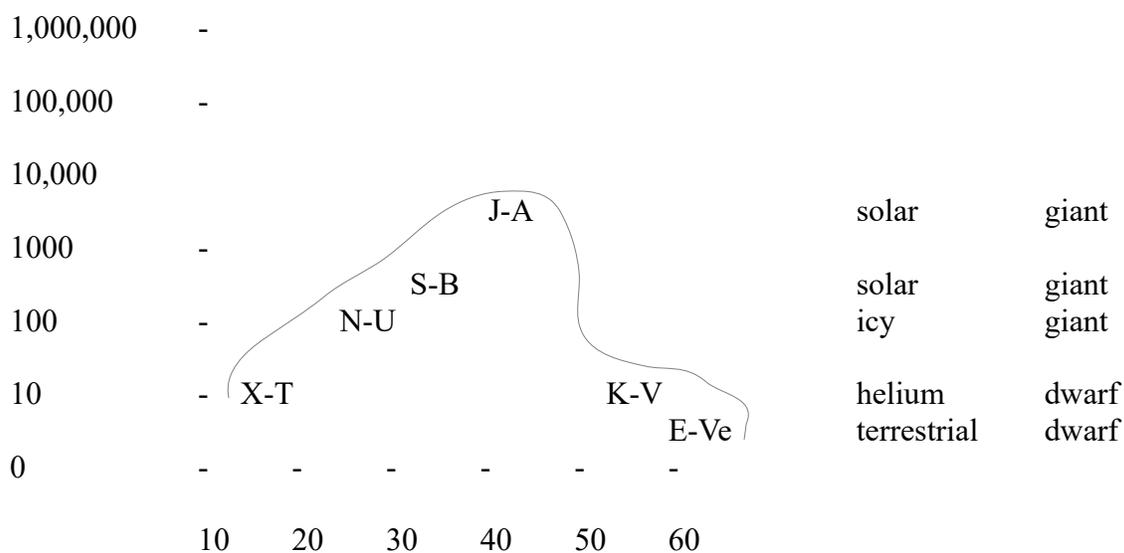
Following the explosion of Bellatrix, Mars, the inner moon, and Bellona, the outer, went into elliptical orbits as a double planet. Tidal forces slightly reduced angular momentum in these orbits, spin angular momentum was eliminated, and tidal stresses on each body progressively rose but were greater

on Bellona because it was the smaller body (in moons it is the smaller that is outer) so it explodes, the debris and subsequent collisions leaving the inner, siliceous ring of the Main Belt (Van Flandern, 2007b).

Krypton would have had several pairs of smaller twin moons, the outer ones exploding because of tidal stresses, with bodies like Ceres surviving as ex-moons, and others smashed up in collisions with other moons or other debris, forming the outer, more massive, carbonaceous MB ring.

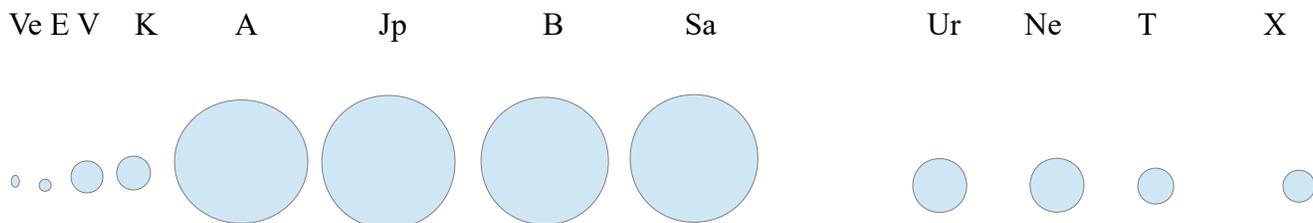
The graph below indicates there is the gaseous phase (Sun), the liquid phase, and the solid phase. After the solar phase there is a return to the initial mass range and the helium phase. In other words, there is a peak reached with the giant, solar planets, especially Jupiter and then a drop off which ends up with small, solid planets. The process would have taken place at, just before, or shortly after 4.6 bya (but see Eukaryotes: an Update for the possibility of a young Earth instead). Presumably, there is the same basic liquid-to-solid pattern in other solar systems but with different arrangements for different stages, which would be presumably because of the different masses and temperatures of the parent stars. A brown dwarf would be near the top, at a minimum of about 25,000 metric zettatons and a maximum of 150,000. A red star would be at the top, at 150,000-1 mln. Compare the Sun, which is 2 mln., Mars .64, Mercury .33, Pluto .013, and Ceres .0009.

Figure 1. Graph Showing the Time-Distance/Size-Composition Relation Among Planetary Pairs



(The vertical axis shows the mass in metric zettatons ($=10^{24}$ kilos, trillion trillion, septillion, or yoctokilos) [Jupiter is shown very approximately as it is at 2000×10^{24} , not 5000], and the horizontal axis shows the time in millions of years, which is very approximate; distance is shown in reverse to correspond with the time factor).

Figure 2. Illustration of the 12 Original Planets (showing approximate relative sizes with distances from the Sun in AUs [upper row of numbers] and the approximate diameters (estimates for the missing planets) in 1000s of kms. [lower row of numbers]).



| | | | | | | | | | | |
|----|-----|-----|-----|-----|-----|-----|----|----|----|----|
| .7 | 1.6 | 2.5 | 3.7 | 4.2 | 6.8 | 9.5 | 20 | 30 | 43 | 68 |
| 12 | 30 | 30 | 140 | 140 | 120 | 120 | 50 | 50 | 30 | 30 |

Planet LHB-A, the explosion for which is postulated to have caused the LHB (Late Heavy Bombardment) (about 4 eons ago), the liquid fragments solidifying in space over the long distances, was twinned with Jupiter, and LHB-B, the explosion for which is postulated to have caused another LHB, with Saturn. In planets LHB-A, Jupiter, LHB-B, and Saturn, being gigantic, the inner and smaller partner in each pair was subjected to enormous tidal stresses causing it to blow up, and this is why we see giant planets without partners in other solar systems as well. The explosions took place before they were able to fission off moons. Venus-Earth ended up as the innermost pair as it was the last to split off, and T and X as the outermost but was the initial innermost since it was split off first. It is suggested (Hartmann, 1983, p. 164) that bodies can break up by tidal stresses.

There is some doubt about the LHB (Wandering Gas Giants and Lunar Bombardment, G. Jeffrey Taylor-psrd.hawaii.edu), but this does not preclude the existence of the 2 planets, and they would be required, as Jupiter would be otherwise twinned with Saturn and the masses of V and K, which would have been absorbed after the explosions, would not have been sufficient, even at 8 and 10 earth masses, to account for Jupiter's size. And Ovenden's mass of 90 earth masses for Krypton was found to be untenable by Opik in a 1978 article called "The Missing Planet" in The Moons and the Planets (now also at Springer.Com).

An argument given against the EPH is that there isn't enough mass in the MB but this is easily contradicted by the fact that, in such an explosion, most of the mass would be vapourized (Van Flandern, 2007) so such an argument is untenable.

The evidence for Mars as a former moon is as follows:

Much less massive than any planet not itself suspected of being a former moon.

Orbit has eccentricity of near 10%, as would be expected for an escaped moon.

Spin is slower than larger planets, except where a massive moon has intervened (Mercury escaped from Venus; Moon robbed Earth of original 2-4 hour spin rate.)

Large offset of center of figure from center of mass – common for moons, not for planets

Evidence that an explosion occurred nearby is as follows:

Shape not in equilibrium with spin, indicating reshaping by some cataclysm

Southern hemisphere is saturated with craters, the north has sparse cratering – indicates either a removal mechanism in the north or a massive cratering event in the south

The crustal dichotomy boundary is nearly a great circle – indicates that something nearby but external to Mars and short-lived devastated half the planet

Northern hemisphere has smooth, 1-km-thick crust; rough southern crust is up to 20-km. thick – suggests massive bombardment of the southern half from a planet-sized source

Crustal thickness in south decreases gradually toward hemisphere edges – consistent with external event, not a local one

Lobate scarps occur near hemisphere divide, compressed perpendicular to boundary – indicates that impacts near the hemisphere boundary were extreme grazers

Huge volcanoes arose where uplift pressure from mass redistribution following pole change is maximal – consistent with present shape not being in equilibrium

Sudden 90° geographic pole shift occurred – as would happen if a great mass were added to one hemisphere centered on Martian equator, causing planet to tip over

Much of original atmosphere has been lost – as would result from a major cataclysm

A sudden, massive flood with no obvious source occurred – cataclysm may have brought the water from oceans on the source body

Xe129, a fission product of massive explosions, has an excess abundance on Mars

Crustal magnetization in southern highlands is weak to absent in northern lowlands

Also, there is ample evidence for such explosions (Van Flandern, 1999, 2007), over 100 points of evidence in 11 lines of evidence, including 10 from asteroids; 30 from comets (including Opik's 1978 test for comets which indicates an explosion origin for these); 27 from planets; 12 from moons and ring systems; 20 from meteoroids; and several miscellaneous. Here are the major ones:

asteroids:

1. explosion signatures in the distribution of orbital elements (semi-major axis, eccentricity, and inclination) found in fragments of artificial satellites that have blown up.
2. mean relative velocities of asteroids are 5 km/sec.
3. low optical reflectivity of asteroids would be expected from the charred residue from an explosion
4. small size and elongation of asteroids and meteoroids and crater chains implying origin through tidal decay of moons likely caused by an explosion
5. Kirkwood gaps
6. asteroids with moons
7. similar spectrums and albedos in asteroids (and captured asteroids) suggesting common origin
8. 1000 objects 1 km. or more still in earth-crossing orbits; these would all have been eliminated in 30 mln. yrs. unless there was a recent origin (which would not be from a solar nebula) or continuous production; the latter has been shown to be untenable

meteorites:

1. rapid melting in some meteorites
2. meteor showers as debris clouds
3. glassy tektites found all over the Earth have several characteristics suggesting an explosion origin including melting shortly prior to atmospheric entry and implied high pre-entry velocities (O'Keefe, 1976)

comets:

1. comets mostly rocky instead of icy
2. comets with moons
3. split velocities of comets
4. Halley's abundance ratio of N₂/NH₃ is 1/10 meaning an origin in inner solar system; it would be at 100/200 if the origin was in the outer solar system
5. Temple 1 from the Deep Impact mission and Shoemaker- Levy from the Stardust mission
6. perihelion bias
7. hyperbolic trajectories which are part of the standard model, are not observed
8. hemispheric bias in the distribution of directions of new comets: some 70-80% of comets come from 1 hemisphere of the sky and some 20-30% from the other which is required by EPH as nearly parabolic trajectories that are to become today's new comets are not sent off in equal numbers in all directions

9. Kreutz sun-grazers

planets:

1. sudden obliteration of the larger older craters on Mars
2. Jupiter has insufficient mass to interfere with the formation of a planet
3. abundance of deuterium to H on Venus indicating presence of abundant water in past not accounted for by cometary influx alone
4. sudden, massive, and short-lived influx of water on Mars
5. recent loss of abundant flowing water on Mars indicated by deuterium/H ratio

moons:

6. Phobos and Deimos captured after planetary break-up in gravitational screen capture instead of from asteroid zone
7. grooves on Phobos likely caused by collision which captured it into lunar orbit
8. large number of low-angle impacts on Martian surface suggesting former large population of temporary moons
9. magnetism and radioactivity on Moon can't be native to it
10. Iapetus dark on one side and bright on the other (the blast wave causes the dark side because of its slow rotation); this was a prediction which proved true

general:

1. all airless bodies coated with black material (the black axiom)
2. hemispherical asymmetry of Earth, the Moon, Mars, Venus, and Mercury caused by blast waves
3. Van Flandern (1999, p. 163-64) points out that gamma rays (which have the shortest wavelengths, therefore the highest frequencies, therefore the most energy) coming from the galactic center have an energy of 511,000 Ev (electron volts), which is exactly the energy produced by the mutual annihilation of electron-positron pairs, and gamma-rays at 2 mln. Ev are also detected from the galactic center, which implies the decay of the short-lived radionuclide (radioactive isotope) Al 26, usually found involved in supernova explosions, which is found in disproportionately large amounts in carbonaceous meteorites.

The geological evidence on Earth for one of the explosions coincides with the extinction of the dinosaurs. And evidence gleaned by Deep Impact on Comet Tempel 1, shows comets to be of both terrestrial and icy composition.

Also, Jupiter's gravitational influence probably does not explain the wide variety of distances, eccentricities, and inclinations in the MB, Jupiter is not large enough and would not be able to arrest the development of a planet and even less so Neptune regarding the KB.

Van Flandern presents 3 planetary explosion mechanisms (MetaResearch Bulletin, 2002-- Planetary Explosion Mechanisms): change of state, natural nuclear fission reactors, and gravitational heat energy.

The 1st would be strong enough to blow up no more than Earth-size planets.

The 2nd mechanism goes as follows: when tidal stresses reach a maximum and internal conditions are otherwise suitable they can act as a trigger for a sudden planetary core collapse blocking the planet's normal heat flow and leading directly to an explosion. Supernova explosions are believed caused by core collapse also. Van Flandern also points out that novas might be explosions of planets.

The total energy for the explosion of a nova is estimated at 10^{43} ergs, which is about equivalent to the energy emitted by the Sun in 10,000 years, and is also thought caused by a thermonuclear process. Novas are thought to be white dwarfs, which are about the mass of the Sun. However, the core collapse model for novas and supernovas might be in error, and the electric universe model offers a plausible alternative explanation: the double layers of these stars are what explode.

The 3rd is based on gravity. The possible energy sources for the explosion of stars are gravitational potential energy or nuclear fusion, neither of which are feasible for planets as they are not massive enough to make either work. This is the main argument against the FEM, but Le Sage gravity would provide plenty enough energy for this. This theory of gravity has been partially confirmed as half of the experiments for it are positive (Edwards, 2002). But all objections to it have been shown invalid by Van Flandern (1999; 2002a; MetaResearch Bulletin).

There is evidence of cataclysms in other solar systems (New Scientist, 2009). These are said to be caused by collisions but collisions are omitted from the Flandernian model because spaces between planets and between moons are too large to allow for such events as being plausible, except after explosions and in the same orbit.

To summarize solar system events according to Van Flandern, this is what happened, going from the inner to the outer planets, not in chronological order:

1. Venus lost its moon Mercury, which became the innermost planet
2. Bellatrix, a liquid helium planet, blew up; it had 2 large moons, 1, Bellona blew up, with subsequent collisional evolution forming the inner, less massive, siliceous asteroid belt, the other, Mars, remained in tact;
3. Krypton, also a liquid helium planet, blew up; it had several smaller pairs of moons, the outer partner of each blowing up, with subsequent collisional evolution forming the outer, carbonaceous, and more massive asteroid belt
4. LHB-A, twin of Jupiter, a giant liquid planet, exploded before it was able to fission off moons, and caused the 1st Late Heavy Bombardment
5. LHB-B, twin of Saturn, a giant liquid planet, exploded before it was able to fission off moons, and caused the 2nd Late Heavy Bombardment
6. T, a liquid helium planet, blew up; it had many pairs of relatively small moons, the outer, smaller partner of each blowing up, with subsequent collisional evolution forming the inner KB belt
7. X, also a liquid helium planet, blew up; it had many pairs of relatively small moons, as well, the outer, smaller partner of each blowing up, with subsequent collisional evolution forming the outer KB (many fragments reassembling as spherical asteroids)
8. some of the debris from the lunar explosions was thrown out to eventually form comets

Solar fission (Van Flandern, 1999) accounts well for the twinning of planets (and moons), coplanar and circular orbits, and angular momentum distribution, and does not require planetesimal collisions. As well, fission is proposed as a possible explanation for the formation of close binary stars (Fix, 2006).

Arguments against the FEM are that the sun does not rapidly spin and has a tilt of 7° . However, the same argument about the sun's tilt can be made against the PH and, also, both can be explained by subsequent evolution, i.e., gravitational interaction with the planets causing the tilt and the slowing down of the spin over time, largely because of angular momentum transfer, but Van Flandern also proposes a possible 7th pair of planets that fell back into the sun and merged with it causing the 7° tilt.

There have been many heterodoxers who propose that the explosions were caused by weapons (e.g., Farrell, 2007), but it would be only 1 or 2 planets, not a planet and many moons, which at best leaves out the Kuiper Belt, and the explosions of planets occurred in pairs. The evidence instead indicates, for the most part at least, natural explosions.

Names for the Missing Planets

The late Dr. Van Flandern suggested the possibility of perhaps using names from Greek mythology for the missing planets (as most of the names for the existing planets are Roman, Uranus being the exception, since it is a Latinized form of Ouranos and the Roman counterpart is *Celus*, which is related to "celestial", the French *ciel*, the Spanish *cielo*, the Italian *cielo*, and the Portuguese *céu*) and said the matter should be put to MetaResearch's message board (pers. comms.), as I had raised the issue (in 2008). I did put the matter to the message board after his decease in 2009, but nothing came of it. And most of the names for hypothetical planets proposed over the years since the 1800s are Greek: Hyperion, Hades, Phaeton, Oceanus, Theia or Orpheus (for the dubious and implausible Big Splat theory), and Tyche, Vulcan being an exception. Many others never received names. Hyperion is also the name of a moon [of Saturn], Tyche is also the name of an asteroid, and Phaeton is also the name of an asteroid, but has a different spelling, but there are no rules for the naming of hypothetical planets. The naming is the purview of the discoverer or theorist or a subsequent professional astronomer or astrophysicist, however, I can make suggestions.

I suggest Cyane (or Kyane) and Rhodos (or Rhode) for planets T and X, respectively, as the inner KBO ring is blue in spectral analysis, and the outer is reddish (excepting the 2:1 resonance population, which is blue, and the hot population which is blue or neutral, but have an origin in the inner ring). Cyane was a fresh-water nymph (a Naiad), the most renowned of all the Nymphae Sichelidae, who tried to prevent Pluto from raping and abducting her playmate Persephone. Having failed in this, she dissolved in tears into the waters of her spring or pool in the Sicilian town of Syracuse, which was a Greek colony. Cyane's partner was the river god Anapos (or Anapis). Rhodos was the goddess and personification of the island of Rhodes, daughter of Poseidon (Neptune) and full sister to Triton.

It is difficult to choose a Greek name for LHB-A and LHB-B, as they would be partnered with Latin names, so I suggest Juno and Opis, as they were the consorts of Jupiter and Saturn, or Cis-Jupiter and Cis-Saturn. Juno was, of course, also the name of an asteroid and the wife of Jupiter, the counterpart of Hera. Opis was the 2nd wife of Saturn and the counterpart of Rhea, and Lua was his first. Or we could simply stay with the current designations.

For V and K, I suggest Phaeton and Typhon, respectively (see History of the EPH).

History of the EPH

The EPH (exploded planet hypothesis) has been supported also by German astronomer H.W.M. Olbers, who originated it in 1812; French-Italian mathematician and astronomer Joseph-Louis Lagrange in 1814; Russian meteorite expert Yevgeny Krinov; Canadian geologist Reginald Daly in 1944 (Dodd, 1986); Brown and Patterson in 1948 (Van Flandern, 1999, loc. cit.); Russian academics Sergei Orloff, A.N. Zavaritskiy, Fesekov, Putilin, Savchenko, Schmidt (Bronshen, Origin of the Asteroids, 1971 – Archive.Org); Aleksandr Kazantsev, science-fiction writer and ufologist, and Professor Felix Zigel (Father of Russian Ufology)(One of Our Planets is Missing-thegalaxyexpress.com, lightforcenetwork.com); Canadian astronomer Michael Ovenden in 1972 and 1973, the explosion occurring 16 mln. yrs. ago, who formulated the principle of least interaction action (Van Flandern, 1999, loc. cit.); notorious skeptic Donald Menzel ("Presque toutes ces petites planètes circulent entre les orbites de Mars et Jupiter. On admet qu'elles représentent les fragments dispersés d'une grande planète qui se serait désintégrée." Menzel, 1978, p. 315); Estonian astronomer and astrophysicist Ernst Opik in 1978 (Van Flandern, 1999, loc. cit.).

German astronomer J.G. Radlof (1823; van der Sluijs – Mythopedia.Info) who named it Phaeton, proposed a collision with a comet instead of an explosion, in keeping with Nonnus' statement

that Zeus discharged a comet towards Typhon. The link with Phaethon was based on a passage from the *Dionysiaca* by 5th c. Greco-Egyptian epic poet Nonnus, who wrote in Homeric dialect and dactylic hexameter, which says he is next to Ares: if Phaethon really stood next to Ares, he could have been the missing planet that formerly revolved between Mars and Jupiter. The mythical death of both Phaethon (in Book 38) and Typhon (in Book 2) at the hands of Zeus was now interpreted as the disruption of the planet. (Note that this seems to be the destruction of 2 planets in the region, which corresponds to Van Flandern's model.)

In Greek mythology, Phaeton was the son of Helios, the sun god, and of a woman or nymph variously identified as the Oceanid Clymene, Prote, or Rhodos (Rhode, Rhodus). He is the brother of the Heliadae, the 7 sons of Helios, and of the Heliades, the 7 daughters of Helios. He drove the sun chariot through the sky for a day, but he was unable to control the horses, so the chariot came too close to the earth and began to burn it. Zeus noticed the danger, and to avoid further damage, he sent a lightning bolt to strike Phaeton, who fell to earth.

Phaeton is also the name of an Apollo asteroid (therefore within the Earth's orbit), but with a somewhat different spelling (Phaethon), discovered in 1983 by Green and Davies, and comes closer to the Sun than any other named asteroid, hence the name, and is the parent body of the Geminid meteor swarms in December. Typhon is also the name of a Scattered Disc object, discovered by NEAT (Near Earth Asteroid Tracking) in 2002.

Radlof also said that the planets were on different orbits than today. He speculated that Venus was one of the fragments of the exploded planet, and that it settled into its present orbit in the immediate aftermath of the explosion, after some close encounters with Mars. These views were motivated by the desire to accommodate Varro's statement regarding Venus' changed appearance and possibly also Phaethon's connection to the goddess Hesperus (Venus). Van der Sliujs says these ideas about Venus qualify Radlof as possibly the first modern 'planetary catastrophist', but this honour really goes instead to Olbers, as he was the first to postulate a planetary explosion in modern times.

The final element in Radlof's theory was the tilting of the earth's axis: "And the Aethiopians may indeed really have turned black on that occasion, because the hot zone ran over their heads when the earth axis was disrupted by that event."

Harry McSween (1999, *Meteorites and their Parent Planets*, p. 35, Cambridge University Press-books.google), falsely attributes the name Phaeton to Yevgeny Krinov (Cole and Cox, 1964, p. 32), involved in the investigation of the Tunguska Event, and who wrote a 31-p. booklet in 1956 about asteroids called Dwarf Planets (cited in Cunningham, 1988, p. 184; the Russian title would be карликовые планеты [Karlikovie Planeti]). Bronshten falsely attributes the name to Orloff in 1949, but does a very good review of various 5th planet theories.

Academician V. G. Fesenkov attempted in 1950 to explain the disintegration of Phaeton by a close encounter with Jupiter. But for the planet to be broken up, it would have to approach Jupiter very closely, and the orbits of the majority of asteroids are far from Jupiter (about 2 AU). He understood the difficulties of his own model and later rejected it.

I. I. Putilin proposed a more complicated idea in 1953 in the book *Minor Planets*. He assumed the cause of the disruption to be rapid rotation. With a diameter of 6800 km. and a rotational period of 2.6 hours the centrifugal acceleration would balance the gravitational acceleration. The ripping off of the outer layers of the planet near its equator took place. The pressure of the gases from within facilitated the subsequent disintegration. He doesn't propose one explosion but several successive explosions of large fragments from which the asteroid families were then formed. But scientists considered this model to be physically unfeasible.

In 1955 Odessan astronomer K. N. Savchenko, gave a different explanation, assuming that Phaeton had 5 moons: Ceres, Pallas, Juno, Vesta, and a 5th, the most distant from the planet, that was located almost at the limit of Hill's sphere, which was 2 million km. The perturbations by Jupiter resulted in Moon 5 leaving Hill's sphere and then becoming an independent planet. After many millions

of years it should have again entered the Hill's sphere, but this time it rapidly approached the planet and collided with it, causing it (the planet) to break up into numerous fragments, and Ceres, Pallas, Juno, and Vesta became independent planets.

K. N. Savchenko did not succeed in publishing the calculations which he made in the verification of this hypothesis. After his arrival at the Conference on Comets and Meteorites at Odessa, at which the model was expounded, he soon died. And although a unique physically plausible explanation of Phaeton's destruction is given in Savchenko's theory, it has encountered difficulties. As calculations show, an object only three times smaller than this planet, namely an object with a diameter of about 2000 km, could break up a planet of the size of Mars at a most probable approach velocity of 5-6 km/sec (the parabolic velocity for Mars is 5.1 km/sec). This is somewhat excessive for a moon of Phaeton. If the moon was of the same size as Ceres, the collision velocity should have reached c. 20 km/sec. Savchenko understood this fact and proposed that the 5th moon, moving past Phaeton several times, increased its velocity and angle of encounter each time. By the 5th passage it could attain a velocity of 17 km/sec. With such a velocity a collision took place. But while scientists have disputed how Phaeton was destroyed, Bronshten claims an hypothesis has been successfully developed in Russia by Academician Otto Schmidt.

According to A.N. Zavaritsky, iron-nickel meteorites are fragments of the core, iron-stone meteorites are fragments of the mantle, and stone meteorites are fragments of the crust. He estimated the size of the core at 1000-1200 kms. and at 40% of the planet's radius. Brown estimated the size of Phaeton at 6000 kms. and proposed a reconstruction of the planet similar to A.N. Zavaritsky's.

Although Urey and Graig attempted in 1953 to explain the two groups of chondrites which they found on the basis of the idea that the asteroids arose from two parent planets, A. A. Yavnel advocated in 1955 that they resulted from 5 parent planets. The latter corresponds to the 5 major geochemical groups of asteroids, but the parent bodies are not planets but moons or fragments thereof in Flandernian theory.

Another interesting aspect, especially for science fiction fans like me, is the 5th planet in fictional literature, 2 being called Phaeton. In "Time Wants a Skeleton," a short story by Ross Rocklynne in *Amazing Science-Fiction* magazine in June 1941, the characters travel back in time to Phaeton, a planet similar to Earth, just before it was destroyed in a collision with another planet (which is not named). *End of an Era*, a 1994 novel by Robert Sawyer, is a time travel story in which Phaeton is not yet destroyed. The contribution by Kazantsev is *Faety (The Destruction of Faena)*, a 1974 novel in which the asteroid belt is the debris of Faena, the 5th planet, just between Mars and Jupiter. The few survivors had to seek refuge on Mars and Earth. *Homo sapiens* is thus assumed to be a mixture of local and Faetan DNA.

Venus and Mercury

The model for Mercury, which has phases and a western evening and eastern deep night version like Venus, both planets being inferior (having orbits between Earth and the Sun), as an ex-moon of Venus is largely based on calculations done by Van Flandern and Harrington (1976) and goes as follows (Van Flandern, 1999):

As Mercury tidally drifted outward it necessarily produced rotational drag on Venus, and it raised even bigger tides on the Venusian atmosphere causing it to circulate in retrograde direction. After billions of years this might impart retrograde motion on the whole planet.

Tides caused on Venus by Mercury while the latter was still spinning rapidly would have caused great interior heating and outgassing, and probably a great deal of surface upheaval (mountain building), too, causing the very dense atmosphere, the massive release of carbonate in the rocks as CO₂ into the atmosphere, and the very high mountains. Mercury is massive enough to have taken much of

Venus's spin in the first half-billion years after formation and Venus's orbit is close enough to the Sun that complete escape occurs. The interchange of energy between Venus and Mercury would have been enormous, given Mercury's large mass (4 1/2 times more massive than the Moon).

Most of the iron (which eventually produces the magnetic field) in Venus would have been forced up into the crust by an excessively high spin rate, with Mercury getting most of the iron during fissioning, which would explain why Mercury has a stronger magnetic field than Venus. By contrast, the Earth's iron was not forced to the surface, perhaps because the Earth was not as hot and molten as Venus during that phase of its formation.

During its lunar phase Mercury would have acquired a prolate shape (somewhat elongated towards Venus) because of tidal forces.

Both planets would have been melted by tidal heating in the early stages following escape. If this occurred before Venus differentiated, it might have caused Mercury's high density and stronger magnetic field. Subsequently, both planets would have melted from mutual tidal heating.

After escape, Mercury acquired greater tilt and eccentricity, and Venus would have lost more of its spin. Its prolate shape would have been reduced after escape but still maintained. At the point of escape Mercury would have had a period of revolution of about 40 days, and would have retained its spin period, which would also be 40 days since it was locked with Venus. But tides raised by the Sun would slow down its spin to its present 60 days, which gives it a 3-2 spin-revolution ratio (3 spins per 2 revolutions, in other words, its rotational period is 2/3 its period of revolution, which is 88 days), because the next stable configuration for such a body (Mercury mass and diameter and degree of prolateness) is this ratio, so it is a predicted outcome of its having been a moon of Venus.

This model, then, explains all the anomalies of both Venus and Mercury. Musser (2006) says it would require too much time for Venus to lose a moon but does not provide any reference for this, and the possibility has been corroborated by Kumar (1977) and Donnison (1978). This is the abstract from Donnison:

"Kumar's (1977) suggestion that the slow rotations of Mercury and Venus are in part due to natural satellites that subsequently escaped is discussed. A more useful criterion for the escape of such satellites than that previously proposed is derived, and it is shown that this distance is sufficiently small for Mercury and Venus to make the escape of satellites a likely possibility."

And this is the abstract from Kumar:

"It is suggested that the slow rotations of Mercury and Venus may be connected with the absence of natural satellites around them. If Mercury or Venus possessed a satellite at the time of formation, the tidal evolution would have caused the satellite to recede. At a sufficiently large distance from the planet, the sun's gravitational influence makes the satellite orbit unstable. The natural satellites of Mercury and Venus might have escaped as a consequence of this instability."

They do not, however, specifically say that Mercury was once a moon of Venus.

This is the abstract from Van Flandern and Harrington (gizidda.altervista.org):

"The possibility that Mercury might once have been a satellite of Venus, suggested by a number of anomalies, is investigated by a series of numerical computer experiments. Tidal interaction between Mercury and Venus would result in the escape of Mercury into a solar orbit. Only two escape orbits are possible, one exterior and one interior to the Venus orbit. For the interior orbit, subsequent encounters are sufficiently distant to avoid recapture or large perturbations. The perihelion distance of Mercury tends to decrease, while the orientation of perihelion librates for the first few thousand revolutions. If

dynamical evolution or nonconservative forces were large enough in the early solar system, the present semimajor axes could have resulted. The theoretical minimum quadrupole moment of the inclined rotating Sun would rotate the orbital planes out of coplanarity. Secular perturbations by the other planets would evolve the eccentricity and inclination of Mercury's orbit through a range of possible configurations, including the present orbit. Thus the conjecture that Mercury is an escaped satellite of Venus remains viable, and is rendered more attractive by our failure to disprove it dynamically."

Venus' retrograde rotation is postulated by some to be due to having tilted upside down caused by a very large tilt that eventually was large enough to tip the planet over due to tidal effects, and, in the case of Venus, involves not having a moon at the time (the Chaotic Obliquity of Venus-imcce.fr and bdl.fr/Equipes/ASD/Venus), but this involves a large tilt in the first place.

Another hypothesis is that of Correia and Laskar (2001) who say that the cause would be a slowing down in the Venusian rotation that would have eventually led to it being reversed.

A collision has also been proposed for this retrograde rotation, but it is of the utmost improbability and implausibility, and this hypothesis is rejected by most astrophysicists.

Origin of the Moon

The first theory of lunar formation was the fission theory in 1879 by George Darwin, son of Charles, and Plumian professor of astronomy and experimental philosophy at Cambridge; the 2nd was gravitational capture by T.J.J. See in 1909 and Gerstenkorn in 1955; the 3rd was coaccretion by Otto Schmidt in 1959 (Lodders and Fegley, 1993). The latest theory of formation of the Moon, the Big Splat, by Hartmann and Davis in 1975 and Cameron and Ward in 1976, postulates an impact with a Mars-sized body which supposedly was part of a double planet system with Earth (Lodders and Fegley, 1993), but a collision in such a configuration is highly improbable. Such a body coming from elsewhere in the early solar system to collide with another is even less probable. Prominent planetologist John Lewis (2000) described it as messy, poorly constrained, not very testable, intractable, but the best we have. But it's probably the worst we have. Other problems with it are:

1. ratios of the Moon's volatile elements are not consistent with the giant impact hypothesis.
2. there is no evidence that the Earth ever had a magma ocean (an implied result of the giant impact hypothesis),
and some material was found which may never have been in a magma ocean.
3. iron oxide (FeO) content of 13% of the bulk Moon properties rule out the derivation of the proto-lunar material from
any but a small fraction of Earth's mantle.
4. if the bulk of the proto-lunar material had come from the impactor, the Moon should be enriched in siderophilic
elements, when it is actually deficient of those.
5. certain simulations of the formation of the Moon require about twice the amount of angular momentum than the Earth-Moon system has now.

The planetary fission scenario has several steps as follows (Van Flandern, 1999):

- step 1--in early formation, temperatures and pressures rise in Earth's center
- step 2--core regions melt with heavy elements sinking to the center resulting in general contraction and spin-up
- step 3-- spin-up continues to increase until overspin is reached (about 2 hrs. instead of the current 24), which is when the outward centrifugal forces exceed the inward gravitational force

step 4--Earth's crust fragments along weak fault lines and the fragments fly off into space from what is now the Pacific Basin, splitting apart the remaining crust in what is now the Atlantic Basin.

step 5-- fragments collect into a spherical shape because of self-gravity

step 6--tidal pumping causes Moon's interior to partially melt, forming a small core.

step 7--Moon raises huge tides back on Earth, keeping the Earth's interior hot and molten for an extended period, and causing an increase in the Moon's orbital height which continues to this day but to a far lesser degree.

step 8--Earth's and Sun's gravity compete with Sun winning out as the Moon gets farther away from the Earth causing the 5° tilt

The last step is according to calculations done by Van Flandern and Harrington with a wide range of initial conditions all with the same result.

Until the '70s it was thought that fission theory was in conflict with dynamic and chemical evidence, but NASA scientist John O'Keefe has shown how the former can be resolved, German cosmochemist H. Wanke has done the same for the latter, and Keith Runcorn has resolved certain other (minor) discrepancies in composition (Van Flandern, 1999). Also, the recency of the ocean floor is incompatible with the theory, but this recency is a fallacy--there is proof of the ocean floor as being very old and all other claims of plate tectonics are contradicted by the evidence as well (see, for example, David Pratt, 2000, 2001). Furthermore, a recent model proposed by Rob de Meijer and Wim van Westrenen (TechnologyReview.Com-the Physics arXiv Blog, 2010) corroborates the fission theory.

There is a trend toward twinning among moons: Jupiter's Io-Europa and Ganymede-Callisto, Uranus' Ariel-Umbriel and Titania-Oberon and Neptune's Naiad-Thalassa and Despina-Galatea and there is enough space to allow for a lost companion for Miranda, Proteus, and Larissa. There is a reversal in sizes/masses in twin pairs in moons as the inner one is larger and this is because in planets there is loss of mass and spin angular momentum, whereas in stars there is a gain in these, resulting in the opposite condition in moons. Rings are regarded as debris from explosions of moons instead of remnants from Roche limit casualties. (Van Flandern, 2007).

Oort Cloud

Comets were postulated to be formed and captured from interstellar material by Van Woerkom in 1948 and as volcanic eruptions from giant planets or their moons by Vsekhsvatsky in 1977 (Hartmann, 1983). Van Flandern (1979, 1999) points out several facts. The tendency of cometary directions of approach to the Sun to cluster toward the directions of the Sun's motion in space might suggest an interstellar provenance, but the Sun moves far too rapidly compared to its stellar neighbours for capture to be possible. Condensation from an extended solar nebula fails to explain the non-random characteristics of cometary orbits, such as the preferred direction of approach to the Sun and how comets could wind up at such huge distances from it, 1000 times farther out than Pluto. It is especially difficult to explain how such bodies could form in the first place, given such a theory, as the sphere of influence of a typical 1 km.-cometary nucleus in an Oort Cloud would be 4 mln. kms., and the average distance between them would be 1 bln. kms., making collision and accretion even less plausible than usual. It would be possible to fit 200 bln. stars in the volume within Pluto's orbit and without them touching at that, yet the imaginary Oort Cloud is a bln. times greater! New comets arriving near Earth's orbit reach infalling velocities with respect to the Sun exceeding 40 kms./sec., so the ejection of such comets from the planetary region to their present orbits would have to be at similar speeds, but if these new comets were given just .5 m./sec. more velocity than they already have near the Sun, they would surpass escape velocity and leave the solar system and never return. Mechanisms that can increase velocities so close to critical in such great numbers are difficult to imagine. In particular, it was shown by Yabushita (1979) that the initial minimum distances of comets from the Sun must have exceeded

about 1500 AUs to have any chance of evolving into an Oort Cloud. The Scattered Disk extends to only to several 100 AUs. So an Oort Cloud inner core was imagined, but it was never observed.

Also, the number of comets required by the standard model is enormous since the 'KB of comets' must constantly resupply the inner core, which in turn must resupply the Oort Cloud. The estimates for the total are said to be at least ½ bln. (Hartmann, 1983), 1 trln. (Oxford Astronomy Encyclopedia, 2002; Ridpath, 1997), 10 bln. to 1 trln. (Hamblin and Christiansen, 1990), and as high as 5 trln. (Freedman and Kaufmann, 2008) and 6 trln. (Weissman, 1999); Oort suggested 100 bln. (Hartmann, 1983) and Lang (2003) estimates 200 bln.

And the Oort Cloud would get eliminated several times during the solar system's history by passing GMCs (giant molecular clouds), galactic tides, and passing stars, and would need again to be regenerated.

By contrast, Van Flandern's theory of a planetary explosion as the origin for comets fits the observations.

Exoplanets

Data from other solar systems tend to favour solar fission as we often see very close-in planets, a phenomenon not explained by the standard model but which is easily explained by solar fission, as, with it, planets in their early stages would indeed have tight orbits. The PH requires recourse to a swidget--the inward migration of giant planets--which would take too long, so isn't at all plausible.

Also, for example, in a recently discovered solar system, the red dwarf Trappist-I (Gillon, 2016), in Aquarius, 40 light-years away, we see the twinning of planets: b-c and f-g. The 7 planets range in mass from .77 to 1.1 earth masses, the orbital period range is 1.5 days to 20 days, 3 are in the life zone, and all are at a 90° inclination. There is also Kepler-11, a G star, 2000 light-years away, in Cygnus, with planets b-c (2 and 3 earth masses) and d-f (7 and 8 earth masses) (Lissauer et al, 2011).

As well, most of the planets found so far are super-earths in tight orbits (which can also be called mini-Neptunes)(with giant planets being the majority overall)(Howard, 2013), a class not found in our solar system because they would blow up later on in their evolution.

Le Sage Gravity

The most successful attempt at providing a mechanical explanation for gravity was by Georges-Louis Le Sage, fils (1724-1803), of Geneva, the first published sketch of which was in 1756 in *Mercure de France* and the first complete exposition of which was in 1758 in *Essai sur la chimie mécanique*. He was a Newtonian and atomist. He envisioned the observable Universe as bathing in a sea of ultramundane corpuscles, ultramundane because they are outside our known world, which have minute mass, enormous speed, and complete inelasticity. Nicolas Fatio de Duillier had, in 1690, formulated the theory first, but, although it was presented to the Royal Society of London, and in 1729, submitted as a poem to the Académie des sciences in Paris, it was never published. (Evans, 2002).

Le Sagean gravity was designed to explain the basic features of Newtonian gravity: induced test particle accelerations toward a source mass, proportional to the source mass, and falling off with the square of the distance from that source mass. If the ether is included, as in the Flandernian version (but as separate from the graviton medium), it yields all GR effects without the need for adjustable parameters: light slowing and bending, gravitational red shift, and the in-plane recession of orbits. The 3rd arises from a single term, while in GR it requires a combination of 3 effects, making Le Sage gravity simpler. (Van Flandern, 2002).

The particle versions of pushing gravity are notably by Le Sage and Van Flandern. The wave versions (Tesla, Brush, Lorentz, Maxwell, Arp, Popescu-Adamut, Kierein, etc.) postulate gravity as associated with EM (as a manifestation of it [mostly as a push of long wavelength radiation]) or arising

from it or from its interaction with matter. The individual quanta of the EM are termed gravitons. Most of the theories are of the long-wavelength type. The short-wavelength version is called mock gravity and has been suggested as important in planetary formation by Spitzer in 1941 and Whipple in 1946 and in galactic formation by Hogan and White in 1986.

Toivo Jaakola sees gravitation as a pressure effect of gravitons flowing from the background space, in other words, an interaction between mass systems and the background field. As a rule, because of the equilibrium principle, the flow is proportional to the mass of the body. For concentric flows, e.g., radiation, the surface density of the graviton inflow follows the familiar inverse square distance law. The energy of the gravitons is proportional to the parameter called the strength of gravitation, G . So for the surface gravity of a spherical body with mass M and radius R we obtain the familiar Newtonian equation $a=GM/R^2$. (Jaakola, 2002).

In Le Sage gravity there is the potential from gravitational aberration (propagation delay) to fling masses apart, orbital decay due to linear drag (from inertial motion), and either fling or drag resulting from rotational coupling, but the key to orbital stability is in the fact that aberration is the predominant factor, so as long as the delay potential from the aberration exceeds the combined effects of the others (linear drag, rotational coupling), the field will adjust its potential to compensate, maintaining an orbit; it is an intrinsic property of the field to establish and hold a stable zero net energy configuration, which is known as Noether's Theorem (Stowe, 2002). The aberration problem is also solved by the propagation of gravity at supraluminal speeds.

Matthew Edwards (2002a) states that, while confirming evidence of a gravitational medium of EM radiation of sufficient energy density is still lacking, its existence poses no special theoretical difficulties, and the need for a gravitational ether was expressed even by Einstein.

John Keiren states that in order for a static universe to be stable there must be a long-wavelength background radiation as the solution to Olber's paradox and that Le Sage's corpuscles are the background long-wavelength photons which are highly penetrating and produce forces as they interact with massive bodies. And Schneiderov, in 1943 and 1961, Jones in 1987, and Byers in 1995 have given arguments supporting Le Sage-type shielding as the source of the strong force binding nucleons. (Edwards, 2002b).

Objections to the model include that no force exists if all gravitons are scattered and that the generated heat would vapourize masses if all gravitons were absorbed. Victor Slabinski (2002) derives formulas that allow for the placement of constraints on the gravitational parameters, and when gravitons are partially absorbed and partially scattered, parameter values are consistent with the observed gravitational constant, the observed excess heat flows from planets, and drag small enough to still be undetected.

Here is a summary of objections, a, that have been raised to Le Sage gravity with their solutions, b, presented by Van Flandern (2002a).

1.

a. If particle collisions with matter are perfectly elastic, momentum is conserved and no (gravitational) net force will result.

b. Particle collisions are inelastic or partially absorbed and partially scattered.

Particles may lose velocity and absorbed particles will raise the temperature of the impacted mass.

2.

a. The temperature of matter would be continually raised by particle collisions.

b. Matter reradiates absorbed energy isotropically to maintain net force and temperature equilibrium. Excess heat is carried off by LCM (light-carrying medium) flow.

3.

- a. Particles must travel very rapidly to impart the necessary momentum to matter, yet produce no detectable frictional resistance to motion.
 - b. The minimum particle speed consistent with the lack of detectable aberration is 20 bln. times the speed of light. This high speed is also consistent with the lack of detectable frictional drag.
- 4.
- a. Matter must be mostly empty space to make shielding effects very small.
 - b. Matter is in fact mostly empty space.
- 5.
- a. The range of the gravitational force between matter cannot be infinite because of the backscatter of gravitons colliding with other gravitons.
 - b. The range of the gravitational force may in fact be limited to about 1 kiloparsec.
- 6.
- a. Graviton-graviton collisions would damp mean graviton velocities, even for elastic collisions.
 - b. Mean graviton velocities are increased by a compensating amount through the Meta Cycle, whereby light waves from spontaneously emitted photons lose energy to the graviton medium causing the photons to redshift.
- 7.
- a. If gravitons were not extremely small compared to their mean free path, the resulting inverse-square force would be proportional to the body's cross-sectional area rather than its mass.
 - b. Gravitons are many orders of magnitude smaller than quantum particles, yet have a mean free path on the order of a kiloparsec. (Gravitons are so small compared to light waves that no significant refraction or scattering of light occurs, which removes the main objection to the tired light model as an explanation for red shift, and the effect of friction on light wave amplitude that accompanies the effect on frequency brings supernovas and other phenomena into agreement with predictions of this model, which can't be said for more simplistic tired light models.)

Experimental evidence for gravity propagating faster than light is presented by Van Flandern (1998) and summarized in Van Flandern's Pushing Gravity chapter (which was copied verbatim without citation by P.K. Hoiland in The Hidden Ether of GR, 2004, at journaloftheoretics.com) and is as follows:

- 1) a modern updating of the classical Laplace experiment based on the absence of any change in the angular momentum of the Earth's orbit (a necessary accompaniment of any propagation delay for gravity even in a static field);
- 2) an extension of this angular momentum argument to binary pulsars, showing that the position, velocity, and acceleration of each mass is anticipated in much less than the light-time between the masses;
- 3) a non-null 3-body experiment involving solar eclipses in the Sun-Earth-Moon system, showing that optical and gravitational eclipses do not coincide;
- 4) planetary radar ranging data showing that the direction of Earth's gravitational acceleration toward the Sun does not coincide with the direction of arriving solar photons;
- 5) neutron interferometer experiments, showing a dependence of acceleration on mass, and therefore a violation of the weak equivalence principle (the geometric interpretation of gravitation);

6) the Walker-Dual experiment ("Propagation Speed of Longitudinally Oscillating Gravitational and Electrical Fields" by William Walker and Jurg Dual, 1997) showing in theory that changes in both gravitational and electrostatic fields propagate faster than the speed of light, a result reportedly given preliminary confirmation in a lab experiment.

7) An earlier lab experiment, with summary description in Wang et al, showed that charges respond to each other's instantaneous positions, and not to the left-behind potential hill ("hill" being a height as opposed to a "well", a depth), when they are accelerated. This demonstrates that electrodynamic forces must likewise propagate faster than light, more convincingly than earlier experiments shows angular momentum conservation.

8) A new lab experiment at the NEC Research Institute in Princeton claims to have achieved propagation speeds of 310 c. This supplements earlier quantum tunneling experiments. It is still debated whether these experimental types using EM radiation can truly send information faster than light. Whatever the resolution of that matter, the leading edge of the transmission is an EM wave, and therefore always travels at the speed of light. However, such experiments have served to raise public consciousness about the faster-than-light-propagation concept.

Of all these experiments, #2, the binary pulsars, places the strongest lower limit to the speed of gravity to 2×10^{10} c.

The conclusion for these experiments, however, has been contested by Steve Carlip (Aberration and the Speed of Gravity-lanl.gov), Ibson et al (1999), and Mojahedi and Malloy (2001). The first 2 articles contend superluminal speeds were not found. The other contends that only the group and energy velocities were superluminal, and the "front velocity" wasn't, which is the only one required to obey Einstein causality.

But evidence for superluminal speeds goes back as far as c. 1900 when Tesla claimed that he had intercepted cosmic rays emanating from the sun that attained velocities "vastly exceeding that of light."

Further confirmation can be found in George Gamow's watershed book *Thirty Years That Shook Physics: the Story of Quantum Theory* from 1966. Gamow, one of the founding fathers of quantum physics, states that in the mid-1920's, Goudsmit and Uhlenbeck discovered not only that electrons were orthorotating, but also that they were spinning at 1.37 times the speed of light. Gamow makes it clear that this discovery did not violate anything in quantum physics, but, of course, it violated Einstein's theory. Dirac studied the problem and, following in the footsteps of Herman Minkowski, who used an imaginary number i (the square root of -1 , which is purely mathematical, with no relation to the real world, just like extra dimensions) to be equivalent to the time coordinate in space-time equations, he assigned the same number i to electron spin. Because they are spinning faster than light, the idea is that they are drawing this energy from the ether, and converting the energy into material form. In this way he was said able to combine relativity with QM and won a Nobel Prize in the process. But the finding that elementary particles have superluminal spin went into oblivion and no physicist talks about this anymore. (Tesla vs. Einstein: the Ether & the Birth of the New Physics, 2012 (newdawnmagazine.com)).

Furthermore, Van Flandern (1999) pointed out that an object can travel faster than light if it is not dependent on the medium, just as a jet can surpass the speed of sound but not a prop plane, which is why gravity can propagate faster than light. The speed of light is no more constant than the speed of sound, which varies according to the temperature of the air. And there is no violation of causality—gravity and supersonic jets do not travel backwards in time.

Another objection is that any form of gravitational shielding would represent a violation of the equivalence principle (between gravitational and inertial mass). But this argument is weakened by #5 above. Also, there is evidence for gravitational shielding. Yarkovskii in 1889 claimed observable anomalies in pendulum motion during an eclipse; Allais in 1959 observed that the inertial frame

implied by a paraconical pendulum turned slightly toward the Sun or the Moon, which appears to be shielding during an eclipse; Quirino Majorana, Italian experimental physicist and physics professor at the Universities of Roma, Torino, and Bologna, detected gravitational shielding in 1919 and 1930. Liakhovets in 1986 and Podkletnov and Niemenin in 1992 also detected it. (Pushing Gravity, 2002).

However, Tomaschek in 1955 (gravimeter/eclipse), Harrison in 1963 (gravimeter), Slichter, Caputo, and Hager in 1965 (gravimeter/eclipse), Unnikrishnan and Gillies in 2000 (Zurich G experiment, using a beam balance like Majorana), and Unnikrishnan, Mohapatra, and Gillies in 2001 did not detect it. (Pushing Gravity, 2002).

Support for the shielding effect may have been discovered by Lageos 1 and 2 in the '90s, as they found anomalous in-track accelerations in eclipse seasons. The 2 artificial satellites have periods where there are up to 40 minutes in every orbit when they are in Earth's shadow, alternating with periods where they are continuously in sunlight. These eclipse seasons are periods when any gravitational shielding that may exist would be operative. The anomalous in-track accelerations in these periods indicate possible gravitational shielding. (Van Flandern, 2002a).

Continuing with the objection concerning the equivalence principle (see Historical Assessments of the Fatio-LeSage Theory, Le Sage's Shadows-MathPages.Com), according to Lesage's theory we can have equality between inertial and gravitational mass only if all matter consists of identical elemental opaque entities (i.e., entities of exactly the same size, shape, and inertial density) in exactly the same proportion, but we now know that different kinds of matter consist of different combinations of protons, neutrons, and electrons. Also, both the inertial and gravitational masses of these substances depend on their binding energy as well as the number of elementary particles they contain, and light is affected by gravity in accord with the equivalence principle. We can restore inertial and gravitation equivalence to Lesage's model by regarding subatomic particles as composite bodies formed from a single species of identical opaque particles.

This assumption (which is, of course, weakened by #5 above), with the assumption that these particles do not align themselves in such a way as to alter their combined gravity, impose further requirements. The inverse-square property depends on the ability of the omni-directional flux of gravitons to maintain the shadowing effect in strict proportion to the angular extent of the image of an elementary opaque particle as the distance increases. Gravitons can impart momentum to massive objects only to the extent that they are absorbed, because any reflected gravitons would not contribute to the shadowing effect. Also, the gravitons must not interact with each other at all, because the slightest interaction would smudge out the shadow effect, thereby eliminating the inverse-square relation. But in a mechanistic context the particles must still have some finite density (particles per unit of volume), so there is a limit to the resolution of the shadow image that can be maintained.

At some finite distance from a fundamental opaque particle of ordinary matter its image will become indistinguishable from a point, by which time the inverse-square relation will have been lost. (Some benefit could be gained for large macroscopic aggregates by averaging the shadows of a large number of particles, but only if we posit that the particles are not all subjected to exactly the same acceleration, which then represents another mechanism of heat generation and entropy increase, and in any case, it is still necessary for the radiation field to have extraordinary angular resolution, as Lesage himself acknowledged.) This characteristic distance is proportional to the size of the fundamental opaque particles, which must be extremely small, but the smaller they are, the shorter the distance to which the inverse-square relation will hold for a given density of gravitons. In essence, the radiation field of Lesagean particles must be dense enough (and free enough from self-interaction) to resolve the angular radius of a particle the size of an electron from 100s of mlns. of miles away. Thus, to maintain the inverse-square relation for any appreciable distance, we need to assume the field of gravitons has virtually infinite density, and this density must be angular as well as translational. In other words, we require not only a virtually infinite flux of gravitons per unit of area, we also require this flux to be coming from all directions with virtually infinite angular resolution. Then, in order to avoid interacting

with each other, each of these gravitons must have essentially zero cross-sectional area.

This objection may have been addressed by Van Flandern in his 7b, but, in any case, the solution, and also the 5b, is elaborated on by him in his book (1999) in the section Limited Range of Gravity of Chapter 4, where he explains that on a galactic scale, if a universal inverse square force were the only one in effect and most of the mass is in the form of stars, the velocity of the stars would drop off as distance from the galactic center increases, just as it does for planets orbiting the Sun, which is the case, yet it is an observed fact that the rotational velocities of the stars are nearly constant (sometimes even slightly increasing) at all distances well away from the hub, even out to the edges of visible matter at enormous distances from the hub. This cannot be true if Newtonian gravity were the only dominant force in effect in galaxies, unless we hypothesize invisible mass in ever increasing amounts from the galactic center in just the right quantities to hold the stellar velocities constant. This is an example of what Van Flandern calls a swidget ("scientific widget", an implausible and artificial helper hypothesis rather than an explanation for a fact that contradicts the theory).

And he asks, "But is it reasonable to assume that gravity acts in the same way at galactic distance scales as it does on planetary scales?" He goes on to say that, if gravity is produced by the pushing action of gravitons, it must have a limited range. This limit is approximately given by the mean distance (R_g , the root mean square) between mutual collisions of gravitons. Well beyond R_g , gravity must become omni-directional, in the manner of a perfect gas. The gravity from more distant masses, however large in the aggregate, would not be able to make itself felt. At any given place, only masses closer than R_g would contribute in a normal inverse-square way to the local gravitational field, which, given constant velocity away from the center of galaxies, seems likely to be caused by a limited range to gravity. The pattern of velocity drop-offs in galaxies and the fact that galactic rotational curves at about 4 kiloparsecs from the center for widely different galactic types has several implications:

- 1) R_g is about 2 kiloparsecs (1 parsec is 3.26 light-years).
- 2) Galaxies with higher rotational velocities should have more mass within each sector of R_g and therefore would be intrinsically more luminous, which is exactly what is observed.
- 3) Some unusual behaviour may occur in galaxies' transitional region from inverse square gravity to perfect gas gravity. As Australian astronomers Wright, Disney, and Thompson (1990) have discussed, the mass-to-light ratios from spiral galaxies up to superclusters seem to increase with the size of the structures involved, so the amount of the supposed missing mass increases with scale until it reaches a factor of nearly 1 kiloparsec for superclusters. But the inferred masses and mass-to-light ratios drop dramatically if gravity is no longer inverse square over such distances, and the need for missing mass (dark matter) completely disappears. Wright at al's calculations show that when galaxies interact, the results from using an inverse linear law are in better agreement with observations.
- 4) Conventional theory requires black holes, but gravity with a limited range does not, and black holes have been disproven mathematically by Laura Mersini-Houghton, Stephen Hawking said they do not exist, and Trevor Marshall shows the Oppenheimer and Snyder 1939 metric, from which the contemporary notion of black holes originates, was in error.
- 5) In explaining spiral structure, conventional belief includes density waves, which are not necessary with a limited range for gravity.

So the objection at MathPages is invalid as the inverse square law does not apply at vast distances.

A final objection is that the gravity-imparting particles, since they would presumably have mass, would themselves have gravity. But Van Flandern qualifies the graviton as having negative mass (2002b, p. 36), which is a theoretical concept (whereby an object accelerates in the opposite direction of the push), but may have been created in the lab (Khomehchi et al, 2017). Or it may be massless like the photon.

His theory of gravity also eliminates the principal objection to the tired light theory (an explanation for the red shift), which is that if energy losses are due to interaction with particles in space, the resulting scattering effect would cause blurred images of distant objects in our telescopes. But in a medium of gravitons travelling many orders of magnitude faster than light and being many orders of magnitude smaller than the particles in the scattering argument, the energy losses in the light waves would be slow, gradual, and continuous, so would not be subject to the scattering effect.

Also, space-time curvature is impossible because space and time have no physical properties because they are abstracts. Super-genius Nikola Tesla already recognized this, but one doesn't have to be a genius to see it, as it is simple logic, and it falsifies Einsteinian gravity. Furthermore, the experiment concerning deflection of light by the Sun done by Eddington was fraudulent, a fact accepted even by some mainstreamers, but subsequent experiments for it are said to have confirmed it, which is totally false. Light deflection due to the sun was already described. Walter Theimer (1977, p. 142) stated: "A gravitational deflection of light was already predicted by Newton and was calculated in 1801 by the astronomer Johann von Soldner. His value amounted to only half that of Einstein's. In 1911 the value predicted by Einstein was the same as that of von Soldner. It was not until 1917 that he changed it to twice the value." Philip Lenard first received notification in 1921 of the publication by von Soldner in 1801 and he therefore republished it in 1921 in *Annalen der Physik*. In his preface Lenard remarks that Soldner, without the assumptions of GR, had calculated the deflection of light due to gravity and found a value that agreed with the results of observations of the eclipse of the sun in 1919. **An effect that is explained by 2 or more theories cannot be claimed by any of these as compelling evidence of their validity. An effect that has already been described cannot be subsequently claimed as the special performance of a later-developed theory, and its empirical support of the later theory is in no way compelling.** Just as a nebula or dust disk around other solar systems is no confirmation of either the planetismal hypothesis nor solar fission, since they are part of both theories. Also, the predictions of GR and Newton's theory differ only by small amounts (*Penguin Dictionary of Physics*).

Social and Other Aspects of Orthodoxy

In his criticism of the unscientific method, Van Flandern made several observations of social phenomena within science:

- scientists as a general pattern do not re-examine fundamental assumptions underlying a conventional hypothesis even if it is incompatible with new observation or experiment
- powerful vested interests in a status quo develop around certain accepted notions, aided by scientific peer pressure
- extreme scientific specialization (narrow focus) has acted to prevent comprehensive overall critiques of accepted ideas
- equations have been made to substitute for the concepts that underlie them

And since recent times official science has rejected rationalism in favour of radical empiricism, which has little use for reason but hypocritically gives it plenty of lip service, and follows empirical evidence only when it agrees with the paradigm but hypocritically gives it plenty of lip service, too. Radical empiricism is closely associated with, or includes, radical or dogmatic skepticism (disbelief for its own sake) and radical behaviourism (the denial of human nature), all of which are bizarre, not to mention extreme left-wing views. And dogmatic skepticism is almost always associated with an unshakable faith that orthodoxy is always right, hence the automatic dismissal of any new or different idea, and of which falsificationism is an extension. Furthermore, there is the bizarre idea that dogmatic skepticism is part of objectivism; it is part and parcel of subjectivism, because it is entirely subjective.

Also, it has arrogated the term 'rationalism' to mean 'secular humanism', which is double-speak for dogmatic skepticism. An example of radical empiricism, which is basically irrationalism, is the bizarre and egregious exclusion of philosophy as a science, but it is included as a cognitive science and scientists have doctorates in philosophy, and the connotation in the latter is synonymous with science.

Also, as discussed in *Science Isn't What You Think* by Henry Bauer from 2017, science has changed dramatically in the second half of the 20th century, becoming less trustworthy through conflicts of interest and excessive competitiveness. Fraud has become so common that organized efforts to combat it now include a federal Office of Research Integrity in the US. And plausible and cogent minority models are often suppressed and convincing evidence contradicting established theories is usually dismissed out of hand, so that policy makers, the media, and the public are presented with biased or incomplete information. See also *Betrayers of Truth: Fraud and Deceit in the Halls of Science* by Broad and Wade from 1982.

Karsten Storetvedt, in his 2011 NCGT essay, "Facts, Theories, Blind Commitments, and Socio-Dynamics," says:

"The history of the natural sciences is a narrative filled with an anarchic mix of facts, fiction, emotions, and the struggle for prestige – including non-technical professional alienation, false play, bandwagonism, sociopolitical group pressure, national pride, immediate incentives, and the rest of non-relevant human peculiarities. Thus, one shouldn't be too surprised that even the worst of accepted theories have had nine lives."

As well, Nissani and Hoefler-Nissani (1992), based on their experimental results, propose several stages in the process of conceptual change, including discomfort, ad hoc explanations, adjustment of observations and measurements to fit expectations, doubt, vacillation, and, finally, conceptual shift.

In some people (e.g., most scientists), however, there are only the 2nd and 3rd stages. The possible explanations for this inability or reluctance to relinquish unreasonable beliefs, even when these beliefs have suffered decisive refutations, are the cognitive difficulty of switching from one belief to another, obedience to authority, conformity (basically the herd mentality), and innate conservatism. Most people are not very rational, and it shows in the way they use language, which is filled with confusions. In astronomy, for example, an asteroid is a planet and not a planet at the same time!

There is also the economic factor, whereby high profile theories are heavily funded, thereby providing little incentive to progress.

And John Hudson (*Shakespeare's Dark Lady-Amazon Look Inside*), who supports alternative views in the Shakespeare authorship question, explains:

"Yet, as the experience of other industries makes painfully clear, existing experts are quite often wrong, and their models and theories fail to fit the data. This is because their perception of the data is shaped by various biases—social and political processes, inherited cognitive delusions, and explicit financial rewards. These biases include a 'confirmation bias' that skews the information scholars are willing to consider, and 'path dependency' in which an existing approach precludes experts from considering alternatives because they live in a self-reinforced information loop [...] Research on group think has documented how this works [...] editing out disparate views and ultimately creating views that are dysfunctional and incorrect [...] a commitment to the status quo makes it easier to get grants and lucrative positions [...] conservative institutions have curatorial control and financial interests that favour entrenched existing views rather than new paradigms [...] the Stratfordian movement has long been led by officials of the Shakespeare Birthplace Trust defending the tourist traffic."

But there is the abnormal psychological aspect most heterodoxers like to miss, for unknown

reasons. Orthodox extremism, which is addicted to orthodoxy and obsessed by it and includes the political and social arena, not just the scientific one, mostly left-wing and, for the most part, demonstrably a case of abnormal (neurotic or unstable) extraversion, traditionally called the choleric personality, and also the doctrinaire personality (by Addickes in 1904), and since recently the undercontrolled personality, which means low on Conscientiousness and Agreeableness, and high on Neuroticism and Extraversion (see, for example, John and Srivastava, 1999)(it is also low on Openness to Culture and Experience [also called Intellect], but I leave it out for several reasons which I won't go into here, but it would score low on this factor, too).

Orthodox extremists use denial and projection (the latter being pot calling the kettle black), two neurotic defense mechanisms, to protect their close-minded and rigid belief system. They should undergo anger management therapy and sensitivity training at the very least.

So there are practically insurmountable barriers in science which make progress highly unlikely, or slow if it occurs.

Conclusion

To sum up, the following major points of the FEM can be emphasized:

1. Planets split in pairs from equatorial bulges of an overspinning, contracting Sun (which accords with the Maclaurin spheroid and the Jacobi ellipsoid; and the planets are essentially made of photospheric material).
2. Mars and Mercury are former moons, the former of Bellatrix, the latter of Venus.
3. Four helium planets and their moons exploded, with subsequent collisions causing the inner and outer Main Belt and the inner and outer Kuiper Belt.
4. Two giant planets, LHB-A and LHB-B, the former twinned with Jupiter and the latter with Saturn, exploded before they could form moons, each causing a stage in the Late Heavy Bombardment.
5. The explosions are supported by some 100 points of evidence.
6. The nebular disk dissipates after a relatively short period.
7. The accretion of planetisimals is implausible.
8. Comets are the result of an explosion so there is no Oort Cloud.
9. Moons originate from fission, singly from solid planets and in pairs from fluid planets.
10. The twinning of planets and moons, circular and co-planar orbits, and distribution of angular momentum are all readily explained.
11. Collisions between planets are ruled out because there is too much space between them.
12. The energy for the explosions comes from Le Sage gravity; objections to this theory of gravity are all shown to be invalid.

Completely contrary to the false claims of detractors, Van Flandern's FEM, is exquisitely sound, perfectly plausible, irreproachably rational and logical, and eminently supported by the evidence, and is, in fact, the best model we have of solar system evolution, as it is the one with the greatest explanatory power, and the only one with an explanation for the twinning of planets (and moons). Yet he was basically alone in it among professional scientists. There were a few who supported either the explosion theory or the fission theory, but no other professional scientist of prominence supported both. It may be because many or most heterodoxers have vested interests in other models, such as the ether theory of gravity, Hoyle's hypothesis, the Saturnian myth, the WEDD (Whole-Earth Decompression Dynamics) model, the EM theory of gravity, and the ZPF (0-point field) theory of gravity. And as long as most scientists are cemented to the fantasies of a limit to the speed of light and space-time curvature, the FEM will always be seen with disfavour by the mainstream.

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