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Collocation of Stars and Planets (CSP) Hypothesis

The Process of How Multi-Star and Planetary Systems Establish Their Hierarchical Families, Orbits, and Spins

Star-Planetary Origins By Douglas B. Ettinger

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Collocation of Stars and Planets (CSP) Hypothesis

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II. The CSP Abstract

The collocation of multi-stars and stars with planets is hypothesized differently from the current accepted method of accretion found in the nebular hypothesis. The new collocation process requires that the planetary bodies and/or a star's binary brethren have already formed prior to being captured by the gravity field and any residual electromagnetic field of a proto-star disk. These bodies are orbiting and rotating similarly but traveling along different trajectories from the overall trajectory of the collapsing dust and gases of the proto-star disk core. These large bodies are formed in a similar fashion as the main proto-star, but do not have large enough mass to begin to collect materials from several astronomical units, AU, away as the main seed that created and attracted its disk of plasma and molecular materials. However, these larger spherical bodies composed of higher metals and compounds do have enough mass to act somewhat independently from the inwardly moving dust and gases composed mostly of hydrogen and helium.

This new hypothesis can account for Kepler's Third Law that gives a correlation between the orbital radii and periods of captured planets. This collocation process explains why most of the angular momentum resides with the planets. These bodies are already formed and have velocities of capture that provide a very high proportion of the known angular momentum before they fall inward to achieve their known orbital velocities. Since these small bodies were created from their own mini-disks of material, they do not need to be formed within the main proto-star disk temperature gradient where they are found today. The compositions of these planets need not match the composition of the star or its disk because they accreted materials from another nearby region of an interstellar cloud or supernova shock front. Indeed, the current nebular hypothesis has difficulties explaining the proportional differences of metals between the parent star and its planets and ratio of metals between planets and satellites.

III. The Nature of a Proto-Star Disk

The proto-star disk has three major components:

1. The proto-star spinning core consisting mainly of the highest major metals produced by nucleosynthesis such as sulfur, nickel, and iron; iron plasma in motion is the major constituent which is highly magnetic.
2. The inwardly spiraling disk of gases and dusts; the gases are 99 % of the constituents with hydrogen at 72 % and helium at 27 %; of course, these materials will be the major composition of the forming proto-star.
3. Planetoids and planetisimals of varying sizes from planets, to minor planets and satellites, to comets. The largest bodies or planets will have their own forming proto-planetary disks with their own planetisimals called satellites.

As already mentioned the iron blobs or seeds that form the proto-star disks are the largest and have the most predominate attractive force in a certain region of space. These blobs are also passing through the densest and clumpiest parts of expanding shock fronts in order to gather the most material faster. Iron blobs of much lesser size are forming the planetoids that may either be inside the main forming proto-star disk or are outside the forming disk but close enough to be affected by the increasing attractive forces. At first the electromagnetic forces predominate and create the initial disk of surrounding materials. These electromagnetic forces increase rapidly due to the in-falling materials being plasma that have electromagnetic properties. The combination of the in-falling materials increasing the spin of the magnetic core and traversing across the disk of charged particles creates an electrical field that produces a machine in nature similar to the known device in physics labs called Faraday's dynamo. Both the electrical and magnetic fields grow exponentially to very quickly create a proto-star. As more material falls toward the central core gravity forces are added to the existing force field and can affect the plasma and planetisimals from distances reaching outward from 40 to maybe 80 AU for an average size star like the Sun.

The disk of materials begins to orbit around the central region creating an ever decreasing spiral very similar to a logarithmic or Fibonacci spiral. As each spiral encloses itself a certain type of resonance creates a gravity wave or trough in the disk of materials. This trough helps to provide a circular region of capture for planetisimals and as it will be shown is the orbital location for the planets. It is assumed for mathematical purposes that the disk of material has a constant thickness from the time it falls onto the surface of the proto-star to the time it starts spiraling inward from 40 to 80 AU away.

This initial spinning disk is assumed to be mostly plasma; any molecular hydrogen soon becomes heated as it is mixed among the plasma and converts back to separately charged particles. The magnetic field lines originating from the poles of the spinning core intersect the disk similar to the way iron filings indicate field lines of a bar magnet. The growing excess of free electrons in the core escape along the magnetic field lines at the poles and circulate back to the proto-star thereby driving and maintaining the orbiting velocity of the disk materials along the entire ecliptic plane and at great equatorial distances from the proto-star center. The central iron core is comparable to the dipole magnet of Faraday's dynamo and the spiraling disk is comparable to the conducting disk of this dynamo. The current of electrons is provided by the free electrons in the plasma. The movement of electrons attracts and carries the positively charged ions. The plasma is maintained by the heat and kinetic energy of preceding supernova shock fronts.

For this model another hypothesis, the SNS, explains in more detail how the planetoids and planetisimals are already well formed, very hot, molten, spinning, and magnetic. The largest planetoids are attracting their own disk of materials and their own smaller planetisimals. The range and numbers of planetoids and planetisimals is very different for each star. Hopefully, our Sun, an average size single star, has a typical range of captured planets and lesser planetisimals. Regardless, we are left with the solar system's example to study in great detail, especially after the last 50 years of space exploration by super telescopes and interplanetary probes. It is important to realize that the planetisimals neither follow the average trajectory of the proto-star disk materials nor travel at the average speeds of the disk materials. Depending on the initial velocity inside the disk as the proto-star is forming or the initial entrance velocity from outside the disk, the planetoid or planetisimal will either fall into the star, develop an orbital velocity as it is falling at the correct time to be captured in one of the troughs of the spinning disk, or be ejected into interstellar space. For the very unusual occurrence of significantly larger bodies being captured within the same orbital zone there are various scenarios one of which is discussed by the "Earth's Metamorphosis (EMM) hypothesis. "

A. Hierarchy of Sub-Systems

Also, refer to the SNS Hypothesis for this topic. These varying blob sizes become the seeds for creating all sizes of subsequent stars and planets. And the clumpiness of the expanding shock front of materials adds to this variance. These seeds or blobs have higher velocities of expulsion and drive through the subsequent shock fronts of previously expelled materials. The largest and fastest blobs collect the most materials from other shock fronts and create proto-star disks and proto-planetary disks.

Many proto-disks are reasonably close enough to attract each other. Because of the electromagnetic properties the smaller disks begin to align themselves with the much larger proto-star disks. This is how multi-star and planetary systems can occur; they are generally from the same source supernova and are moving along similar velocity vectors inside a galaxy.

A hierarchical system develops where the largest magnetic spinning orb (MSO) or iron blob becomes the main proto-star with its accompanying disk. If there are other large sizes, but smaller iron blobs in the neighboring region, they will become smaller proto-stars that are attracted to the largest, main proto-star. Hence, binary and other multi-star systems are created.

The next level of size in the hierarchy is the iron blobs that collect enough material to become planets generally the size of the outer planets or larger. The terrestrial planets are probably a similar size without their outer volatile layers boiled away. These proto-planets are attracted to the proto-stars initially by the EMF field and then later by the additional growing gravitational field. The next level of size in the hierarchy are the iron blobs that collect enough material to become satellites mainly for the outer planets if they are first encountered. All levels of size have their own proportionately size proto-disks that are becoming aligned magnetically and electrically to their parent planet or parent star.

The final level of size which is the most numerous is the smallest iron blobs that form the minor/dwarf planets and some comets. These celestial bodies are easily perturbed by the larger bodies and slung into very elongated orbits. Numerous minor planets of the Kuiper Belt may have been attracted to the outer perimeter of the solar system before it had one half or more of its mass expelled by solar winds. The Kuiper Belt objects (KBOs) then remained in their ancient orbits never to be fine-tuned by further perturbations. These minor planets would keep their original orbital elliptical shapes and inclinations. Many other KBOs are attracted toward the center of the proto-star disk or a particular proto-planetary disk and then subsequently slung into the outer perimeter.

Another possibility which is not ruled out for these extreme outer bodies of minor planets and comets is a capture from interstellar space as the Sun orbits the Milky Way galaxy. Supernovae over time have produced a prodigious quantity of smaller planetoids and planetisimals in interstellar space which surely assures capture of uncountable bodies over the lifetime of any typical system. Hopefully, their capture is followed by interaction with the outer planets to maintain a certain level of peace and quiet within the inner solar system which is our home. However, the fossil record does indicate a dozen or more great dying events between long periods of time. These great dying events may have resulted from rogue, minor planets passing through the outer planets' defenses and striking Earth.

B. Why are Star Systems so Varied?

More than half of the observed star systems are binary or multi-star which can now be explained by the CSP and SNS hypotheses. Single star systems more than likely have a certain amount of planets like our Sun. Planetary systems for multi-star system become more complicated. These systems inherently cause unstable orbits for any planets. Stable planetary orbits may exist in two cases: 1) If the distance between two binaries is very close or 2) If the distance between two binaries is extremely far away where the gravitational force of the parent star greatly overshadows the other star.

Much variance occurs as the stars evolve and become red giants or supernovae. Then binaries can possess any combination of either main- sequence stars, white dwarfs, neutron stars, black holes, or active Wolf-Rayet stars. More than likely, planets may survive multi-star evolutionary events, but do not have life as we know it.

IV. Treating the Proto-Star Disk as a Flow of Materials

As discussed previously, the disk is initiated by electromagnetic properties and the forces it generates. However, as the proto-star grows significantly in mass, the properties of gravity begin to predominate. Also, the electromagnetic properties diminish because the circuit and source of electrons along the magnetic field lines becomes depleted. The developing gravity forces and subsequent pressure forces begin to trap the fermion particles and use them in the nuclear fusion process at the proto-star's core.

Gravity forces overtake the electromagnetic forces and enhance the properties of liquid flow for the proto-star disk of materials as they have done on Earth. Bernoulli's Theorem describes liquid flow properties. The sum of the pressure energy, kinetic (velocity) energy, and potential (radius from star's center) energy at any point in a stream (the inwardly decreasing spiral size of gases and dust) is equal to the sum of the energies at any other point along the same stream.

Bernoulli's Theorem:

$$p_1 m/\sigma + \tfrac{1}{2} m v_1^2 + m g h_1 = p_2 m/\sigma + \tfrac{1}{2} m v_2^2 + m g h_2$$

where p = pressure, m = mass, σ = density, v = velocity, g = gravitational acceleration, and h = radius from the star.

Inside a proto-star disk the pressure has little effect. The factor of pressure does not take over until the materials are pushed into the small envelop within the proto-star's surface. In the above equation by decreasing the radius from the star is approximately offset by the increasing gravitational acceleration. Mainly, the density is affected as the material is crowded into an ever decreasing volume, and the velocity is increasing as the gravitational acceleration increases. The velocity of the disk material is also still increasing due to the decreasing distance of charged particles (still in the state of plasma) from the magnetic field center.

The rate of flow at any cross-sectional area of the spiral of in-falling disk material is equal to:
Q = (A) x (v) = area of a stream times the velocity of the stream.

From the Equation of Continuity:

$$Q = A_1v_1 = A_2v_2 = \text{a constant for an incompressible fluid flow}$$

where v_1 and v_2 are respectively the velocities of the fluid at cross-sections A_1 and A_2.

This equation is utilized to study the connection between the orbital velocities of the solar system planets and the growth of the Sun's mass. This study presents plausible mathematical properties for the spiral of inwardly falling material. Mass equals the volume divided by density. Since it is assumed that pressure is hardly affected until the material falls onto the star the density of disk materials increases as the cross-section of the spiral decreases toward the center of the proto-star. Hence, the following proportionality is assumed:

$$A_n \times v_n \;\alpha\; \text{(mass of the growing star)}$$

where A_n is any cross-sectional area of the disk's spiral, and v_n is the velocity of the material at that cross-section.

A. Predicting the In-Fall Time of the Disk

The typical proto-star disk mass is estimated at three times the amount of mass that forms the proto-star. The remaining mass is eventually driven away by the violent solar winds coming from the proto-star that is beginning to fuse hydrogen and create radiation energy and outward pressure to stop the further collapse of materials. An important feature to know about this proto-star disk is how long it takes for the collapsing materials to create a main sequence star. It is assumed that the flow of materials spirals inward increasing its velocity and also increasing its density for 360 degrees of each spiral. This flow is mostly independent of the falling and capturing velocities of planetoids that form the planets. The dust and gases are considered to be homogeneous unlike the different point-type masses of the planetisimals and the larger planetoids.

The disk materials certainly have an effect on the captured planetoids but in indirect ways. The increased density of the proto-star disk near its center aids in slowing down the falling velocity of the inner planets via drag or friction losses as they are captured in their orbits. Otherwise, the chances are improved for them being slung into parabolic and hyperbolic trajectories just as most comets do today. The friction losses also help to create more circular orbits over shorter periods of time and reduce the elongation of their initial elliptical orbits. Another large effect of the inward swirling materials of the proto-star disk is to create troughs in the planar surface just as occurs with liquids that are flushed down a drain. However, these troughs or grooves maintain their position due to the inexhaustible amount of materials in the proto-star disk. These troughs in the fluid flow create an orbital position of stable equilibrium for masses moving with the flow. The forces acting on the mass tend to bring it back to its original position since its potential energy with respect to the thickness of the disk is minimal. If the centripetal force and inward gravity forces from proto-star are close to matching, when a point mass or planetoid moves into and across one of these troughs then its chances of finding an orbit around the Sun greatly improves.

The amount of time that is predicted for the collapse of materials from the disk into the proto-star is also roughly the amount of time available for planetoids and proto-planetary systems to be captured, too. Some broad assumptions are made to produce a model of a collapsing proto-star disk. The model of the disk is segmented into spirals growing outward from the center with constant thickness. Each spiral increases in diameter every 360^0 for an amount conveniently chosen as equal to the radii of each planetary orbit. The cross-sectional area of flow of materials for each spiral is equal to the difference between two radii and the thickness of the disk. Since the disk is assumed constant in thickness the area, "A", is simply proportional to the differences in the adjacent radii. The velocity of the flow passing this cross-section is "v".

It is assumed using the continuity equation that $A_1 \times v_1 = A_2 \times v_2 = \ldots = A_n \times v_n$, and the mean velocity of flow for each spiral cross-section can be computed knowing the areas and one assumed velocity. It is assumed that velocities computed represent a mean velocity of the materials to make a 360^0 path around a particular spiral. The average distance of each path is arbitrarily chosen to be the orbital distance of each planet. Hence, the distance of an approximate circular path is the circumference equal to $\pi \times d$ or $2\pi \times r$ where r equals the orbital distance from the Sun of each planet. The time to cover this path is:

$$\text{time (t)} = 2\pi \times r / v$$

which is approximate since v is a mean value and the flow is accelerating.

A very rough total time for all the material in the disk to collapse onto the star is equal to the time it takes the last material of the most outer spiral segment to produce one solar mass and move through all the chosen spiral segments:

$$\text{Total time for the in-fall of proto-star disk material} = \sum (2\pi \times r_n / v_n)$$

where r_n is the orbital radius of each planet and v_n is the computed average velocity of disk materials making one orbit within each spiral segment.

The computational method is very simple, and should represent a scale value close to observable data of typical proto-star disks' ages.

A computation for the in-fall time of proto-star disk materials to produce our Sun of one solar mass follows.

The difference in mean orbital distances between planets in AU units is tabulated. The following values are used to obtain a proportional value for the smallest cross-sectional area, A, of each spiral.

Δ AU of orbits α Cross-Sectional Areas

Mercury – Sun	= 0.4 – 0	= 0.4
Venus - Mercury	= 0.7 – 0.4	= 0.3
Earth/Moon – Venus	= 1.0 – 0.7	= 0.3
Mars – Earth/Moon	= 1.5 – 1.0	= 0.5
Ceres – Mars	= 2.7 – 1.5	= 1.2
Jupiter – Ceres	= 5.2 – 2.7	= 2.5
Saturn – Jupiter	= 9.5 – 5.2	= 4.3
Uranus – Saturn	= 19.2 – 9.5	= 9.7
Neptune – Uranus	= 30 – 19.2	= 10.8

A velocity for disk materials hitting the proto-star's surface is determined by considering the Sun's initial and present angular momentum. The following facts come from Wikipedia. [a]

The Sun's mass = 1.99×10^{30} kg;
the Sun's equatorial radius = 6.96×10^{5} km;
the Sun's rotation velocity at the equator = 7.189×10^{3} km/h = 2 km/sec; and
one sidereal year = 3.16×10^{7} sec.

The Sun's approximate angular momentum = L = m x v x r = 1.99×10^{30} kg x 6.96×10^{5} km x 2 km/s = 2.8×10^{36} kg km^2/s. In the "Supernova Seeding (SNS) Hypothesis" it is hypothesized that the initial proto-star of the Sun is rotating in the opposite direction and is near the half-way point of gathering mass. Thus, the initial angular momentum at this stage is approximately (½) mass x (½) radius x 2.8×10^{36} = 0.7×10^{36} kg km^2/s.

The Sun at this point requires 0.7×10^{36} kg km^2/s to stop its opposite rotation; and, 2.8×10^{36} kg km^2/s to acquire its present angular momentum for a total of 3.5×10^{36} kg km^2/s.

Letting m (v) r = 3.5×10^{36} kg km^2/s, then ½ (1.99×10^{30} kg) (v) (6.96×10^{5} km) = 3.5×10^{36} kg km^2/s. The original velocity of incoming material onto the Sun's surface:

$$v = (3.5 \times 10^{36} \text{ kg km}^2/\text{s}) / (1.00 \times 10^{30}) (6.96 \times 10^{5} \text{ km}) = 5 \text{ km/s}$$

This velocity is assumed to be approximately the velocity at Mercury's orbital distance. Using this velocity and the continuity equations, the other velocities for the different orbital distances can now be computed by setting:

$$v = (Av)_{Mercury} / (A)_{Other\ Planets}$$

	A x v(km/s) = continuity value	**≈ 2.0**	**Avg. orbital distance (r)**
Mercury	0.4 x 5.0	= 2.0	58 (x 10^6 km)
V	0.3 x 6.7	= 2.0	108
Moon	0.3 x 6.7	= 2.0	150
M	0.5 x 4.0	= 2.0	228
Ceres/Gaia	1.2 x 1.7	= 2.0	405
J	2.5 x 0.8	= 2.0	778
S	4.3 x 0.47	= 2.0	1427
U	9.7 x 0.21	= 2.0	2870
Neptune	10.8 x 0.18	= 2.0	4500 (x 10^6 km)

Then substituting, v, and the average orbital distance, r, into the next equation gives the times for materials to swirl inward one spiral toward the proto-star estimated to be the orbital circumference for each planet. The average orbital radius = r = the average of the perihelion and aphelion distances in 10^6 km units.

	(2π r / v) x (year/3.16 x 10^7 s)	**=Years**
M	6.28 x 58 / 5 x 10^6 / (3.16 x 10^7)	=2.3
V	6.28 x 108 / 6.7 x 10^6 / (3.16 x 10^7)	=3.2
Moon	6.28 x 150 / 6.7 x 10^6 / (3.16 x 10^7)	=4.4
M	6.28 x 228 / 4.0 x 10^6 / (3.16 x 10^7)	=11.3
Ceres/Gaia	6.28 x 405 / 1.7 x 10^6 / (3.16 x 10^7)	=47.3
J	6.28 x 778 / 0.8 x 10^6 / (3.16 x 10^7)	=193
S	6.28 x 1427 / 0.47 x 10^6 / (3.16 x 10^7)	=603
U	6.28 x 2870 / 0.21 x 10^6 / (3.16 x 10^7)	=2716
N	6.28 x 4500 / 0.18 x 10^6 / (3.16 x 10^7)	=4968
	Σ	=8548.5

Observational data predicts proto-star disks to last 10,000 to 100,000 years. [b] The above computed value does not include the time required for a proto-star in its T-Tauri stage to expel the remaining dust and gases that are still hiding the new star. Hence, the above value seems realistic and may be closer to the actual time needed for planets to be captured around a new star.

B. Predicting the Size and Density of a Proto-Star Disk

The nebular hypothesis requires a very large disk size since the model needs two to three times the matter of one solar mass coming from a typical widespread cold giant molecular cloud (GMC) with comparatively low density. The model for the CSP hypothesis utilizes a more compact, denser proto-star disk since it develops from the supernova seeding (SNS) process. The SNS process uses very strong electromotive forces and magnetic circuits before achieving enough point mass for gravity forces to begin dominating. The available materials are coming from much denser, more compact, charged plasma expelled and heated by supernova explosions and shock fronts.

The mass of the Sun's proto-star disk is estimated as 2 times the solar mass, $M_\Theta = 2 \times 1.989 \times 10^{30}$ kg $\approx 4 \times 10^{30}$ kg. The currently accepted density for a proto-star disk is 1×10^4 to 10^5 particles/cm^3. [c] Hydrogen, the major constituent of a stellar nebula exists in its monatomic form as one proton. The mass of a single proton or particle is 1.672×10^{-27} kg.

Hence, the density of a proto-star disk is converted to:

$(1 \times 10^5$ particles/cm$^3) \times (1.672 \times 10^{-27}$ kg/1 particle$) \times ((100$ cm/m$) \times (1000$ m / 1km$))^3$
$= 1.672 \times 10^{-7}$ kg/km^3

Current thinking is that stellar nurseries occur from molecular clouds having hydrogen in its molecular form, H_2. However, the CSP hypothesis claims that proto-star disk starts with hot hydrogen in the plasma form which is a single proton.

The volume of a proto-stellar nebula must then equal the mass of the proto-star disk divided by the disk's density. This volume becomes 4×10^{30} kg / 1.672×10^{-7} kg/km^3 = 2.38×10^{37} km^3. If the nebula is approximated as a sphere then its radius, $r = \sqrt[3]{(3/4\pi \times V)} = 0.62 \times \sqrt[3]{(2.38 \times 10^{37} \text{ km}^3)}$ $=1.79 \times 10^{12}$ km = 1 AU / $(149 \times 10^6$ km$) \times 1.79 \times 10^{12}$ km = 11,900 AU. This is a likely value when considering that a typical 4 light year distance between stars is equal to 4 x 63,241 AU = 253,000 AU.

Consider that the spherical nebula collapses into a simple disk shape that is 2000 AU in diameter and 2 AU in thickness. This phase of the collapse is not required by the SNS hypothesis since opposing magnetic circuits due to Lenz's Law create a rotating disk without utilizing the material from a giant molecular cloud (GMC). The ratio of densities of the disk and the sphere are equal to an inverse ratio of their volumes. The volume of the disk = $V_2 = \pi \times r^2 \times t = \pi (1000)^2 \times 2 = 6.28 \times 10^6$ AU^3 = 2.1×10^{31} km^3. Then the disk density = $\rho_2 = \rho_1 (V_1 / V_2) = 1.672 \times 10^{-7}$ kg/km^3 $(2.38 \times 10^{37}$ km$^3) / (2.1 \times 10^{31}$ km$^3) = 0.189$ kg/km^3.

Diagram 1 - Spherical Nebula Collapses into Disk

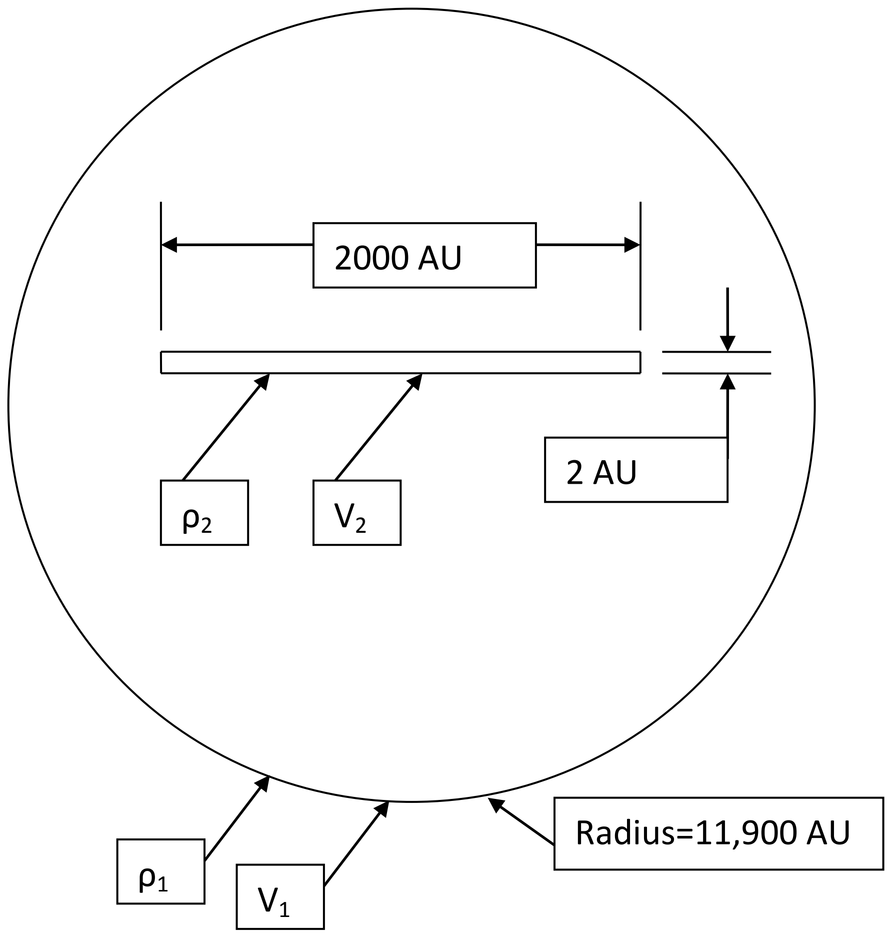
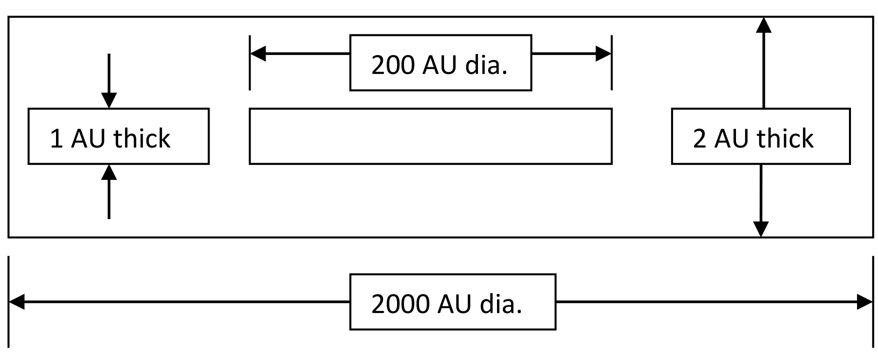


Diagram 2 – Larger Disk Collapses into Smaller Disk



Next consider that the disk collapses to a smaller disk of 200 AU diameter and one AU thickness. Again, similar computations are made. The volume of the smaller disk = $V_3 = \pi \times r_3^2 \times t_3 = \pi (200)^2 \times 1 = 12.5 \times 10^4$ AU^3 = 4.2×10^{29} km^3. The small disk density = $\rho_3 = \rho_2 (V_2 / V_3)$ = 0.189 kg/km (2.1×10^{31} km^3) / (4.2×10^{29} km^3) = 9.45 kg/km^3 = 9.45×10^{-12} g/cm^3 = 5.7×10^{12} particles / cm^3. This expected density for a proto-star disk during its collapse for the CSP hypothesis is compared with other universal densities in the following table.

Table A – Substance Densities including Proto-Star Disk

Substance or Object	**g / cm^3**	**kg / km^3**	**particles / cm^3**
Steel	7.8	7.8×10^{12}	
Sun (mean)	1.4	1.4×10^{12}	~8.4×10^{23}
Water	1.0	1.0×10^{12}	1.0×10^{24}
Air @ sea level	1.3×10^{-3}	1.3×10^{9}	1.2×10^{9}
Predicted proto-star disk center after reaching 2000K and allowing free-fall velocities	1.0×10^{-8}	1.0×10^{4} [c]	1.0×10^{16}
CSP proto-star disk	**9.45×10^{-12}**	**9.45**	**5.7×10^{12}**
Bok globules	1.67×10^{-18}	1.67×10^{-6}	10^4 - 10^6 [d]
Classical proto-star disk	1.67×10^{-19}	1.67×10^{-7}	10^4 - 10^5 [c]
Giant molecular clouds	1.67×10^{-21}	1.67×10^{-9}	10^2 - 10^3 [d]
Predicted proto-star disk center after becoming opaque	1.0×10^{-26}	1.0×10^{-13}	1.0×10^{-1} [c]

At this time it is important to review current popular thinking about star formation. Stars are formed by gravitational collapse supposedly created either by the collision of one or more GMCs or by shocked matter from a supernova intersecting a GMC at high speed. Then the GMCs separate into smaller parts in a hierarchical manner until fragments reach stellar mass sizes. As the fragments become denser and more opaque less energy is radiated away causing the temperature to rise. The fragments condense into a rotating sphere of gas to birth a proto-star.

Complicating this simple picture are the effects of turbulence, macroscopic flows, magnetic fields, and cloud geometry which hinder the creation of a rotating, collapsing disk. In addition, as the proto-star cloud continues to collapse the gravitational binding energy can only be dispersed by radiation losses. As the cloud becomes more opaque the energy must be removed by yet some undiscovered means.

For stars with higher than 8 $M_\odot$ the mechanism of star formation is not well understood utilizing the nebular hypothesis. [e] Less observational data is available. A current theory suggests that more massive proto-stars are seeded by low-mass proto-stars which compete with other proto-stars to draw in surrounding matter from the parent GMC. Another theory simply postulates the coalescence of two or more lower-mass stars.

Other major problems with the nebular hypothesis are accretion disk physics, the phase for planetary births. The generation of turbulence does not allow for a good mechanism to provide effective viscosity. Dust particles tend to stick together in a dense disk environment and that leads to larger particles as observed by infrared spectra. But disk physics cannot solve the simple sticking of dust particles as they grow from one centimeter size to one kilometer size. [f]

The nebular hypothesis for a Sun-size star predicts about 100,000 years for the proto-star disk to collapse and create a proto-star that is fusing hydrogen. The total mass of the disk at this time for starting fusion does not exceed 10 to 20 % of the present star's mass. After another one million years the proto-star becomes a T-Tauri star with only 1 to 3 % of the stellar mass remaining within the disk. The typical T-Tauri stage is expected to last about 10 million years. The disk is supposed to disappear due to accretion onto the central star, by planet formation, ejection by jets, and photo-evaporation by UV-radiation. [g] Accretion model calculations demand much more time in billions of years to form the massive outer planets. The observations and modeling do not agree.

Planetary formation is thought to be triggered by gravitational instability that leads to fragmentation within the disk. Modeling indicates only 1000 years for this process with a disk mass larger than 0.3 $M_{\odot}$. Typically, observed disk masses are only 0.01 to 0.03 $M_{\odot}$. [h] Again, the observations and modeling do not agree even for the formation of the inner planets.

The following table shows some primary differences between the current accepted thinking and the Collocation of Stars and Planets (CSP) hypothesis and how some problems of the nebular hypothesis are resolved by the CSP.

Table B – Comparison of Solutions to Nebular Hypothesis Problems

Topic	Currently Accepted	CSP Hypothesis
Giant Molecular Clouds (GMCs)	100 ly across; 6×10^6 $M_{\odot}$; temp. @ 10K [d]	Not utilized for star formation.
Bok globules	few solar masses; home for star nurseries. [d]	These compact systems are part of the CSP.
Proto-stellar nebula (PSN) size	2000 to 20,000 AU [g]	1000 AU maximum.
Initial collapse of PSN	100,000 years [g]	10,000-20,000 yrs. after last SN shock front moves thru its CSM perimeter.
Proto-star disk radius and temp. gradient	1000 AU; 400K inside 5 AU; 1000K inside 1 AU. Ices can only exist in the outer perimeter. [g]	100-200 AU; always hot enough for plasma state. Ices can only exist after plasma throughout disk cools or is evacuated.
Life span of proto-star disk	100,000 yrs for disk to collapse and birth a star. [g]	<< 100,000 yrs with planets forming and captured within 10,000 yrs.

Particle number density of disk	10,000 to 100,000 parts / cm^3 [g]	5.7 x 10^{12} parts / cm^3
Disk mass at start of star's fusion process [g]	10 to 20 % of proto-star of 1.0 M_Θ to 150% for 2.0 or more M_Θ	50 to 150 % of 1 M_Θ; 120% for T-Tauri phase for stars > 1 to 2 M_Θ
Disk mass dissipation during T-Tauri phase	≈ 10 x 10^6 years [h]	≈ 10 x 10^6 years.
1. Initial creation of fragments into rotating clouds from H_2 molecules @ 10 K.	Can only in general terms postulate collision of GMCs and dissipation by SN shocked material to become point sources for mass.	Specific details are provided by magnetic circuits, current flow of plasma and magnetic spinning orbs(MSOs) of iron blobs created by final supernova explosion.
2. Excessive gravitation binding energy cannot be dispersed as opaqueness of proto-star cloud increases.	The virial theorem requires more energy transfer than radiation losses can provide.	Gravitational binding energy is greatly reduced since the large distances of collapse by a GMC of20,000 AU for a proto-stellar nebula (PSN) are not required.
3. Effects of turbulence, macroscopic flows, and magnetic fields hinder effective viscosity.	Dust particles cannot stick together as they grow in size.	Magnetic and electrical current effects along with the MSOs enhance the aggregation of particles within the supernova's CSM.
4. Proto-star disk accretion model requires certain time spans and efficient ways to combine larger bodies w/o self-destruction and w/ common spin vectors.	Observed accretion disk ages do not allow for the larger outer planets to accrete; and common spin vectors are not explained.	Individual MSOs gather their own materials using EMF properties and then are attracted to larger neighboring proto-stars or proto-planets in a hierarchical fashion with natural alignment of magnetic circuits.
5. The mechanism for forming stars larger than 8 M_Θ is not well understood; observational data is not available.	Current stellar nebula collapse model cannot explain large-mass stars and has difficulty with binary stars. [e]	The varied sizes of iron blobs or MSOs and their intersection of varying clump-sizes of materials with several layers of shock fronts provides hierarchical families that can become larger mass stars and binary systems.

The ultimate creation and sizing of proto-stars and proto-star disks is essential for deriving the formation of Main Sequence stars and planets as we know them. The CSP hypothesis resolves many important questions about this topic that the nebula hypothesis struggles with.

V. The Process of Planetoids Falling toward the Proto-Star

Assume that a sizable planetisimal or planetoid of significant mass, m, with similarly matching velocity vectors is caught in the gravitational and electromagnetic fields of a forming proto-star and its collapsing disk. This already formed body begins orbiting and falling toward the center of the star based on Newton's law of gravitation:

$$F_g = G\ (m\ M)\ /\ r^2$$

As the planet continues to orbit and fall it accelerates and gains velocity because the distance from the star, r, is decreasing and the force, F, is increasing. Due to Newton's 2nd and 3rd Laws:

$$F_c = m\ a = m\ (v^2/r)$$

The accelerating body creates an unbalanced force directed toward the center of the almost circular path which is equal to F_g. This is centripetal force and by Newton's 3rd Law is reacted equally by a radial outward centrifugal force, F_c. Hence,

$$G(m\ M)\ /\ r^2 = m\ (v^2/r)$$

The small mass of the planetoid, m, cancels from the equation indicating that this parameter has no effect on orbital velocities or periods or radii. Hence,

$$v = \sqrt{(G\ M/r)} = \text{orbital velocity} = v_o$$

This equation is dependent on the growing mass of the star, M. So as M increases so does the orbital velocity. Three parameters are essential in order for a falling planetoid to be captured in an orbit and not collide with the star or be ejected from the proto-star disk. The planet must have a certain trajectory roughly, but not perfectly, inside the plane of the disk and must have a certain velocity at a certain time as the proto-star's varying mass, M, is growing. Once an inner orbit is filled it is highly improbable that a second sizable planetoid is captured in this same orbit because the proto-star mass, M, keeps increasing thereby adding a gravitational trough and in turn the next new favored orbital radius.

If the planet achieves too much velocity it can escape the entire proto-star system by being slung into a parabolic or hyperbolic orbit never to return. This velocity is:

$$v \geq (\sqrt{2})\ (v_o) = \text{escape velocity} = v_e$$

Summarizing, the falling planet is not necessarily and most likely not falling at the same speed or at the same trajectory as the falling, spiraling dust and gases. A planet is accelerating and gaining velocity indicative of its initial planetary orbital velocity or entrance velocity and is independent of the rotating disk velocity. A list of most scenarios follows:

1. A planet is captured because just at the right time the planet's changing velocity equals the orbital velocity, v_o, that equals $\sqrt{(G\ M/r)}$ when its radius, r, and the proto-star's changing mass, M, are matched. This scenario is extremely unlikely even for one planet.

2. A planet is captured because at the right time the planet's changing velocity is somewhere between the values of v_o and v_e. In this case the planet is slung into an elliptical orbit which is the most likely case. However, the closer the planet's velocity is to v_e, the higher the eccentricity and the more elongated the orbit becomes. In the case of high eccentricities, the planets will more likely cross over other forming outer orbits and either collide or be perturbed enough and slung outside the planetary system. This scenario creates the Kuiper Belt of minor planets. In the case of lower eccentricities the orbit over the life of the solar system has a chance to become more rounded by the Sun's constant gravitational force and the perturbations of other neighboring planets and the frictional drag of the proto-star's disk materials.
3. A planet as it falls closer and closer gains enough speed to exceed escape velocity, v_e , and be slung outward into a parabolic or hyperbolic orbit away from the entire disk system.
4. A planet's initial trajectory closely matches that of the overall collapsing disk and has a low entrance velocity. In this case the planet never achieves orbital velocity, v_o , and falls into the proto-star. As this planet comes closer to the proto-star, there are the drag effects of the increasing density of incoming materials that continue to slow the planet.
5. There is the highly improbable event that two planets begin sharing the same orbital region. In this case a brief summary of what could occur follows:
    a. The planets glance off each other having debris ejected from the orbit and/or falling back to the planets' surfaces.
    b. The planets collide creating one body with debris being gathered at Lagrange points and/or falling back to the planet's surface.
    c. The large planet perturbs the small planet either in one close passing or over numerous times finally ejecting it from the orbit.
    d. The planets collide and eject each other from the orbit leaving behind only a belt of debris of varying mass, as is postulated in the "Earth's Metamorphosis (EMM) Hypothesis".
    e. The planets become synchronized sharing the same orbit forever, as is also postulated in the EMM hypothesis.

This discussion highlights the reasons why the general trend is to have only one planet for each orbit. And the orbits are generally filled from the inner to the outer one because the dominating gravity effects of the growing proto-star keep moving outward until the star stops growing and because of the perturbation effects of already orbiting planets. The proto-star disk is losing material and becoming less dense as it continues to fall inwards toward the proto-star. Near this stage nuclear fusion starts inside the proto-star and the resulting solar winds begin driving away anymore incoming materials. The solar winds will not only stop incoming materials but evacuate any materials remaining in the disk. A so-called pristine, youthful star system is created within 10,000 to 100,000 years from the time supernova seeds or forming planetoids begin to attract surrounding plasma from the CSM. This proto-star is now headed for the main sequence of stars.

A. Accounting for the Solar System's Angular Momentum

The derivation of the solar system's angular momentum has always puzzled astrophysicists. Angular momentum is the rotational counterpart of linear momentum, (m x v). A system of rotating objects like the solar system has a center of mass, which is close to the Sun's center. The distance from this center to each object, r, is multiplied by the transverse component of the linear momentum of that part. The sum of the vector quantities is the system's angular momentum. Hence,

$$\vec{L} = \sum (r_i \times m_i \times \vec{v}_i) = \text{angular momentum}$$

that assumes there is no angle between the position and momentum vectors. This is the case for the Sun's spin and the planets in their orbits which are roughly circular and planar.

The solar system has most of its angular momentum residing in the orbiting planets with the Sun having only a small fraction of the total. According to the nebular hypothesis a freely, independent rotating system such as a collapsing proto-star disk must conserve and keep constant its initial angular momentum. Examples of this conservation of angular momentum are a rolling upright tire and Kepler's second law that reveals that the planets orbit the Sun with equal areas that are swept out in equal intervals of time.

The case of a spinning figure skater bringing in her arms to increase her angular velocity applies to the collapsing proto-star disk in the same way. As all the material falls onto the star from the disk the angular momentum of the system should be transferred to the Sun causing it to spin at a large and destructive speed. This is not the case thereby creating a conundrum for the nebular hypothesis which is worsened by the planets possessing most of this vector quantity.

As stated by the supernova seeding (SNS) process, expelled, magnetic, spinning orbs (MSOs) or iron blobs from supernova explosions cause the surrounding plasma of previous expulsions to rotate due to induced electromotive forces (EMF). These rotating plasmas along with smaller MSOs create orbiting planets around the largest MSOs soon to become proto-stars. Translational kinetic energy produced by the supernova is converted to rotational kinetic energy by means of induced electromagnetic forces (EMF). The MSOs and plasma have very strong magnetic circuits.

This conversion creates the initial orbital velocities and angular momentum for the solar system's planets. The planets are attracted to the largest MSO in the neighborhood, but are independent of the gases and dust that are gathering into a disk around this dominate MSO. The proto-planetary disks forming into planets already have most of their angular momentum before the disk begins to collapse.

But why does not the Sun spin up and blow apart after material from the proto-star disk falls onto its surface? The SNS process has the answer.

The magnetic fluxes of the dominating MSO and the surrounding rotating plasma create opposing currents and opposing EMFs. These EMFs are similar to two coils that create dipole magnets which are oppositely aligned magnetically and have opposing angular momentum vectors. As material from the proto-star disk that came from the outer coil of rotating plasma falls onto the inner coil or MSO, its spin is slowed until it eventually stops and starts in the other direction. These initial opposite spins and magnetic circuits maintain the stars overall angular velocity at manageable levels so the proto-star is kept held together by gravity forces. These braking forces of opposing magnetic circuits and angular velocities create additional heat that accelerates the initial fusion process at the core of the proto-star to produce the T-Tauri stage and create fierce solar winds. After these vector forces become more aligned, the fusion process becomes more controlled having less heat energy available and the rotational velocity slows to normal levels. The young star can now become stabilized and enter the Main Sequence.

B. Titius-Bode Law is an Artifact of the Sun's Growth Rate

The collocation process begins to explain how the Titius-Bode Law occurs. A power law is created because the inward spiraling disk increases velocity over time as the mass and density of the center of the disk increases. The inwardly moving bodies have velocities that are changing faster than the aggregate of materials of the disk until a certain increasing central density is crossed. Then these bodies stop falling and begin to orbit the central region in an elliptical manner somewhere between orbital and escape velocity. The Titius-Bode Law represents the artifact of the growth curve of the forming star; this growth curve matches closely the mathematics found in the golden, Fibonacci, and logarithmic spirals. The collapsing materials of the disk keep adding to the central region as the cross-sectional area of the spiral keeps increasing outward. The orbital radii of our planetary system indicates that mass growth increases as do the Fibonacci series of numbers from Mercury's orbit to the average mean orbit of the Main Belt of asteroids. Then mass growth increases linearly from this Main Belt to the orbit of Neptune. The orbital radii mirror the growth rate of the Sun during its proto-star phase.

A model is chosen to depict how the planets are captured or how they find their respective orbital region as the proto-star begins to form at the center of the proto-star disk. This model accounts for the varying and increasing mass ($M/M_\odot$) inside each orbital region.

As each planet falls inward its increasing velocity causes an outward centripetal force that begins to match the body's inward force of gravitation. If these forces on the planet are equal as it enters a gravitational wave or trough of the inwardly spiraling disk materials, it can begin orbiting and stop falling.

As the proto-star grows in mass, this trough moves outward creating an ever enlarging spiral. The changing gravitational force due to the star's increasing mass quickly increases within the inner star system, but gradually decreases as the distance of the trough moves farther away near 5 AUs. This effect of the gravitational trough moving outward in combination with the weakening gravitational force causes orbital distances to be more compact at the beginning.

The model assumes that the proto-star mass grows in a roughly linear fashion beyond 5 AU. For convenience it is also assumed that the proto-star's mass increases by 1/9 each time a gravitational trough collects another planet. The orbits are filled starting with the most inner orbit.

Another assumption is that the proto-star's in-falling disk of materials represents a spiral that grows outward proportionally to the growth of the proto-star's mass. The disk material inside the spiral is considered to increase similar to a Fibonacci number series for each planetary orbit. The Fibonacci series of numbers represents the increasing area of a spiral moving away from the central point. In turn, this increasing area is proportional to the mass flowing toward the proto-star.

Hence, a table is constructed to indicate that amount of material inside each orbital region at the moment a particular planet is captured inside a trough. The mass is the addition of the mass of the proto-star and the disk mass within the spiral bounded by each planetary orbit. The masses within the disk are determined by the Fibonacci series of numbers from Mercury to Jupiter. Then a linear progression is select for the outer planets beyond Jupiter as materials are gathered at a lower rate. The tabulated totals are given in the following table:

Table C – Material within Orbital Region upon Planet Capture

Planets	Mass within Proto-Star - $M_\odot$	Mass within Proto-Star Disk Spiral - $M_\odot$	Fibonacci Series Number	Linear Progres-sion	Total Mass inside New Orbit - $M_\odot$
No Planet	1/9	0			1/9 or .111
Mercury	2/9	1/9	1		3/9 or .333
Venus	3/9	1/9	1		4/9 or .444
Moon	4/9	2/9	2		6/9 or .667
Mars	5/9	3/9	3		8/9 or .889
Ceres (Earth)	6/9	5/9	5		11/9 or 1.222
Jupiter	7/9	8/9	8		16/9 or 1.777
Saturn	8/9	13/9	13 not used	yes	1.777 + .500 = 2.277
Uranus	9/9	21/9	21 not used	yes	2.227 + .500 = 2.727
Neptune	10/9	34/9	34 not used	yes	2.727 + .500 = 3.227

The original orbital velocities are calculated based on:

$$v_n = \surd\ [(G \times M_n) / r_n]$$

where M_n = total mass (M_Θ) inside the orbital region at the time of capture. The calculated original velocities follow.

For Mercury, $v_1 = \surd\ [(6.674 \times 10^{-20}\ km^3 / kg\ sec^2) \times 0.333 \times 1.99 \times 10^{30}\ kg\ / (58 \times 10^6\ km] = 27.6$ km/s.

Table D – Planet Varying Orbital Velocities

Planet	M_n	r_n	v_n (km/s) first orbital velocity	v_o (km/s) current orbital velocity
Mercury	$0.333 \times 1.99 \times 10^{30}$	58×10^6	27.6	48
Venus	$0.444 \times 1.99 \times 10^{30}$	108×10^6	23.4	35
Moon	$0.667 \times 1.99 \times 10^{30}$	150×10^6	24.3	30
Mars	$0.889 \times 1.99 \times 10^{30}$	228×10^6	22.1	24
Ceres (Gaia)	$1.222 \times 1.99 \times 10^{30}$	405×10^6	20.0	18
Jupiter	$1.777 \times 1.99 \times 10^{30}$	778×10^6	17.4	13
Saturn	$2.277 \times 1.99 \times 10^{30}$	1427×10^6	14.6	9.6
Uranus	$2.727 \times 1.99 \times 10^{30}$	2870×10^6	11.2	6.8
Neptune	$3.227 \times 1.99 \times 10^{30}$	4500×10^6	9.8	5.4

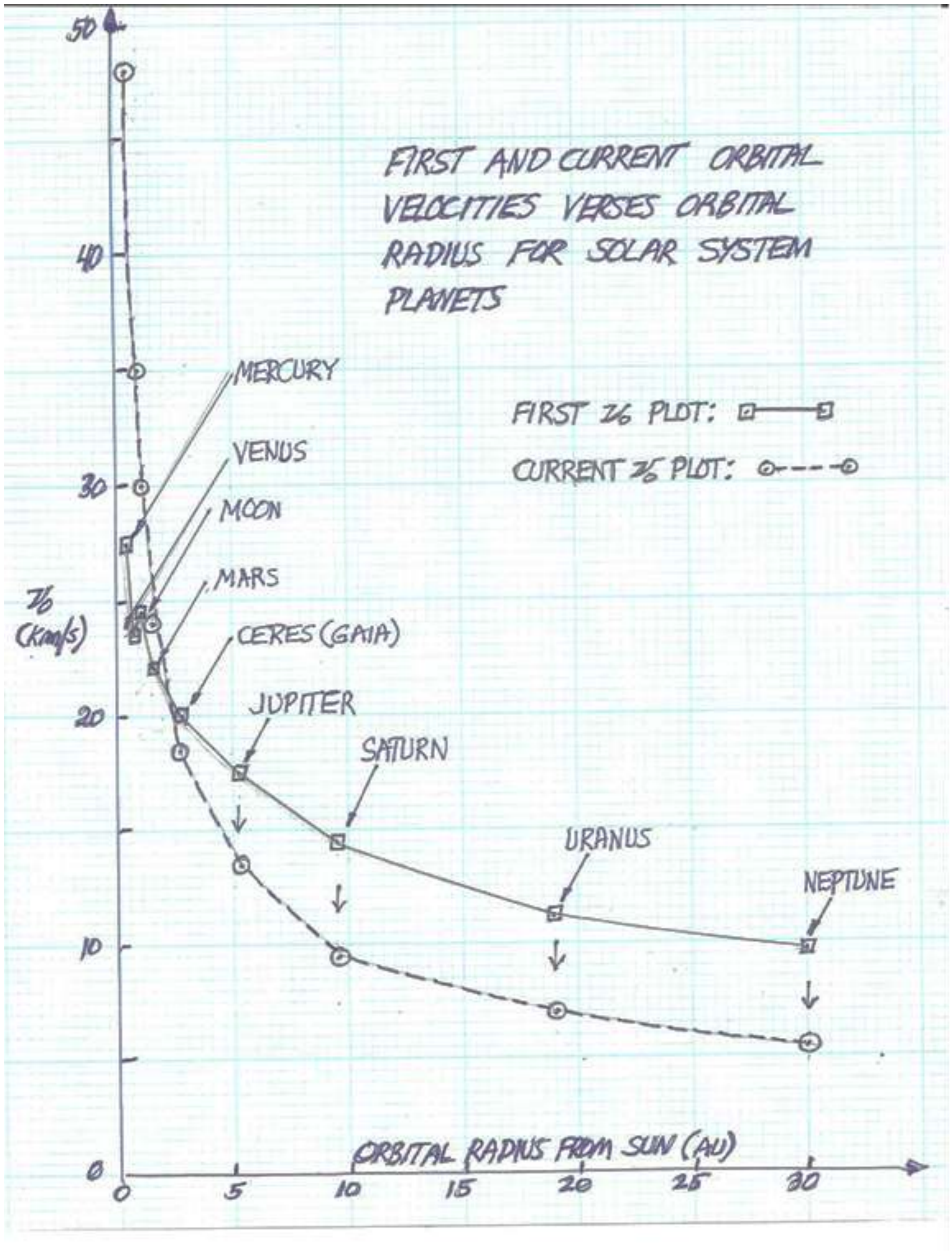
The first orbital velocities and the current orbital velocities are plotted against the orbital radii in the following graph. As one can imagine from the graph, the proto-star mass keeps increasing until it comes close to exceeding it current solar mass of 1.99×10^{30} kg. In order to conserve angular momentum the inner planets increase their velocities to compensate for the growing proto-star mass. The curve for the first velocities for the inner planets moves upward.

The proto-star begins to fuse hydrogen and produce fierce outwardly moving winds in its T-Tauri stage. The remaining proto-disk materials stop falling onto the star and are gradually evacuated from the disk. A small portion of these evacuated materials may be swept up by the outer planets. The volatile materials of the inner planets are actually swept away due to the higher temperatures closer to the Sun. Again the orbital velocities of the outer planets must adjust to conserve angular momentum and decrease. The curve for the first velocities for the outer planets moves downward.

Orbital radii are less affected by mass changes. The balance of gravitational and centripetal forces helps to maintain the planetary radii. Some small changes are inevitable due to perturbations between the planets and any sizable planetoid that has been captured from interstellar regions and has close encounters with any of the planets.

This model of planetary capture provides a mode for what occurs after the planet is captured and the total mass inside the orbit is still changing. Because the planets are caught within a gravitational trough of disk material that is moving outwardly in a spiral fashion a specific type of power law normally based on Fibonacci or golden spiral series of numbers can be adapted to represent planetary or regular satellite orbital spacing. The Titius-Bode Law was a successful attempt to represent this power law with a special mathematical formula for the Sun's planets. In reality this power law should more scientifically represent by a number series that reflects a growing spiral. Growing spirals occur numerous times in biological nature here on Earth that is indicated almost perfectly by Fibonacci numbers. In similar fashion, the spiral of dust and gases falling onto a proto-star can be indicated in the same way. The artifact of this spiral is the orbital spacing of planetary and regular satellite systems.

Diagram 3 - First and Current Orbital Velocities vs. Orbital Radius for Solar System Planets



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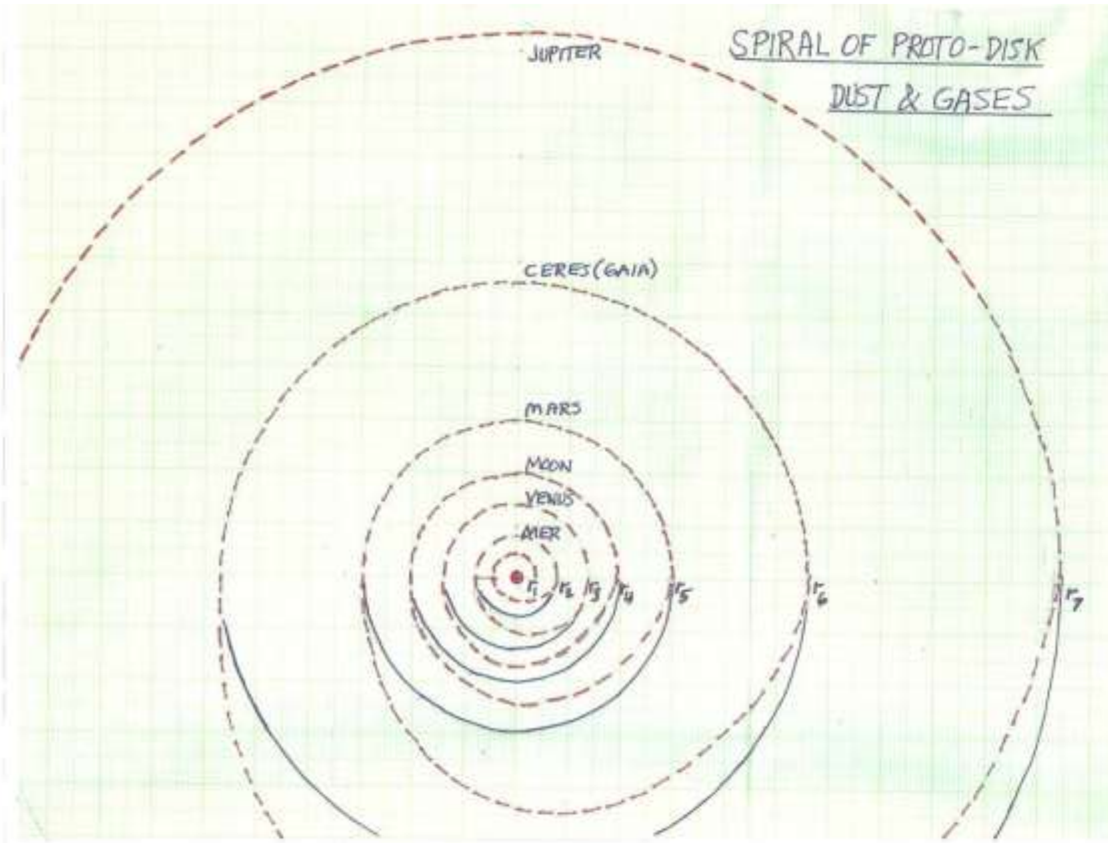
The next diagram shows how a spiral of inwardly flowing proto-disk dust and gases might appear. The dotted line indicates a representation of a possible spiral of in-falling dust and gases overlaying the planetary orbits to scale.

Diagram 4 – Spiral of Proto-Disk Dust and Gases



C. Filling each Orbit with a Planet

Very importantly, this hypothesis provides the explanation for why each orbital location is filled with only one planet. The exceptions are the Earth-Moon orbit and the average orbit of the Main Belt of asteroids which are explained by the "Earth's Metamorphosis" (EMM) hypothesis. The Earth was re-located from the asteroid's Main Belt to the Moon's orbit by a major collision.

As each increasing spiral of gases and dust in the disk overlap while swirling inward toward a prominent collection of mass, a gravity wave is created that produces trough-like grooves in the rotating disk. Any sizable body falling toward the center of the gravity source is gaining speed and depending on the amount of speed as its enters this trough will either 1) not have sufficient velocity and continues to fall toward the center, or 2) will have too much velocity, called escape velocity, as it is caught in the gravity trough and be flung outwardly into a parabolic or hyperbolic trajectory, or 3) have the correct amount of velocity, called orbital velocity to be captured in an elliptical, almost circular, orbit. The chances of another sizable body having the correct velocity for a certain limited time while it intersects an ever increasing and changing gravity trough's position are slim. The spiraling gases and dust continue to spiral inward, increasing the gravity force field, and moving the next gravity trough outward to collect the next falling body that has the proper orbital velocity. The same selection process occurs for each new gravity trough as each expanding spiral overlaps itself. The expanding spirals and increasing gravity field force occur together in a mathematical manner similar to Fibonacci or logarithmic numbers. The artifact of any proto-star that has sufficient proto-planets in the neighborhood when forming is that a sequence of orbits should be filled each by one planet until the distance is too great for the weakening gravity field to gather more dust and gases or planets. All other existing planets without the proper velocity at the right time either spiral into the proto-star or are ejected from the planetary system. It is entirely possible for some larger bodies that were ejected into parabolic orbits to be perturbed enough by other incoming planets causing them to remain captured in extremely elongated elliptical orbits that take thousands of years to complete. The orbits of these planets are extremely unstable and will succumb to eventual ejection or falling into a massive planet or the Sun.

The following table indicates a close connection of orbital distances with the Fibonacci series of numbers that correlates the growth of the Sun by incremental masses of larger and larger spirals of material falling onto its surface for the inner solar system. An approximate linear increase is indicated due to density lessening as material was drawn inward from the regions between Jupiter and Uranus. The Titius-Bode Law or equation is just a coincidence for approximating the orbital radii. Actually, a Fibonacci series more closely represents the universal condition of either planets seeking orbits around stars or satellites seeking orbits around major planets. The tighter spiral winding of materials orbiting and falling toward the Sun is more represented of the inner planets. The gravitational forces lessen and proto-star disk density becomes sparser beyond the orbital region of Jupiter. Beyond Jupiter's orbital region material and planets are being gathered at a linear progression rate toward the proto-star.

Of course, many factors disturb a perfect representation of materials and planets falling onto a star in a spiral fashion to indicate this Fibonacci series of numbers. The disk can be clumpy and/or the density varies significantly from region to region. Materials that are still spiraling inward can be interrupted by inner planets that have already been captured in their orbits. Also, orbital adjustments are made either as the parent body increases its mass or as the proto-star begins to evacuate materials from the inner disk regions.

Table E – Relationship of Fibonacci Numbers to Solar System Orbits

Planet	Real Distance (AU)	Titius-Bode Law Distance	Fibonacci Number	FN x 0.39 Real Distance for Mercury	Approx. Linear Increase
Mercury	0.39	0.4	1	0.39	
Venus	0.72	0.7	2	0.78	
Earth/Moon	1.00	1.0	3	1.17	
Mars	1.52	1.6	5	2.00	
Ceres	2.77	2.8	8	3.12	
Jupiter	5.20	5.2	13	5.07	5.2
Saturn	9.54	10.0	21	8.19	10.4
Uranus	19.2	19.6	34		20.8
Neptune	30.1	38.8	55		36.4

For a binary system of two comparable masses, this selection process may occur if the binaries are very close together. If the comparable masses are growing individually with their planets before the growing gravity forces brought them closer together, the planets would be certainly disturbed and be totally ejected or devoured by their parent stars. The randomness of sizes, distances from each other's origin, and their individual velocity vectors can create an un-imaginable number of different systems, but which contain definite universal trends.

D. Applying Kepler's Third Law [i]

Kepler's Third Law is a relationship of the distance of planets from the Sun and their orbital periods. In fact, it is also the same relationship for primary moons and their planets, for exo-planets and their parent star, and for multi-star systems. This law becomes a proof for the Collocation of Stars and Planets (CSP) hypothesis.

The law states that the square of the orbital period, P, of a planet is directly proportional to the cube of the semi-major axis of the orbit, a, as was discovered by Johannes Kepler in the 17th century. His analysis came from Tycho Brahe's astronomical observations. The law is represented by:

$$P^2 \alpha a^3$$

or

$$P^2_{\text{planet A}} / a^3_{\text{planet A}} = P^2_{\text{planet B}} / a^3_{\text{planet B}}$$

This law improved the Copernican heliocentric theory and was later refined by Isaac Newton who applied his laws of motion and law of universal gravitation. Newton's mathematical treatment produced:

$$P^2 / a^3 = (4 \pi^2) / (M G) = 2.9747 \times 10^{-19} s^2 m^{-3}$$

where M is the mass of the primary body that is much larger than the secondary body. Newton determined a universal gravitation constant:

$$G = 6.6742 \times 10^{-11} (kg/m^3)^{-1} s^{-2}$$

having the dimensions of density and time.

This Keplerian law becomes part of the foundation of modern astronomy and is proven mathematically. However, the science of astronomy never explains why this law occurs during the formation of systems of orbiting bodies about a larger central mass. The nebular hypothesis impedes finding an answer to this question. This important question is answered by the CSP hypothesis along with the supernova seeding process (SNS) and Newton's laws of motion and gravitation. The nebula hypothesis attempts to use an accretion process to form the planets, but fails to apply Kepler's Third Law.

From the supernova seeding process it is known that proto-planetary disks have already formed in the vicinity and perimeter of a newly forming proto-star disk. The proto-planet point masses are well defined before they are attracted to a dominating proto-star by the combination of electromotive and gravitational forces. These proto-planets have trajectories aligned in the plane of the proto-star disk and closely match the rotational vectors of the collapsing proto-star disk materials.

This scenario directly leads to Newton's 2nd law where the inertia force of a proto-planet is $F = m a = m (v/t)$. Since the proto-planet is falling toward the central proto-star, a centripetal force of $F_c = m (\omega^2 r)$ is created. Due to Newton's 3rd law, as the falling proto-planet gains velocity because of the law of gravitation, an equality occurs:

$$F = F_c = m (v / r)^2 r = G (m M) / r^2$$

where the small mass of the proto-planet cancels. Hence, a standard gravitation parameter is revealed:

$$GM = \omega^2 r^3 = r v^2$$

By letting r = a = the semi-major axis of the orbital ellipse, and v = 2πa/P where P = orbital period reveals:

$$GM = 4 \pi^2 a^3 / P^2$$

thereby, deriving Kepler's Third Law and a planet's orbital velocity of:

$$v_o = \surd \{(GM)/r\}$$

and escape velocity for a planet from the star system of:

$$v_e = \surd 2 [\surd\{(GM)/r\}]$$

The above mathematics is quite simple and is well known, but is being explained to clearly show that planets follow Kepler's Third Law because they are already formed and are falling toward the proto-star from the perimeter of the disk, instead of being created within an accretion ring inside the proto-star disk. As the falling proto-planet gains velocity its centripetal force will eventually equal its attractive force of gravity with the proto-star. When this equality occurs the proto-planet starts a generally elliptical orbit somewhere between the velocities of v_o and v_e. If the proto-planet never achieves v_o then it falls into the Sun.

The nebular hypothesis can make a case that when the spiraling dust and gases of the disk reach a velocity where the gravity and centripetal forces are equal, an accretion ring occurs. However, for an accretion ring to gather enough matter to form most of the planets' masses takes too long. The nebular model indicates the necessary accretion time easily exceeds the expected lifetime of a proto-star disk. Also, the nebular model provides no conclusive mechanism to achieve a trend of most objects having the same spin vector. The accretion model has an additional problem of completing the coalescence of one large object because as the separate lumps become larger there collisions may as likely cause smaller pieces as one conglomerate.

E. Reasons for Common Orbital and Spin Vectors

The nebular hypothesis certainly makes an easy case for why the planets and other bodies orbit in the same direction as the Sun's rotation and are almost co-planar with the Sun's equator. The idea of a whirling vortex of dust and gases does create a picture in your mind of how co-planar and similarly aligned orbital characteristics occur. However, the nebular hypothesis does not explain why there is a strong trend for all the celestial bodies to spin in the same direction as their orbital direction. If you apply the mechanics of Newton's and Bernoulli's equations, spins should occur in the opposite direction. The orbiting rings of dust and gases in the disk should act like an outer ring gear of a mechanical system that rotates planets like planet gears in the opposite direction.

The CSP hypothesis utilizes the SNS hypothesis to explain how common orbital directions are created: 1) the direction of induced electromotive force (EMF) as the magnetic iron blobs pass through charged plasma of previous shock fronts creates a common rotation, and 2) the common vector components of the different shock fronts align themselves. As iron magnetic spinning orbs (MSOs) pass through the previously ejected lighter materials of a supernova progenitor star these orbs induce currents and magnetic circuits in the surrounding plasma. These induced currents rotate the plasma in a common direction that surrounds the MSO. The global aspect of an MSO trajectory is one of the more important vectors created by gravity forces set-up by the remnant of the source star. The progenitor star of the supernova is still massive enough after each explosion and after its final phase as a neutron star or black hole, to cause common trajectories of ejecta. Read the SNS hypothesis for more details.

The collocation hypothesis again utilizes the SNS hypothesis to address common spin directions via electromagnetic phenomena. The electromagnetic forces are indeed stronger than the forces of the forming gravity fields since the beginning masses are much smaller. The electromagnetic forces are much larger due the electrical properties of separated charges in the plasma and in spinning iron blobs. As opposed to the nebular hypothesis that theorizes that a cold molecular cloud of material condenses and collapses toward some higher density region, the collocation hypothesis requires that materials begin forming new stars and planets soon after the final supernova explosion. The materials are still in a very hot plasma form and the spinning iron blobs are like magnetic dynamos. The hot plasma of hydrogen and helium ions collapse onto the magnetic iron blob and create an electric field pointing toward this blob. The rotating plasma collapsing onto the very magnetic iron blob creates a device well known in physics which is Faraday's dynamo. In Faraday's dynamo electric current or free electrons move inwardly and perpendicular to the magnetic field being created by the spin-up of the central mass.

In the same way the free electrons in the proto-star disk move inward and aid in coupling with spinning the dust and gases. The dust and gases are comparable to the moving disk of the Faraday dynamo. Each lesser blob of iron creating its own minor proto-disk aligns itself magnetically and electrically as it approaches the largest magnetic proto-disk. Any randomly misaligned or opposing spinning blob is either ejected or is turned on its axis to become aligned magnetically. The smaller proto-disks act in unison with the electric and magnetic fields of their smaller bodies to create similar spins for all bodies inside the larger dominating fields.

The CSP hypothesis provides a believable mechanism for creating spin axis alignments. No mechanism based on gravity or flow properties can create bodies that spin and orbit in the same direction as electromagnetic phenomena can do. No electromagnetic properties can be considered for the nebular hypothesis because the cold materials are in molecular form and do not have the electrical characteristics of positive ions and free electrons that are found in plasmas and spinning molten materials. This property of common orbital and spin vectors is solely based on the known properties of electromagnetic physics and inductive reasoning. Computer modeling and possibly laboratory experiments can confirm this inductive reasoning in the near future.

VI. Limitations of Star Sizes

An important star parameter is also introduced. How large can a star become and what dictates its size? This discussion only involves second and later generation stars; it does not include the first generations stars that occurred during the initial formation of galaxies. The gravity force of a forming star is dependent on the inverse square relationship of its distance from any other masses. The star can only grow as fast as the 1) thickness of the proto-star disk, 2) the density of gases and dust in the disk, 3) the amount of dust verses gas, 4) the starting size of the iron core seed that started the collapsing disk, and 5) the spin speeds of the starting core and the surrounding ring of plasma that relate to its magnetic and electrical properties. Items (1) and (2) are the more important influences and provide information about the range of sizes and densities for the clumpiness of shock front materials. These parameters are all random functions that relate to the size/quantity of the progenitor star's supernova and its ejecta, and the interfaces of other interacting shock fronts from nearby supernovae, or any neighboring interstellar molecular clouds.

The bigger the core size and the higher spin can more quickly gather material if the disk can supply it before fusion inside the proto-star becomes organized and begins to expel incoming material through violent solar winds. If too much mass is gathered too quickly, then the star's spin speed is controlled by material being ejected from the poles which is what a T-Tauri pro-main-sequence star does. So the clumpiness of clouds and intersection of shock fronts that supply a star's material verses the maximum spin velocity verses the rate of fused hydrogen creating the fierce solar winds that halt and expel anymore incoming materials all act together to limit a star's size. Our Sun is an average star and foretells the size and the density of a certain remnant clumping of materials being produced by a massive supernova.

Later generation stars are not generally as massive as first and second generation stars and their maximum sizes are much less. However, unusually large later generation stars do occur for various reasons that are explained in the supernova seeding (SNS) hypothesis. A simple reason may be that some very close binary systems collided or merged. A habitable region on planets that survived in these systems probably does not exist.

VII. Composition of Solar System Components

The varied and unique differences in composition and structure of each object in our solar system are easily explained by the Collocation of Stars and Planets (CSP) hypothesis and its attendant SNS hypothesis. Some special studies of composition and structure are made to show how they are not considered anomalous as they are with the nebular hypothesis.

This section will look first at the reasons for iron and iron sulfide cores for even the smallest of objects, making sense of isotope dating, explaining the varied differentiated cross-sections, and finally making sense of a required temperature gradient for any proto-star or proto-planetary disk.

A. Iron and Iron sulfide Cores

Other quandaries that are answered by this new hypothesis are the reason for the outer planets and moons having iron and iron sulfide cores; these planets and moons developed from their own proto-planetary disks that had randomly unusual amounts of higher metals. The blobs of condensed iron, nickel, and iron compounds created individual point sources of gravity and electromagnetic (EM) fields that then gathered neighboring materials. There is no need to explain how molten iron exists at the colder temperatures of interstellar molecular clouds (IMC) or in the colder outskirts of newly forming proto-star disks. A detailed explanation of how these molten iron blobs and proto-planetary disks form independently of the main proto-star disk is referenced in the “supernovae seeding” (SNS) hypothesis. Briefly, this SNS hypothesis deals with original massive supernovae creating seeds for the growth of new stars and planets by creating blobs of randomly different sizes of molten iron, nickel, and iron compounds. These massive supernovas blow off different materials in each successive explosion until the last upheaval which creates iron blobs through the processes of nucleosynthesis. The faster moving iron blobs catch-up with the slower moving shock fronts of lighter materials ejected in earlier explosions. These iron blobs collect the lighter materials in a certain succession and in randomly different amounts as they plough through each shock front.

The largest iron blobs with the most gravitational and electromagnetic influences become the seeds for the main proto-star disks which are created as these blobs crash through the earliest and last shock fronts consisting mostly of hydrogen and helium. Later the gravitational and electromagnetic influences of the proto-star disk begin to gather the lesser proto-star disks and much smaller proto-planetary disks which create binary/multi-star systems and orbiting planets. The “collocation of stars and planets” (CSP), hypothesis does most certainly rely on the SNS hypothesis that initially creates the seeds for these stars and planets.

B. The Variance of Smaller Objects of the Solar System

The variance of planets’ volumes, densities, and masses is astounding and reason enough to disprove the nebular hypothesis which creates a vision of collapsing a GMC 100 light years across. This cloud of 10^2 to 10^3 particles / cm^3 at only 10 K. [d] fragments to create a proto-star 1000 AU diameter disk at 10^4 to 10^5 particles / cm^3. This vision produces the idea of very homogeneous mixing by the time it shrinks into a vortex only several 100 AU in diameter. How do the planets end up with these concentrated masses with varying sizes and ratios of metals that are higher than the Sun’s ratio of metals to its major constituents of hydrogen and helium?

If one has ever experienced mixing paint or concrete, not too many turns of the mixer creates fairly consistent coloring or aggregate. The nebular hypothesis somehow creates with its very thorough mixing these different size globs of varying cross-sections and densities. Consider the smaller bodies in the solar system and see whether the nebula hypothesis is efficient at producing homogeneity.

Let’s study the solar system’s larger asteroids, moons, and dwarf planets. [j] The range of sizes goes from 2634 km for Ganymede to 487 km for Enceladus. Typically, the volumes range from

0.006 to 0.070 Earth volumes. The larger range of mean densities is around 3.34 g/cm^3 for the Moon, Io, and Europa. The average range of densities is 2 g/cm^3 that reflect an outer core of silicates and a very small iron core. The lower range of densities from 1.02 to 1.6 g/cm^3 is the least differentiated, generally smaller, and composed mostly of ices. Objects that have radii of 1500 or more km have highly differentiated silicate mantles with iron and sulfur inner cores. Most of the ices are found within varying thicknesses of crust. All these unique objects began with some seed in the liquid state with the denser materials sinking to the center. Obviously, other mechanisms besides the homogeneous mixing of a collapsing molecular cloud and proto-star disk via gravity are working behind the scenes for creating these smaller objects.

C. Meteorite and Asteroid Compositions

Asteroids and meteorites, those asteroids that survived impacts on Earth, are believed to be the primordial components that accreted to form the planets. Supporting this belief is the radiometric dating of materials of meteorites that indicate these objects are the oldest materials in the solar system. However, the combined ideas of the EMM and CSP hypothesis claim that these objects are collisional debris resulting from the impact of larger objects while the solar system was being configured. The various crustal materials from these larger objects were ejected into inter-planetary space. The heat energy from these collisions did not change a large percentage of the ejecta so that the radiometric clock was unchanged. Hence, the radiometric dating data does support the age of the solar system, but is not measuring the exact time when the condensing and crystallization of rocky materials within the proto-star disk took place. The dating methods are actually measuring the times when the cooling and hardening of the very young planetary crusts took place which is very close to the age of the solar system.

All these objects along with comets are irregular, collisional-type space debris. Two main exceptions are the largest asteroids in the Main Belt, Vesta and Ceres. They have planetary characteristics such as differentiated layers and residual magnetic fields. Vesta is battered by numerous impacts two of which produced impact basins that cover most of its south pole. Ceres, surprisingly, has a spherical shape. Perhaps these objects were two of the original planetoids that were captured in this orbital region between Mars and Jupiter as they were falling toward the Sun. These two have recently been re-classified as minor planets. Since Earth, called Gaia when it was in this same orbital region, was knocked into another orbit – these smaller planetoids survived by never being perturbed away or colliding with Gaia. These planetoids remained in this orbital region and were pelted over the life of the solar system by asteroids that were formed by Gaia and its impactor. Obviously, Vesta was affected the most. Its own collisional debris developed a family of smaller asteroids that cluster together.

This reasoning that asteroids came from collisions between planetoids, between planetoids and established planets, and principally the large collision of Gaia with its impactor is further corroborated by studying the various categories of meteorites and asteroids defined by their compositions. Compositions of asteroids are determined from albedo, surface reflectance spectrum, and density. Density data is meager since it relies on observing the orbits of asteroids' moons. However, large samplings of data for asteroid albedo and spectra have been obtained and compared with meteorite data. Determination of rough compositions is considered consistent and trustworthy. These compositions are categorized as widely different along with a large range of sizes. Why?

The size or mass distribution of the asteroids follows a power law after Ceres and Vesta [k] which can be attributed to an accretion model, but this observed distribution could have easily been due to collisions between planetoids of various sizes as well as the Gaia-impactor event and other large impact events. However, the reasons for the categories of different compositions are not well answered. These journals have a strong suspicion, if not a postulation, that the answer is directly due to the dissection and analysis of impacts of differentiated bodies that either have thin crusts with almost liquid mantles or have hardened icy, rocky bodies.

A simplified table will be constructed to show the various categories of composition and how they may be connected to the postulated origin of collisions in the early solar system. The asteroids are compared to meteorites because they have similar spectra. *The italicized versions come from current scientific thinking.* The non-italicized and sometimes modified versions are part of the postulations of these journals and the CSP hypothesis.

Table F – Compositions and Origins of Asteroids and Meteorites

Asteroids [l]	Meteorites [m]	Possible Origins
1. C-type or carbonaceous 75 % of population; generally, beyond 2.7 AU (The initial contact of the two bodies spewed the topmost hydrated crusts farther than the heavier mantle materials. These first ejecta were either melted or only partially heated producing the characteristics of different chondrite-type meteorites.)	Stony-type; includes the CI and CM type chondrites containing 3 to 22 % water, as well as organic compounds; composed mostly of silicates, oxides, and sulfides; 86 % of the population.	*1. Original amino acids formed in outer space.* *2. Original materials that accreted to form planets.* *3. Chondrites appear to be melted while being part of free-floating object in space. Why?* *4. Other chondrites not heated beyond 473 ^{0}K.* 5. The organic compounds came from life's building blocks already formed on cooled, water-covered crusts. 6. Asteroids are the ejecta from the differentiated young crusts and mantles of impacted planets and planetoids. 7. The impacted crusts either had liquids or ices that created hydrated materials found in meteorites.
2. S-type with stony composition; 17 % of the population; this type dominates inside 2.2 AU and is common in the central belt within 3 AU. (The stony and heavier materials were not ejected as far, but managed to escape Gaia's gravity field as it fell toward the Sun – thus being pulled closer to the Sun before finally orbiting.)	Stony-type; includes achondrites similar to terrestrial mafic igneous rocks; some groups came from the Moon and Mars; 8 % of the population.	*1. Thought to have been crustal materials of asteroids.* 2. These mafic igneous rocks came from deeper inside Gaia's crust and from the top-most part of the impactor's mantle. These are the same materials that make-up Earth's oceanic crust today. They come from the top-most mantle layers that are differentiated the most, but are not the granitic crusts of continents.
3. M-type and other remaining types; their composition is uncertain – possibly iron-nickel mixed with stone; 8 % of population. (These metallic types have the least numbers since a core of iron is exposed only if both the body is small enough and sufficient kinetic energy is available to break it apart.)	Iron-type & stony-iron type; composed largely of metallic iron-nickel & of both metallic and rocky materials; iron is 5% of the population and stony-iron is 1 %.	*1. Thought to have been pieces of core or central mantle of differentiated asteroids.* 2. The metallic materials probably did not come from either the cores of Gaia or its Impactor since they are too deeply embedded. These iron-rich materials came from the cores of the few smaller planetoids that battered each other in this orbital region.

The above table indicates that asteroids and meteorites have heterogeneous compositions with histories of different temperatures of formation within a small range of orbital distances from the Sun. The nebular hypothesis fails to answer the reasons for this heterogeneity, but the EMM hypothesis provides the reasons for different temperatures and compositions within this small, particular orbital region. Be reminded that this table provides understanding and proof for the collision of Gaia (now Earth) with a large object and its aftermath. The table also helps to explain other major collisions such as those that occurred on the Moon and Mars; those between planetoids; and those between other permutations of planets, planetoids, satellites, or large asteroids throughout the solar system's lifetime. More and better dating data of a range of compositions for asteroids are required to absolutely confirm the EMM and CSP hypotheses.

D. Varied Differentiated Cross-Sections

Another interesting point that the supporting "supernovae seeding"(SNS) hypothesis provides is an explanation for why all the solar system's planets and satellites have so many varied compositions and cross-sections as measured by surface spectroscopy and moment of inertia measurements. As the iron blob goes through each succeeding shock front it gathers the various elements in a differentiated form. From nucleosynthesis it is understood that the major elements created in each succeeding layer and blown off are hydrogen, helium, carbon, oxygen, silicon, sulfur, and iron. Hence, the blasted iron blob will first gather sulfur, then silicon, then oxygen, then carbon until it finally gathers the largest constituents of helium and hydrogen. Not only is a rough differentiation of materials already performed, but differences in the amounts of each or missing types of materials is possible due to the random clumping of materials in the chaotic shock fronts expanding outward from the supernova. No even mixing of materials with an increasing, consistent temperature gradient toward the proto-star disk center is needed or imagined as is the case for the nebular hypothesis.

E. Analyses of Comets' Materials and Spectra

The materials of comets have been analyzed either by spectrometry measurements of closely passing space probes or from actual materials taken from comets and returned to Earth. Some of these materials require very high temperatures to be chemically produced. These temperatures are not available and were never available in the outskirts of the solar system per the nebular hypothesis. The low temperature volatiles can only survive for billions of years if left undisturbed in the Kuiper Belt or farther away in the Oort Cloud. There are no answers to this anomaly unless you consider the SNS hypothesis. A very small molten iron core attracted the hot plasma of volatiles in a supernova shock front before it cooled and crystallized. Subsequently, it was captured by the solar system's proto-star disk and either remained in its outer perimeter for billions of years or as it made its way inward was ejected by an existing planet to this region. It may also have been captured more recently by the solar system passing through a cloud of planetisimals left over from other supernova events.

The Stardust Mission [n] during 2004 to Comet Wild 2 [o] retrieved materials from its tail that were crystalline and could only have formed from very hot temperatures. These results are also corroborated by comet spectra from telescopes. Other probe missions showed that comets resemble asteroid materials by having much less water than expected. Also, jets of volatile materials produce the comet's coma and tail. This fact was well revealed in 2005 by Deep Impact Probe. [p] This probe indicated as it passed by Comet Tempel 1 [q] that the comet volatiles are below the surface and feeds jets of vaporized water that form its coma.

In April 2011 scientists from the University of Arizona discovered evidence of liquid water in Comet Wild 2. Iron and copper sulfide minerals were also found that only are found in the presence of water.[o] Comets are no longer thought as being slowly vaporizing, dirty snowballs that never were in a melted condition. Obviously, liquid water indicates at one time a much warmer environment than was ever envisioned. Comets are now thought as being asteroids that still have volatiles that are being vaporized by the Sun's radiation. The CSP hypothesis considers short period comets to be the recent results of collisions between smaller rocky objects with a small proportion of volatiles or a collision of an impactor with a watery or icy surface. Long period comets are more likely to be KBOs that are occasionally perturbed inwardly from their extreme outer residency.

A substantial amount of crystalline silicates such as olivine, amorthite, and diopside were found that forms only at high temperatures. This is also consistent with previous spectral observations of comets' tails. The composition of dust samples revealed a wide range of organic compounds. [o] Some of these hydrocarbons were found to have longer chain lengths than is observed in diffuse interstellar mediums suggesting they were further processed somewhere within the solar system or during the proto-star disk stage. The EMM and CSP hypotheses further corroborate this conclusion. Life's beginnings were already occurring on Gaia's oceanic crust before the planet was struck by a major impactor and expelled organic compounds.

Another study of the dust samples showed an oxygen isotope signature that suggests the mixing of rocky materials between the center and edges of the solar system. The results of these studies are suggested by R. van Boekel in a 2004 article of Nature magazine. [r] One of three scenarios is proposed:

1. The hot inner disk region can produce crystalline silicate by gas-phase condensation or thermal annealing. Beyond 1 to 2 AU glass-making temperatures of 1000 °K are not available. These crystals can only be transported outward by themselves or by the aid of a solar wind.
2. Another way is to have in situ annealing in the outer perimeter by collision or by lightening.
3. A third way is the collisional destruction of large parent bodies in which secondary processing takes place.

The CSP hypothesis definitely endorses van Boekel's third way due to collisions between large objects in the solar system. From these collisions ejecta is thrown into all types of elliptical orbits within the so-called "scattered disk" that is largely inside 35° of the ecliptic plane. These orbiting ejecta become perturbed by the planets into becoming long-period comets that appear, but do not, come from large distances beyond the outer planets in a region called the Oort cloud. If these comets remain as short-period comets they will over millions of years cluster around 5.2 AU near Jupiter's orbit because its gravity field dominates the outer regions.

This CSP vision of comet creation addresses the following mysteries:

1. Comets are composed of materials created by glass-making temperatures either from the energy of collisions or by existing conditions on the parent planetoids.
2. These collisions easily create ejecta with liquid water and other embedded volatiles that would later produce jets and hydrocarbons with longer chains because their origin is from more friendly environments found on such young surfaces as the Earth or Mars.
3. Collision of small bodies with the inner planets can create ejecta that become comets and carry oxygen isotopes to the outer solar system.
4. Varied, elongated, and even retrograde orbits within the scattered disk are explained by the randomness of trajectories of ejecta. Long period comets are explained by the shorter period comets being perturbed by the outer planets to become long-lived, long period comets. The invention of the Oort Cloud and its unknown origin are no longer needed.
5. Collisions continue to occur within the solar system but with less frequency as more free roaming objects are swept up. The continuing collisions provide an un-ending reservoir of comets and asteroids with volatiles, although the Sun's radiation vaporizes the volatiles over short periods of time. Close encounters can also reduce comets to asteroids and smaller planetisimals. Comets cannot exist today if they were part of the original solar system; after only several thousands of orbits all the volatiles would have been depleted. Since comets exist today, they need to be continually supplied throughout the life of the solar system of 4.5 billion years. CSP claims to have a more plausible process that does not rely on strange perturbations of an unproven Oort Cloud that is 50,000 AU away.

The conclusion of the CSP hypothesis is that comets, asteroids, and all other irregular objects in the solar system are the result of collisions or some other secondary re-processing. However, the CSP does leave room for the possible capture of interstellar materials especially close to the time of the Sun's birth when it was possibly part of a close cluster of young stars and proto-planets.

Interesting discussions occurred with a colleague about space probe photography of Comet Hartley 2 [s] that appeared to be two discrete piles of debris that were joined in the middle to create a dumbbell appearance. My colleague is a professional asteroid tracker and is quoted as saying,

> "One thing is quite clear about irregular asteroids and comets; they are objects that have been 'reprocessed'. Objects that condense on Earth in water or air even in a gravity field have some symmetry. Materials that condense in a normal vacuum of outer space or in a high density molecular cloud, or in a pristine proto-star disk should show

> some definite symmetry based on the known physics of condensation. Obviously, these subject, irregular objects have been made by either hard or soft collisions beget more smaller collisions before everything is reasonably stabilized. Space probes have observed very close, binary, irregular asteroids connected by gravity that may eventually come together without a hard impact. This may have occurred to Comet Hartley 2. The more interesting thought is how they were created in the first place. Let me whisper this conclusion softly – collisions."
>
> "Is our solar system like a bowling alley? It may take on this quality given gravity, resonance, enough time, a few objects, and some larger collisions to provide enough randomness to make statistical analysis impossible." [t]

These journals fully agree with this assessment. Our planet and our species' fate is determined largely by total randomness. Finding trends in the heavens is science which helps us to understand; but, science has no way of dealing with final entropy and its effect of increasing randomness.

F. Anomalous Temperature Gradient of the Proto-Sun's Disk

The more obvious proto-disk temperature gradient anomaly, revealed by the study of comets, is also the big mystery of the outer planets, their moons, and the dwarf planets of the recently discovered Kuiper Belt all having iron cores. How does iron liquefy to form planetary cores at these remote distances of 10 or more AU from the center of the hot proto-star disk? The temperature of the proto-star disk is postulated to be only 400 K at 5 AU and can hardly make solid iron cherry red. The temperature created by the internal pressures of the smaller bodies is not enough to differentiate the metals with higher atomic numbers let alone liquefy them.

The CSP along with the SNS hypotheses state that in-falling materials at the perimeter of a proto-star disk are still in plasma form since it obtained energy from a supernova explosion and its succession of shock fronts. Materials are not collapsing from a GMC whose materials are only at 10 K. Per the SNS process proto-planetary cores have already been created and are attracted toward the center of the closest, most dominate, and largest proto-star disk. No temperature gradient anomaly exists. Liquid iron cores have already started to evolve at the hot perimeters of a proto-star disk.

A study is made to analyze the major compounds of the solar system to see how they cool by first liquefying and then crystallizing as they fall toward a proto-star disk center, and also as they fall onto proto-planet and proto-satellite surfaces. Of course, as materials find their way onto planets and satellites their temperatures will primarily vary according to the depth below the surface, distance from the proto-star, and the heat from radioactive decay products. As the proto-star rises in temperature postulated radiation energy will then heat the center of the disk to 1000^{o} K at a distance of 1 AU.

Table G – Progression of Phases for Important Planetary Material as Cooling Occurs by Liquefying and then Crystallizing

Metal or Compound [u]	**Progression of boiling temp. ° K.**		**Progression of freezing temp. ° K.**	
	(10,000 to 1×10^6) [v]	Iron plasma created by supernova forms into magnetic spinning orbs (MSOs) and free expansion of ejecta.		
	(11,000 to 18,000) [v]	The circum-stellar medium (CSM) from previous progenitor star expulsions is being swept up.		
	(6000 to 10,000) [v]	Outer shells of progenitor star's CSM are cooling and hydrogen beginning to recombine to form GMCs.		
	(2000 to 4000)	Iron plasma due to central internal pressures of growing orbs begins to approach the liquid and solid states.		
Fe	3134	Gas during proto-star stage	1811	Forming solids on planets/planetoids as proto-star disk cools
Si O_2	2503	ditto	1873-1998	
Fe S		ditto	1467	
S	718	ditto	388	
	(2500-3500)	Proto-star temp. range vaporizing rock and iron		
	(1000) [w]	T-Tauri stage at one AU from Sun		Vaporizing volatiles close to Sun
	(400) [w]	T-Tauri stage at 5 AU from Sun		Many volatiles survive being trapped or shielded within outer crusts.
H_20	373(100°C)	Gas found in Earth's atmosphere.	273	Liquid range of H_2O occurring between 0.7 - 3 AU for a mature Sun.
NH_3	240	ditto	195	Exist mostly as crustal ices on bodies beyond Ceres at 2.7 AU whose surface is 235 K with Sun overhead.
SO_2	263	ditto	201	
CO_2	216	ditto	195	
N_2O	184	ditto	182	
CH_4	112	ditto	91	

The previous table helps to visualize what happens to materials at different places and at different times inside the proto-star disk. The most commonly found compounds or ices in the solar system that are listed in this table also need higher temperature and pressures to be produced chemically. The cold environments of a GMC or IMC do not have the necessary conditions until the proto-star actually develops enough internal radiation pressure and heat.

For the CSP and SNS hypotheses these temperatures are always available outside the proto-disk perimeter from the re-occurring eruptions and shock fronts of a supernova progenitor star. A review of some the chemical reactions requiring high temperatures follow.

List of Chemical Reactions [u] That Normally Occur on Planets and Smaller Planetoids

1. $Fe + S \rightarrow FeS$; all three materials are found in the cores of planets.
2. $3H_2 + N_2 \rightarrow 2NH_3$; this ammonia production also requires high pressure.
3. $2H_2 + O_2 \rightarrow 2H_20$
4. $2CO + O_2 \rightarrow 2CO_2$; which is 40% of gases emitted from volcanoes
5. $CO_2 + 8H^+ + 8e^- \rightarrow CH_4 + 2H_20$
6. $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$; these chemicals are blast furnace products.
7. $2NH_3 + 2O_2 \rightarrow NO_2 + 3H_2O$; this reaction produces nitric oxide.
8. $S_8 + 8O_2 \rightarrow 8SO_2$; this reaction produces sulfuric oxide released by volcanoes.

These common elements and ices are available in copious amounts within the circum-stellar medium (CSM) and shock fronts of supernova progenitor stars. Due to nucleosynthesis the onion –like layers of H, He, C, O, Si, S, and Fe are blown off and into the CSM that is randomly clumpy but maintains a layered effect. These particles readily come in contact with each other as the various shock fronts intersect with sufficiently high temperatures to create these combinations of elements during their attraction to either a proto-star, a proto-planet, or disks of materials through EMF properties. The hot cooking and mixing of these materials cannot be provided at the outer perimeters or even at distances inside the proto-star disk by the thinking of the nebular hypothesis that calls for the collapsing of cold, condensed materials.

VIII. Pillars of Creation

The majority of the materials expelled from the supernova are from the first two layers, those of hydrogen and helium, which will become the major constituents of future, smaller stars. Since hydrogen and helium are the two last shock fronts to be intersected by the iron blobs with their collection of gathered higher metals, it is possible that some of these elements could have cooled to the point where they became molecular and dusty. The EMF fields are unable to attract these cold molecular particles and gravity fields of the growing masses may not be large enough to attract these molecular gases.

These are reasons that large clouds of cool molecular hydrogen and dust are observed in interstellar space. The explosions of supernovae are very chaotic, but enough of these exploding stars do provide enough symmetry for the iron blobs to intersect the ever expanding hydrogen and helium shock fronts. But not all of these gases are intersected by iron blobs or by iron blobs large enough to attract the cooling gases. Hence, giant clouds of molecular hydrogen can form and not be attracted to anything. A more likely scenario, than a collapsing giant molecular cloud (GMC) proposed by the nebular hypothesis, is an erratic iron blob traveling from one supernova and striking the outer shock fronts of another supernova. This kind of collision may cause the very peculiar "pillars of creation" that are seen by the Hubble space telescope.

The fast moving iron blob or “supernova seed” collects enough gases and dust from the shock-front clouds of another supernova that are opposing the iron blob’s direction of travel. Gases collect around the seed to form a star and at the same time leave a wake of materials as the shocked front moves past and beyond the isolated forming star which is at the tip. The appearance creates the familiar “Pillar of Creation”.

IX. Eliminating Need for the Nice Theory and Lagrangian Collisions

The currently popular and accepted Giant Impact Hypothesis [x] creates the Moon from a large Martian size planet that strikes Earth with a glancing blow creating a remnant that orbits the Earth. Debris from the collision is mostly accreted to form the Moon. This hypothesis has some main issues. Among them are the determination of the required angular momentum and the source of this Martian size planet crossing Earth’s orbit when the solar system supposedly stabilized 500 to 600 million years after its birth. In fact the nebular hypothesis that created the solar system not only needs a reason for this anomalous planet but also a reason for the Late Heavy Bombardment that occurred during this same time period.

The answer to this plaguing issue is two recently proposed ideas that are slowly becoming accepted mainly because no other ideas were available. These ideas are either the Nice theory or Lagrangian collisions or a combination of both. The collocation of stars and planets (CSP) does not rely on such processes and disputes whether they are indeed plausible.

A. Nice Theory or Model[y]

The Nice hypothesis requires gravitational resonances between the orbiting planets to force them into crossing other orbits and then finding other stable orbits in the outer solar system; perturbations created by their migrations cause other minor celestial bodies to move into unstable orbits thereby causing collisions with the larger bodies 600 million years or more after their birth.

The difficulty with the Nice hypothesis is the extremely chaotic conditions created by such planets as Uranus and Neptune crossing the orbits of Jupiter and Saturn. A modified Nice hypothesis claims that Uranus and Neptune merely moved outward from their original orbits and disturbed the outlying minor planets. Then these disturbed minor planets moved inward and played havoc with the pristine arrangement of the existing planets. Questions arise about 1) the origin of the minor planets beyond Neptune, 2) the computer modeling for orbital resonance pushing celestial bodies outward, and 3) the amount of time it takes for the outer large planets to be accreted from distances beyond the orbit of Saturn. It helps if the giant ice planet formed closer to the Sun, but still does not provide enough disk time to accrete all their materials. The time for computerized accretion takes longer on a much larger scale than is observed by the age of proto-star disks. Supposedly about another 100,000 years is required for the evacuation of most dust and gases beyond the perimeter of the outer planets.

B. Lagrangian Collisions[z]

Lagrangian collisions are theorized to be lesser bodies trapped in stable Lagrangian positions of the same orbit of a larger body. Then due to perturbations over billions of years these lesser bodies which are sharing the same orbit crash into the larger body at low impact velocities.

Support for later Lagrangian collisions is not well supported. There are known Lagrangian bodies in various parts of the solar system; the better known Trojan asteroids of Jupiter are theorized to be in stable Lagrangian positions and have been this way ever since the birth of the solar system 4.6 billion years ago. There is no support via observations or analytical methods for larger bodies such as Martian-size ever being accreted and/or sharing orbital Lagrangian position. But, a body the size of Mars is required to produce the Earth-Moon system via a collision per the most current idea, the Giant Impact Hypothesis. This Martian or Ganymede size body is quite possible by considering the "supernova seeding" (SNS) hypothesis and its sister hypothesis, the "collocation of stars and planets" (CSP).

Any of these ideas, the Nice theory, Lagrangian collisions, or the CSP hypothesis must be supported by the current studies of dating the various solar system objects from meteorites to Moon and Earth rocks. Present dating data further corroborates the CSP hypothesis.

C. The Age of Things is Not Clearly Understood

The age of the universe is given by looking for the oldest stars and measuring backwards to the Big Bang by using the Hubble constant, which is a measure of the expansion rate of the universe. Approximating the density or composition gives an age of 12 to 14 billion years. The least massive, hence the oldest stars in the galaxy's globular clusters reveal an age of 11 to 18 billion years. The WMAP satellite determines the cosmic background fluctuation thereby giving a more precise density and an age of **13.75 ± 0.11 billion years (by)** which is the currently accepted value. [aa]

The age of the Milky Way galaxy is given by measuring long-lived radioactive elements in meteorites, uranium 238 and thorium 232. These measurements place the galaxy's oldest stars at 13.2 bya near the age of the universe which is close to the predicted time that the universe becomes clumpy and galaxies with stars begin to form. This time period is 100,000 to one billion years after the Big Bang. The age of the Milky Way when it formed into a thin barred-spiral disk is **8.8 ± 1.7 by ago**. [bb]

The age of the solar system is given by radiometric dating of rocks using half-lives of 700 million years to 100 billion years. This technique measures the last time the rock being studied was melted or disturbed enough to restart the clock for the long-lived radioactive elements. Measuring these elements in meteorites reveals **4.568 by**. [b]

The age of the Earth is actually based on lead-lead dating of the oldest meteorites which is **4.54 ± 0.05 by** which is consistent with the oldest samples found on both Earth and the Moon. This does not agree with the oldest minerals analyzed to date which are small crystals of zircon from Western Australia. These crystals are **4.404 by old**. [cc]

The age of the Moon is **4.527 ± 0.01 by** based on the oldest rocks recovered from the highlands by Apollo 15. Zircon crystals from recovered rocks and soil date the Moon at 4.1 to 4.4 by. [dd] Lunar rocks are depleted in volatiles and lacking hydrated minerals common to Earth. In spite of this fact, scientists insist on a common origin for the Moon and Earth due to related isotopes of oxygen in their rocks.

Listed in billions of years these ages look deceptively close; however, their age differences for the solar system and the oldest meteorites is 4568 – 4540 = 28 million years. The age difference for the oldest rocks on the Moon and the Earth is 4527 – 4404 = 123 million years. Accretion models at the Earth's orbital range during the proto-star disk stage of formation take 4 to 100 million years to form planets. If this dating data can be trusted, then the Moon formed 4540 – 4527 = 13 my after the asteroids (meteorites), which are supposed to be the original materials for planetary accretion, first formed in the solar system. And, the Earth formed 4540 – 4404 = 136 my later. These results are incompatible with accretion models and the observations of proto-star disk lifetimes and the Giant Impact Hypothesis.

These age discrepancies can be justified by the Collocation of Stars and Planets (CSP) hypothesis by proposing that asteroids and their related meteorites and comets are all created by collisions of larger bodies during their capturing process within a proto-star disk or by on-going collisions between asteroids. Asteroids are not formed by the accretion of dust and planetisimals inside proto-star disks. As currently theorized, asteroids are not the building blocks of planets. Asteroids only come from collisions never having the mechanisms to re-configure into spherical shapes. These objects can only collide with themselves, other solar system objects including the Sun, or form rubble piles and/or small satellite systems from weak gravity attraction with each other.

Asteroids came from the ejecta or collisional products of already differentiated objects with hardened crusts that were either rocky or icy or both. The asteroids in reality are measuring the dates of young planetary crusts if the material did not completely melt during the collision event. Completely melted debris after cooling will measure an impact date. It is predicted that the proper dating of a good proportion of meteorites and asteroids will reveal impact dating younger than the accepted age of the solar system. This age is now understood per the CSP hypothesis to be the age of cooled, hardened crusts of very young planetary objects. The crusts for each planetary surface do not necessarily crystallize at the same time.

The Moon's rocks measure an older age than the Earth's since the Moon's surface was smaller and cooled faster due to much less mass. This parameter dominated over the Earth originally being farther away from the Sun between the orbits of Mars and Jupiter. The Moon does not require the same hydrated rock as Earth since each solar system object formed from a different clump of material as the supernova seeding (SNS) process is taking place. The Moon can have the same oxygen isotopes as the Earth since Earth brought collisional debris to the Moon's orbital region with similar volatiles formed from its collision with a huge impactor. This collisional debris is then finally swept up by the Moon providing similar isotopes of various volatiles including oxygen.

The Earth's collision with a Martian-size impactor marks another important age, the Late Heavy Bombardment (LHB) period [ee] occurring about 3.9 bya. This age was obtained from impact melts of the largest of the Moon's impact craters which cluster between 4.1 and 3.8 billion years ago. This important dating reveals the age of severe asteroid bombardment on the Moon, Mars, Mercury, and possibly some of the Jovian moons. The LHB also agrees with the oldest Earth rocks and, hopefully, in the future the ages of some asteroids and meteorites. Age data for the full range of asteroid samples has been possibly overlooked or not logged since scientists have only been interested in the oldest rocks.

The LHB possibly corroborates certain dating discovered by geneticists. They have measured the rate of genetic divergence of species using a molecular clock to date the last universal ancestor of all living organisms no later than 3.5 to 3.8 bya. This dating follows the LHB event and may indicate when Earth cooled again rather quickly after its main collision. After a few million years, the oceans would have returned with its deep sea vents known to harbor life. And, soon to follow are the cooling and wasting of continental crusts preparing havens above sea level for flora and fauna.

The LHB caused by the Earth's collision with a large impactor marks the age of the earliest cooling rocks on Earth that formed the lighter granitic continental crusts. The age of the heavier oceanic crust is constantly being changed by means of plate tectonics. However, some of the oldest rocks from these times are exposed on the surface of the original continental spines called cratons or shields. Such rocks as found in the Canadian shield, in Australia, and Africa are 2.5 to 3.8 million years old. Wikipedia has listed some of the oldest cratons on Earth: Yilgarn craton (≈2.9 > 3.2 by); Pilbara craton (≈3.4 by); Canadian shield (≈2.4 >3.6 by); Dharwar Craton in India (> 3.0 by); and Baltic shield (3.5 by). The oldest dated rock is 4.031 by [ff] The EMM hypothesis uses this data as proof for when the Earth was struck by an impactor forming its new continental crust which cooled and crystallized shortly afterward.

Further corroboration of the dating and occurrence of Earth's main impact is a recent study of crustal motions that started sporadically. Plate tectonics would have started immediately after this impact since the original oceanic crusts were cracked and raised from the impactor's impregnation. The first original continent created by the oozing of materials from the impact crater location started to break apart and drift radially outward after cooling to a solid form. The drifting is caused by plate tectonics that push one plate beneath another in a process called subduction. If rocks from this subduction later uplifted to the surface, geologists can recognize the chemical alteration. This signature in rocks of shorter, sporadic subduction has recently been discovered in the Archean eon that spans 3.8 billion to 2.5 billion years immediately following the postulated Earth's collision with a Martian-size planetoid. The hotter mantle in those times weakened the diving plate and it broke before going too deep. The plates would then cool and harden sufficiently at the surface before starting the process again. “Only when the mantle cooled sufficiently – perhaps by around 2.7 billion year ago – could permanent, modern-style subduction take hold.” [gg] This new study helps to explain why accelerated continental drifting via plate tectonics did not get started until the end of Archean eon and possibly well into the Proterozoic eon that spans another 1.5 to 2 billion years.

The LHB also explains the dating of various rocks on the Moon. From the EMM hypothesis the Earth was knocked into the same orbit as the Moon and brought debris along to bombard the Moon during this same period of time. This bombardment created not only huge craters but mares created by the upflow of mantle materials heated by these impacts. The majority of space debris was swept up within a short period thus identifying the LHB period, but other debris brought along by Earth was swept up more slowly over a period of 800 to 900 million years as measured by crater counting and the ages of other mare rock on the Moon.

This storyline is confirmed by the following Moon rock dating:

1. Ages of impacted rocks cluster between 3.8 and 4.1 bya.
2. Most of the Moon’s mare’s basaltic crust erupted 3.0 to 3.5 bya. Eruptions span the period of 1.2 to 4.2 bya. The youngest age of basalts was measured by crater counting. Crater counting on other planets and satellites also reveal the LHB time period.
3. Melt inclusions from a lunar sample formed during an explosive eruption 3.7 bya is comparable to the Earth’s upper mantle. Collisional debris from Earth’s impact came both from the Earth’s young crust and the impactor thereby explaining these melt inclusions.

A brief timeline of solar system formation is formulated using the ideas of the CSP hypothesis that makes sense of the supposedly incompatible dates of materials and objects that were just mentioned. If one cannot explain the fairly accurate radiometric dating collected over very recent times, then the current nebular hypothesis should be thrown out the window. Other hypotheses are ready now to replace it.

Table H - A CSP Timeline for Solar System Formation that Makes Sense of the Incompatible Radiometric Dating Data

Object Measured by Radiometric Methods	Measured Age (billions of years ago - bya)	Popular and Currently Accepted Theory	Explanation by the CSP Hypothesis
Oldest radioactive elements within meteorites	4.568	Accepted as the age of the solar system.	Possible age of the oldest material crystallized during one of the proto-disk formations.
Oldest crystallization of meteorites on Earth	4.540 ± 0.05	Accepted as age of Earth formed at same time as proto-disk's planetisimals.	Age of oldest debris from impacts while proto-disk was gathering planets into orbits.
Oldest of crystallization Moon rocks	4.527 ± 0.01	Accepted age of the Moon.	Age of general crystallization of original Moon's crust; ages of planetoid crustal hardening can span different times.
Oldest zircon crystals on Earth	4.404	Disagrees with the oldest meteorites; no answer is provided.	Possible date of the original first crystallization of Earth's crust that survived the impact and subduction processes.
Late Heavy Bombardment	3.900 ± 0.10	Ages of impacted rock clusters on the Moon	Period immediately following Gaia's (Earth's) major collision.
Oldest rocks (cratons) measured on Earth [hh]	3.800 to 2.400	Considered to be surviving rock from continental wasting and subduction processes	Actual time shortly after the major collision when the newly created granitic continents solidified.
Earliest organisms on Earth measured chemically	3.800 to 3.500	Earth cooled sufficiently after accretion heating. Photo-synthesis starts.	This event represents the 2nd cooling of Earth's crust and re-start of primitive organisms
Organic and hydrated compounds found in meteorites are the result of debris from Gaia's (Earth's) original crust that was ejected during its major collision event.			
Moon's basaltic crust erupted	3.800 to 3.000	Considered to be a lessening of the LHB period	This period is when the Earth brought collisional debris to Moon's orbit. The most and largest impacts occurred around 3. 9 bya; the Moon kept sweeping debris at a lesser rate over the next 900 my.
Crater counting on the Moon's surface showed continued impacts.	3.000 to 1.200	Considered to be the last vestiges of early solar system debris.	This period represents continued but much less frequent impacts for both the Moon and Earth until all the vestiges of the collision were removed.
The end of major impacts around 1.200 bya probably ended the reasons for the two "Snowball Earths" occurring at 2.400 and 0.800 bya. Without the interruption of major impacts and dramatic climatic changes, life's rich diversity started. This event occurs 0.542 to 0.500 bya and is called the "Cambrian			

Object Measured by Radiometric Methods	Measured Age (billions of years ago - bya)	Popular and Currently Accepted Theory	Explanation by the CSP Hypothesis
Explosion." [ii]			
Sporadic subduction processes on Earth	3.800 to 2.500	Plate tectonics could not operate efficiently because the plate would break-off.	CSP hypothesis concurs with this modern geological finding.
Modern-style subduction take hold on Earth	2.700	The mantle cools sufficiently for the moving plates to dive more deeply.	CSP concurs and postulates that subduction processes would initiate more active continental drifting.
Major ancient continents begin to develop from the oldest known continent of Ur [jj]	2.500 to 1.800	Not currently addressed.	The re-configuration of continents and oceans creates different climates and niches for varying flora and fauna.

X. Explaining Anomalous Conditions of the Solar System

The solar system has numerous anomalies of which the more important ones will be discussed. The nebula hypothesis has attempted to address these anomalies with the recently introduced Nice Theory. The theory claims through computer generated simulations that the two outermost planets through resonance moved outward from much closer orbits and disturbed the sizable Kuiper Belt Objects (KBOs). These disturbed small planetoids then moved inward and made a bowling alley of the inner planets. This theory is not accepted by this journal. These anomalies which are conditions that deviate from normal trends in our solar system are now presented and explained by the CSP hypothesis.

A. Continuance of Planetary Rings and Comets

Rings of small ice and dust particles around Saturn and recently discovered rings around Jupiter, Uranus and Neptune are truly a mystery. Over the 4.5 billion years these small particles should have been either dissipated by solar winds or gravity field perturbations and/or swept away by orbiting moons. How can these particles survive this long? If these materials are the result of a captured body being captured and torn apart as it passes the Roche limit, then how can these marauding outer-solar system particles with unstable orbits last for so long?

The CSP and SNS hypotheses have two answers. The CSP hypothesis claims that during the initial capture of planets and planetoids by the proto-star disk, the smaller bodies of planetoids met various fates. Two of these fates would supply an ample reservoir of celestial objects that would continue to plague the solar system for its lifetime. Those fates are collisions that produced asteroids/comets and huge perturbations or close encounters that swung these bodies into elliptical and non-coplanar orbits. These objects then continually were perturbed into occasionally changing orbits causing other spectacular fates in their futures. As the solar system becomes older, it becomes more quiet and stable as these objects are swept away, reduced in size, or ejected from the solar system. Nevertheless, there always remains the hazard of these diminishing objects. These residual objects continue to supply captured bodies especially for the outer giants. These captured, falling bodies disintegrate into particles as they fall below the Roche limit for that planet. Some of these objects are heated by tidal forces of the outer giants acting on either an original or later captured satellites. The tidal forces create internal heat that in turn causes periodic eruptions that supply materials to some of the planetary rings. Space probes have proven such cases with Jupiter's Io and Saturn's Enceladus. Hence, the planetary rings are continually replenished.

The second answer comes from the SNS hypothesis that insists the supernova seeding process over the life of a galaxy provides a generous reservoir of MSOs. Due to power law considerations this reservoir is immense for the smaller bodies that are called planetoids that come from MSOs. They are continually being swept up by the various solar systems' gravity fields on its perimeter. These smaller bodies are mostly formed from ices with some rock and are captured on the outskirts of the solar system to become either additional Kuiper Belt Objects (KBOs) or mostly scattered disk objects (SDOs) that range within 100 AU and within 30 or more degrees above and below the ecliptic plane. [kk] This is not to say that many KBOs are the solar system's original captured bodies. These recently discovered bodies have very unstable, elongated orbits and are now being tracked by modern telescopes.

These resupplied KBOs are the bodies that eventually are caught by the outer planets' gravity fields. The KBOs then fall toward these planets and are ripped apart by immense tidal forces inside their Roche limits or possibly colliding with each other. Very fine particles, especially those from their icy crusts, are created by the disintegration of these KBOs. These particles are left behind with enough velocity to continue orbiting the planet and form rings which last a substantial amount of time. Hence, the claim is made that there is a constant reservoir of materials that keep re-supplying the rings around the outer planets.

B. Tilt of 90° for Uranus and its Satellites

Totally unexplainable is the alignment of Uranus's spin axis with the ecliptic plane. The alignment of axes of its satellites' orbits is also 90° to the ecliptic plane. Uranus is like a ball rolling in its orbital path. If a giant object struck Uranus and rotated it 90^0 this scenario does not explain why the orbiting axes of the major satellites are also aligned with Uranus' spin axis.

The CSP and SNS hypotheses answer this phenomenon by utilizing the very strong electromotive forces to align the various proto-planetary disks with its youthful proto-star disk parent. As time goes onward the gravity forces increase as the masses increase and the electromotive forces diminish. This characteristic leads to less alignment features for the last planets attracted to the perimeter of the proto-star disk. The power of the Sun's gravity with its wave function attracted Uranus and Neptune into their respective orbits, but lacked the electromotive forces to align their spin axis vectors. Hence, Uranus's proto-planetary disk with its flock of moons was capture within an aligned orbit, but never had enough combined electromotive forces for both itself and the proto-star to align its spin vector. Neptune's proto-planetary disk by chance possessed a spin and orbit that were both aligned with the proto-star disk vectors.

Voyager 2's measurements revealed an Uranusian magnetosphere that is tilted 59° from the axis of rotation and its magnetic dipole is shifted from the center of the planet by as much as one third of the planetary radius. The magnetosphere for Neptune has similar characteristics unlike other planets where its magnetic field originates from the geometric center and generally aligns with the spin axis. [ll] "One hypothesis is that, unlike the magnetic fields of the terrestrial and gas giant planets, which are generated within their cores, the ice giants' magnetic fields are generated by motion at relatively shallow depths, for instance, in the water-ammonia ocean." [mm, nn]

This important hypothesis certainly can explain the magnetic field anomalies, but provides more credence to both the CSP and SNS hypotheses. CSP claims that ice giants and gas giants can be captured in any newly forming orbit of a proto-star disk but will only continue to exist in the outer perimeters since the T-Tauri stage of star development heats up and blows away the gases and ices of these types of planets in the inner solar system leaving behind only a rocky, metallic core. The SNS claims that the larger MSOs will grow faster and exponentially gather mass from the surrounding gases. These MSOs become the gas giants with larger, magnetic cores. The intermediate MSOs become the ice giants. These proto-planets have smaller, less magnetic central cores.

As rotating ices and gases gather around these cores they remain in the liquid phase and create their own magnetic field that eventually dominates the magnetism of the smaller metallic cores. Hence, these liquids with their much thicker cross-section can spin in a more asymmetrical fashion and create an independent spin axis from the core. The hypothesis created from Voyager 2's findings is plausible, but the generated magnetic fields may come from deeper depths closer to the core.

The SNS hypothesis emphasizes that different size MSOs traveling through different clumps of materials of varying amounts can lead to very different planets and planetoids. This is why both gas giants and ice giants exist in the same proto-star disk. These types of planets if captured within the inner orbits close to the proto-star evaporate and lose their gases and ices during the hot, windy T-Tauri stage of star formation. This is why terrestrial planets exist in any inner star system. Terrestrials are the vestiges of gas giants' and ice giants' central cores.

C. Venus's Retrograde Rotation

The vector orientation of spins and orbits should be very consistent for the inner planets since the CSP claims that the electromotive forces that align these vectors is very strong as the first inner orbits are filled. What happened to Venus with its retrograde rotation of 243 Earth days which is 19 days longer than its orbital period? All other planets have prograde rotation that has the same vector direction as their orbits.

Due to its closeness to the Sun, tidal locking and tidal effects on its dense atmosphere over billions of years tends to slow rotation, but is not sufficient to reverse its rotation. Impacts by fairly huge bodies traveling in an opposing direction to its rotation are needed for affecting Venus's rotational energy by any large amount. Observations of its geology reveal about 1000 impact craters in well preserved condition and a predicted global resurfacing event that took place about 300 to 600 million years ago. Hence, there is no strong evidence for impact events older than these times. [oo]

However, other lines of evidence can lead one to suspect that Venus received a major impact that changed its rotation, delivered volatiles such as CO_2 to the planet, and destroyed its internal magnetic field. No continual plate tectonics occurs like on Earth because the crust is too strong to cause subduction of plates without water to make it less viscous. Earth was originally in the water belt between Mars and Jupiter and retained its water during the Sun's T-Tauri stage. Any differentiated volatiles on Venus' surface were boiled away. The proportion of CO_2 to H_2O that the impactor brought to Venus was much greater than for Earth. These differences in distance from the Sun and the composition of the impactors sealed Venus's fate.

If any water was brought by Venus's major impact event, it did not have chance to survive. The runaway greenhouse effect of the CO_2 that was released into its atmosphere evaporated the water, becoming photo-dissociated, and thereby releasing the free hydrogen into space. The hydrogen was swept away by the solar winds since the collision(s) dramatically slowed Venus's rotation to the point that its core's magnetic field could no longer hold charged ions.

The major collision event that Venus endured was unlike Earth's main collision event. For Venus its rotation was stopped thereby eliminating any strong magnetic field. For Earth the affect was mostly a tilted axis and a displaced orbit; the planet kept spinning and maintained a strong magnetosphere.

D. Effect of Major Collisions

Major collisions are defined as collisions between bodies where the mass and volume ratios are significantly small. The densities vary widely due to the smaller body being more likely composed of ices and the larger body being more rocky and metallic. These collisions occurred early in the solar system when the planets and satellites were choosing their orbits per the CSP hypothesis. Because these events were early, the bodies were still very molten, almost in a liquid state, because large losses of residual heat from their formations and radioactive decay did not yet take place. Hence, instead of destroying each other in collisions, the larger body was able to absorb most of its impactor mass.

How the collisions occurred largely affected a wide spectrum of anomalous outcomes. If the collision was offset substantially below or above the equator of the larger body, then tilting the axis occurs as was the case of Earth. If the collision(s) was not offset from the equator but offset longitudinally and opposing it direction of spin, then the rotation could be stopped or substantially slowed as was the case with Venus. If the collision was almost head-on, a huge penetration can occur that shows huge anomalous geological telltale marks. This is believed to be the case with Mars where a huge impact basin and mare was created on one side; and on the opposite side the largest volcano in the solar system released much of the impactor's volatiles.

The effect of major collisions is well preserved on the two satellites of Saturn which are Mimas and Iapetus. [pp] These hard, icy objects during their observed collisions were probably hot and viscous so the smaller object could be absorbed. Perhaps the impact velocities were also very small. These objects provide proof that major collisions do not annihilate both bodies.

Another noteworthy major collision occurred on the back side of the Moon. The Aitken impact basin is 2240 km in diameter. [qq] This basin is the largest crater on the Moon and the largest known crater in the solar system. Various ideas have been proposed for this huge impact. The EMM hypothesis does give a reason for the source of such an impactor during the LHB period and the lighter bombardment that followed for several 100 million years.

E. The Lack of Satellites for Inner Planets

Why is the lack of satellites for the terrestrial planets considered an anomaly? Most large solar system bodies have satellites as do insignificant bodies such Kuiper Belt Objects (KBOs) and small asteroids. According to the CSP hypothesis it is very natural for large planetary bodies to have satellites. The terrestrial planets were much larger planets before the T-Tauri stage of the Sun boiled away the inner planets' volatiles. These planets should have had a host of satellites. One cannot count Earth's Moon because it is really a planet; and the Martian satellites are captured asteroids. Perhaps Gaia, the planet between Mars and Jupiter, had some moons that were disturbed and displaced after an Impactor struck Gaia. Two such candidates are Ceres and Vesta.

The reason for no inner planet satellites is rather obvious. Satellites are always the smaller bodies in a planetary system. Thusly, they are composed mostly of rocky mantles mixed with volatiles and having large icy crusts. The majority of these materials are boiled away for the inner solar system satellites when the Sun enters the T-Tauri stage. After these satellites lose the majority of their mass they are no longer attracted to their parent planet. These bodies with diminished masses will then escape into large elliptical orbits that either are perturbed farther away from the inner solar system or eventually fall into the Sun. The inner planets are not only depleted of their outer volatile materials but also their satellites because these bodies have exposed volatile materials that also boil away during the extreme heat and high winds of the T-Tauri stage of the Sun.

F. Sun's Equatorial and Ecliptic Plane Difference

Astronomers speak primarily of three planes in the solar system and refer all other orbital planes to them. They are the Sun's equatorial plane, the Earth's orbital plane called the ecliptic, and the invariable plane which is similar to the average plane of all the planetary orbits.

The nebular hypothesis visualizes a flat proto-star disk wherein all the planets and their satellites are formed. The disk materials are falling onto the forming Sun thus assuring due to the conservation of angular momentum that the Sun's equator is aligned with the disk's plane. In reality the Sun's equator is 7¼ degrees from the ecliptic plane which closely approximates the orbital plane of all the planets. This average plane of all the orbits should supposedly represent the plane of the proto-star disk. Why is the Sun's equatorial plane so different? All the planets are within 2 degrees except for Mercury at 7.00°, Venus at 3.39°, Saturn at 2.49°, and Pluto at 17.17°. Pluto is a definite exception and is now known to be a Kuiper Belt Object (KBO) or a Scattered Disk Object (SDO) which have different origins from the planets.

The data strongly suggests that the planets formed independently of the proto-star disk materials that define the Sun's equatorial plane. The CSP hypothesis claims that all the planetary components of a star system are more than likely formed independently from the main proto-star disk. These components are close enough to the perimeter of the main disk that they are eventually attracted via electromotive forces initially and then later by the exponentially increasing gravity field. In order to be captured these proto-objects need to have trajectories close to the invariable plane of the proto-star but need not be within 2 to 3 degrees. The exception is Mercury with an inclination of 6.34° to the invariable plane. According to the CSP, Mercury was the first planet captured when the electromotive forces were the strongest. Possibly asteroid impacts affected its orbital plane later in its life.

Further proof of the independence between the proto-planets and the proto-star disk are their inclination of equators to their orbits. These inclinations for the terrestrial planets were more easily caused by main impact events. However, it is difficult to envision major impact events tilting the spin axes of the giant planets. The transfer of kinetic energy of an impact to the angular momentum energy is too difficult without causing major destruction and space debris. Saturn has 29°; Uranus has 98°; and Neptune has 29° for this equator-orbit inclination. Again, the conclusion is that their proto-planetary disk planes were independent of the main proto-star disk plane that eventually attracted them. [rr]

G. Orbital Eccentricities of Asteroids, Comets and the Moon

The orbital eccentricity of an astronomical body is the degree to which its orbit deviates from a perfect circle, where 0 is perfectly circular, between 0 and 1 is elliptical, and 1.0 is a parabola that no longer is a closed orbit. [ss] For the CSP hypothesis orbital eccentricity tells the story of a celestial body's historical past. The body's perihelion indicates closely where it originated in a collision; and, the amount of eccentricity indicates the power of the collision and perturbations with the outer giant planets. Very high eccentricities for celestial bodies can only mean that a collision occurred; or, in a few cases it can mean there was an extremely close encounter. The eccentricities of all the planets are less than 0.0934 for Mars with the exception of Mercury at 0.2056.

"Most of the orbital eccentricities of the asteroids are between 0 and 0.35 with an average value of 0.17. Their comparatively high eccentricities are considered to be due to the influence of neighboring Jupiter and past collisions." [ss] These larger eccentricities are largely preserved because of the scant gravitational influence by other planets due to their very small masses and large distances from the system's regular planetary orbits except during its perihelion approach. This property gives credence to these objects resulting from collisions. These objects are not the residual debris or building blocks for planetary formation during the proto-star's accretion stage because their orbital properties are very unique.

The eccentricity of comets is most often close to 1.0. Periodic comets have highly eccentric orbits with eccentricities just below 1.0. In other words, most comets are non-periodic coming from the extreme outer solar system and beyond. The current academic thinking is that these comets are perturbed by some nearby passing star while sharing residency inside the unproven Oort Cloud of millions of icy bodies perhaps ½ to 1 light year away.

The CSP and SNS hypotheses propose another more likely scenario. The scenario is that the solar system capture of interstellar space debris created by eons of supernovae that occurred near the Sun's orbit in the galaxy. Academic theory claims that capture is not possible because of the two-body capture theory. However, there is no perfect two-body system around the perimeter of the solar system. Other factors are interposed such as solar winds, combined gravitational influences of the outer planets and Kuiper Belt objects, passing shock fronts from novae and supernovae, and possible electromagnetic properties of the heliosphere. Also, the sheer number of these small interstellar objects being produced and their infinite number of trajectories produces a better probability of capture. The common comets' eccentricity does not lie. It tells us that these asteroid-like bodies with frozen volatiles come from well outside the solar system on an unending timeline that is not connected to the genesis of our solar system.

The parameters of a very recently observed comet, C/2010 X1 (Elenin), are listed. It has an orbital period of 11,800 years, an inclination of 1.839°, an eccentricity of 1.00006, a semi-axis of 518 AU, and a perihelion of 0.482 AU. The diameter of its nucleus is about 3 to 4 km and is traveling at about 24 km/s. [tt] If this comet indeed orbited the Sun several times to within ½ AU, its volatiles would have perished over a few million years of orbits. The comet still has volatiles enabling observers to see its coma and tail. Did some closely passing brown dwarf disturb only this comet and no others from the Oort Cloud? The size, velocity, and inclination near the ecliptic for this comet can easily lead one to postulate that it was captured from interstellar space as is claimed by the CSP hypothesis. Having the Oort Cloud randomly eject one of its cold gems toward the Sun is much harder to imagine.

"The Moon holds a notable value of eccentricity of 0.0549. It has the largest value of all the 19 round satellites in the solar system." Why? The value is as large as the 10 times for most of the other round moons. Our Moon also has an orbital velocity of only about 1/10 to 1/5 of the orbital velocities of the other moons. Obviously, a very different process created the Earth-Moon system as opposed to the other planet-moon systems. [uu]

In order to achieve enough orbital energy for this larger eccentricity, some special capture mode is necessary. An explanation for this parameter is provided by the EMM hypothesis. The trajectory of the falling Earth after its main collision almost matched the curvature of the Moon's existing orbit as it was captured again by its centripetal force balancing the Sun's gravitational force. The Earth was orbiting faster than the Moon and after eons of passing each other, the Earth slowed to the Moon's velocity while the Moon moved farther away. The mechanism of the two planets synchronizing their orbits as explained in the EMM hypothesis produced the Moon's unusual eccentricity that cannot be explained any other way.

H. Kuiper Belt Objects (KBOs) [vv]

Kuiper Belt Objects started being discovered as late as 1987. These discoveries along with their unexpected large sizes caused Pluto to be demoted to a minor or dwarf planet. Pluto, as well as Neptune's moon, Triton, are considered to be KBOs after spectroscopic data revealed the surface compositions of methane ices to be very similar to KBO 1993 SC. [ww]

These KBOs span a belt that extends beyond the orbit of Neptune at 30 AU to approximately 50 AU from the Sun. These objects are composed largely of "ices" such as methane, ammonia, and water. Unlike the smaller bodies in the asteroid belt, they lack any measurable rocky and metallic materials. So far, only a few KBO densities of less than 1 g/cm^3 have been determined due to known diameters. Very likely, the larger, round KBOs have rocky and metallic materials in their mantles and cores creating higher mean densities, but have not been measured. The basic difference between asteroids and KBOs are the irregular shapes of asteroids verses the round shapes of KBOs including their smaller satellites. The asteroids can only be the result of collisions. The KBOs are closer to being primordial with very little re-processing.

For this CSP hypothesis, the KBOs are termed as planetoids with the largest having around a 3000 km diameter. They are also similar in size and composition to the round satellites of the outer planets. This span of size dictates that the composition is icier, less rocky, and less metallic. Their origins come from two different reservoirs: one from the primordial planetoids that were either originally gathered by the proto-star disk or by individual proto-planetary disks; and, another reservoir from interstellar space over the lifetime of the solar system as it orbits the galaxy.

The first reservoir includes three categories:

1. Planetoids that were perturbed from their orbit by a larger body as orbital selection phase was taking place; these bodies were further perturbed by the outer planets into the Kuiper Belt.
2. A few planetoids that were either captured directly or perturbed into orbits around the outer planets like Neptune's Triton and Saturn's Phoebe.
3. Planetoids that were captured in the later stages of the proto-star disk formation on its outer perimeters; some of these objects could much later have been perturbed inward toward the Sun.

The second reservoir relies on random and infrequent capture of planetoids and planetisimals produced by supernovae remnants that the Sun intersects. For capture to take place the trajectories of these planetoids need to have certain velocity vector and value in order to align roughly with the solar system's invariable plane. Most of the planetoids in an intersecting SN remnant will simply pass by the Sun's path.

There is a currently a serious mystery in academia as to how these KBOs are formed by accretion in the very cold, very empty space beyond Neptune. Computer modeling of solar system formation requires 99% more mass than now exists in the Kuiper Belt; this much mass is required for accretion of KBOs larger than 100 km in diameter. Without a higher density than is observed these bodies cannot form. This enigma is resolved by the SNS hypothesis.

These objects were already mostly formed by the Supernova Seeding (SNS) process. No accretion inside a proto-star disk is required. In fact, neither Uranus nor Neptune per computer simulations could have formed in their present locations to produce such high masses. The Nice Theory was invented to utilize resonances of Jupiter and Saturn causing Uranus and Neptune to migrate outward to their present positions. This popular model still fails to account for the distribution of the Kuiper Belt structure. The SNS process ignores the Nice Theory and produces these planets via their own miniature proto-planetary disks before being attracted to the perimeter of the Sun's proto-disk. The SNS process automatically aligns MSOs even for the smaller sizes of objects that can provide a large frequency of paired objects many of which are far apart and loosely bound. The migration of large planets by the Nice Theory produces too many chaotic forces to allow for the observed loosely bound bodies in the Kuiper Belt. The Nice Theory and the accretion of the ice giants and the icy KBOs in the cold outer perimeter of the proto-star disk are not required.

The Kuiper Belt is concentrated within ten degrees of the ecliptic plane having a more diffuse distribution of objects extending several times more above and below the plane. The concentrated bodies having nearly circular orbits, more than likely, come from the first referenced reservoir of KBOs. These bodies' orbits have become very stable after initially reaching a certain resonance with nearby Neptune over millions and billions of years. These two populations also have different compositions as is revealed by a redder color for the first. [xx] This is evidence that the concentrated, more stable bodies were once slightly re-processed during their initial visit to more central, hotter locations in the proto-star disk.

The bodies in the more diffuse distribution inclined by up to 30°, more than likely, come from interstellar space and have more unstable, more inclined, open orbits. These so-call Scattered Disk Objects (SDOs) become the unending source of both long period and short period comets. The difference is probably that the short period comets have been largely perturbed by the outer planets into forming an elliptical orbit over some period of time whereas the long period comets are coming directly from interstellar space. The observed long period comet trajectories give rise to the belief of an Oort Cloud at 50,000 AU; [yy] but, the Oort Cloud is not required, if the majority of SDOs come from passing through SN remnants having per the power law an unbelievable number of planetoid-size objects in free space.

"In 2004, Mike Brown *et al.* determined the existence of crystalline water ice and ammonia hydrate on one of the largest known KBOs, 5000 Quaoar. Both of these substances would have been destroyed over the age of the solar system, suggesting that Quaoar had been resurfaced, either by internal tectonic activity or by meteorite impacts." [xx] The suggested solutions to this dilemma are highly improbable. Perhaps Quaoar was captured from interstellar space as is suggested by such possibilities of the SNS hypothesis. Then these compounds are independent of its central star and its solar winds thereby lasting indefinitely which conclusively proves capture from interstellar space.

The conclusion made in a Wikipedia article is that the current residents of the Kuiper Belt have been created closer to the Sun or some mechanism dispersed the original mass. [xx] Part of this conclusion is correct in that the KBOs were dispersed trying to find and share orbits as they fell toward the Sun. According to the CSP and SNS hypotheses these bodies were made independently of the proto-star disk. Then these KBOs or planetoids fell into the main disk to either collide or be ejected by much larger objects. The ejected bodies were then further dispersed by outer planet perturbations to the outer perimeters beyond Neptune. Subsequently, other KBOs joined the Kuiper Belt from interstellar space over the solar system's time span.

I. Triton's Retrograde Orbit

Triton, Neptune's largest moon, is believed to be a captured KBO. [zz] According to popular theory, this capture of a fully formed body occurred when Neptune migrated outward according to the Nice Theory. All other large round moons of the outer planets are thought to have coalesced from their individual proto-planetary disks.

A space probe measured Triton's density at 2.061 g/cm^3 and moment of inertia which in turn determined that it had a substantial core of rock and metal. This is good evidence that the other KBOs of comparable size have similar mantles and cores. There is not enough heat energy to separate and coalesce metals and then create a differentiated body in this 50° K environment as envisioned by the nebular hypothesis and its accretion models. This data definitely supports the SNS hypothesis that provides electromotive forces, hot plasma, and magnetic spinning orbs (MSOs) to form KBOs with differentiated bodies.

The above conclusion that not enough heat energy could have differentiated Triton is open to a different interpretation. The following claim is quoted, "Triton's eccentric post-capture orbit would have also resulted in tidal heating of the moon's interior. This would have kept Triton liquid for a billion years, which is supported by evidence of differentiation in the moon's interior. This source of internal heat disappeared following circularization of the orbit." [zz] This explanation is very plausible, but it still does not explain how this KBO is formed by accretion and having these particularly large amounts of certain elements in this very low-density part of the proto-star disk.

The Neptunian system has a special uniqueness in having a scarcity of moons as compared to the other gas giants. Nereid has an extremely eccentric orbit and Triton has a retrograde orbit. An acceptable reason for these conditions is given in Wikipedia. Triton's initially eccentric orbit swept up the smaller, irregular moons and dispersed the regular moons through gravitational interactions. These impacts and gravitational interactions aided Triton in being slowed sufficiently to be captured. But why does Triton have a retrograde orbit? In fact, it is the only large moon with such an orbit in the solar system. Smaller, irregular moons have retrograde orbits that can be explained by collision events and by dispersed impact ejecta.

Triton like all the other KBOs is thought to be of primordial origin and supposedly formed inside the prograde-rotation of the proto-star disk. How does Triton's orbital direction become reversed? The simple answer is that Triton's direction was never reversed. It always had this orbital direction when it was captured in the outskirts of the solar system sometime within its 4.5 billion years of operation. This piece of data is direct proof that sizable bodies such as KBOs can be independent of the early proto-star disk formation. Isotopic data for Triton would be important for confirming this conclusion.

A KBO can be captured from either orbital direction, but it must have certain velocity vectors that are close to the combination of the Sun's velocity vector and a velocity vector close to the planetary system's invariable plane. Anomalous conditions such as Triton's retrograde orbit provide opportunities to more deeply analyze the solar system formation without being constrained by the mental block of the nebular hypothesis.

J. Spots on the Giant Planets

Thoughts about the giant spots on the giant planets are rather speculative. However, brainstorming reasons for these spots can lead to a very spectacular and frightening storyline. Currently, there is no known reason for the coloring of spots such as the reddish color of Jupiter's Great Red Spot (GRS). As of 2008 no comprehensive theory of the dynamics of the Jovian atmosphere, which is the most studied, has been developed. Hence, no reasons have come forth regarding the origin and persistence of large vortices such as the GRS or the Great Dark Spot on Neptune. So let's pick a reason and run with it. Let's pick a likely candidate, collisions.

Comet Shoemaker-Levy 9 (SL9) of 1994 [aaa] clearly demonstrated that impacts are occurring on the outer planets till this very time. Other impact sites were discovered on July 19, 2009, leaving behind a black spot similar in size to Jupiter's Oval BA; and on June 3, 2010, another smaller impact occurred. Other spots called storm vortices have occurred suddenly on the other outer planets in the recent past. Possibly these spots were produced on the opposite side by collisions that were hidden from the view of telescopes. The visible scars from SL9 lasted several months and were more prominent than the GRS for a given amount of time. Could the longer lived white spots and the GRS be the result of much larger objects crashing into Jupiter?

A new hypothesis is proposed by this journal and is called the "Persistent Storm Vortices (PSV) Hypothesis". Any storm vortices that persists for hours to centuries, is rather stationary both latitudinally and longitudinally with respect to the surrounding cloud cover of zones and belts, and is noticeable with ground telescopes is the result of a collision of some interplanetary object, most likely an asteroid or a comet. The size and amount of persistence is relative to its final core size after initial break-up, the composition of the remaining core, its impact velocity, and its angle of impact. All these factors can add toward the impact object's core penetrating deeply into the troposphere and beyond into the liquid hydrogen mantle starting at about 1000 km below the top of Jupiter's clouds.

The impactor's core ends up floating at some depth within the liquid hydrogen but close enough to the troposphere boundary to affect the cloud cover and create cyclonic or anti-cyclonic vortices. These vortices or ovals are held in place by the various zones or belts of latitudinal clouds that vary with wind speeds due to atmospheric upwelling and downwelling. These belts or zones maintain their latitudinal distances with little variance; hence, these global bands of storms help to maintain spots within a very tight latitudinal range. The winds along latitudinal lanes do move the impactor core longitudinally but very slowly due to the liquid hydrogen and high pressures holding the impactor core in one place. For instance, the GRS has lapped Jupiter at least 10 times since the early 19^{th} century. [bbb]

Of course, this new hypothesis must explain the unusual behavior of the spot, Oval BA, on Jupiter. Three individual white oval storms joined to form the larger Oval BA. These white storms are traced to 1939 when the South Temperate Zone (STZ) split into three identifiable dark sections. The sections eventually moved northward and embedded themselves within the South Temperate Belt (STB), shrunk to cover almost 90^0 of longitude, and then created three white ovals. In 1998 two of the ovals joined and in 2000 the remaining two ovals joined to form Oval BA within the STB. [bbb]

This unusual scenario can be explained by a large falling body that broke primarily into three large chunks that then became embedded and floated on a sea of liquid hydrogen within the very stable STZ, but sufficiently close to the boundary with the STB to be eventually spun due to agitation of the nearby GRS and moved into the adjacent band. As the broken chunks became more eroded and rounded they slowly moved longitudinally closer together finally joining the slower, larger chunk. Hence, Oval BA was born.

The impactor core creating the GRS is obviously eroding as is evidenced by the GRS's shrinking size. The materials of the impactor core chemically react with the surrounding atmosphere of H_20, NH_4HS, and NH_3 deep inside the troposphere layer at about 10^6 Pa pressure and 400° K. to give the spot a reddish color. Over the history of the GRS its color varied becoming more subdued during certain spans of time. [ccc] Very possibly as the core impactor slowly eroded different core materials were uncovered causing different chemical reactions and coloring.

The white ovals and other white storms occur in the lightly colored zones where ammonia concentration is higher which leads to denser clouds of ammonia ice at higher altitudes, which in turn lead to their lighter color. Higher altitude clouds that make white storms can also occur in the dark belts. The color of spots is due to either the impactor falling in a lightly color zone or a relatively dark belt; or due to the chemical reactions that may occur between an intact impactor core and the materials in the surrounding troposphere.

This hypothesis does lead to thinking about various exciting laboratory experiments:

1. Can an oval storm be produced by a protruding object blocking parallel wind currents that have a similar atmospheric vertical structure as is found on Jupiter?
2. Can the known elements and compounds in Jupiter's troposphere be chemically combined with known materials of asteroids and comets to produce a reddish color at the known temperature and pressure of Jupiter's topmost cloud cover?
3. Can a hypothetical core of a large asteroid or comet float on top of liquid hydrogen at a pressure of 10^5 pascals and a temperature of 400° K.?

The spots of the outer giant planets are truly solar system anomalies and an enigma for planetary and atmospheric scientists. The previous suggested PSV hypothesis comes from inductive reasoning especially after watching the SL9 comet that broke-up and fell into Jupiter. People on Earth were possibly watching what their own demise or Revelation will look like. There is some solace in thinking that Jupiter along with the other giants is the solar system's vacuum cleaner and the Great Protectors of Earth. However, many comets do find their way into the inner solar system and astronomers are now plotting over a 100 significant asteroids that cross Earth's orbit with some passing closer than the Moon.

K. Unusual Geological Features of Mars

These journals suggest that the Martian surface features are created in the aftermath of Gaia's (Earth's) collision with a major impactor during the Late Heavy Bombardment. Gaia accompanied with collisional debris and possibly a small original satellite was knocked inward and crossed the Martian orbit on its way to sharing an orbit with the existing Moon. Some of this debris and/or a Gaia satellite struck Mars and also possibly became the two irregular Martian moons. This postulation is backed by NASA's findings that relate dating of the LHB on the Moon at 3.9 bya to impact sites on Mars; the Moon's craters are comparable to the craters found on Mars utilizing a method called "crater counting". [ddd]

The EMM hypothesis claims that impacts on Mars during the LHB created its anomalous surface features in a similar manner as happened on Earth. Among its superlative solar system features are the largest volcano in the solar system, Olympus Mons, along with three other nearby major volcanoes. The Martian surface also has the largest canyon, Valles Marineris, which is almost a straight crack 3000 km long. [eee] The Hellas impact basin on the opposite side from the volcanoes is one of largest impact basins in the solar system. [fff] The major geological question deals with the anomalous swelling of the Martian Tharsis plateau [ggg] that is revealed very well on NASA's Mars MOLA map. [hhh]

These conditions have no relative comparison in the solar system. But after careful study of the MOLA map a most certain scenario is painted. Obviously, a large impactor struck Mars creating the Hellas impact basin. The impactor was much harder than the mostly youthful, molten Mars. The impactor penetrated the already differentiated crust and the molten interior. A combination of ejecta returning to the surface from the impact and the displacement and expulsion of molten mantle material created the highlands of the southern hemisphere. The smooth Borealis basin in the northern hemisphere [iii] is the original differentiated curst, although it is postulated to be even a larger impact basin. Any impactor that could have created such a basin would have destroyed the planet. Most of the ejecta did not reach escape velocity and over a period of time fell back creating the other numerous, but smaller impact craters seen in the southern hemisphere.

The major Martian impactor was an ice ball composed mostly of CO_2 and water with possibly a small rocky/iron core. The composition is very likely after considering the power law of comparative compositions and sizes of solar system bodies. As already postulated a substantial amount of the impactor due to the resulting restitution coefficient penetrated the Martian mantle and traveled almost 1/3 to ½ of the distance through most of the very liquid mantle and core. The ices would, of course, gasify and almost immediately begin to differentiate and rise to the surface of the planet mostly on the opposite side. These gases mixed with its small core of iron and sulfides and partially some of the stripped Martian core. Then the volatile materials became trapped under the existing crust on the opposite side of the planet from the impact location. This entrapment of the lighter volatiles bulged the crust to create the Tharsis plateau.

Fissures in the crust created volcanic activity that released the CO_2 and water into the atmosphere along with iron and sulfides to produce the atmosphere and orange color of the Martian surface. The volcanic action efficiently released the volatiles from underneath the crust thereby causing a dramatic collapse of the crust. This collapse created the largest canyon in the solar system. There is no better way to explain all the Martian surface features except in this way. Hence, there is now an explanation for the major Martian mystery of the unusually elevated Tharsis plateau.

XI. Conclusions

The CSP model provides solutions to most of the solar system anomalies and enigmas whereas the nebular hypothesis along with the Nice Theory is only a patchwork of ideas that does not have congruent and connecting answers for most of solar system's mysteries. A list of the more important mysteries or enigmas resolved by the CSP, but not adequately by the nebular hypothesis follow.

A. Enigmas Resolved by the CSP Hypothesis

1. How single and multi-star systems occur along with their planets.
2. Why Kepler's Third Law gives the correlation between orbital radii and periods of planets.
3. How a single star system has most of its angular momentum residing in its planets.
4. Why outer solar system bodies accreted enough higher metals to have iron cores.
5. How the outer gas and ice giants were able to accrete enough materials within the normal lifetime of a proto-star disk.
6. Why outer solar system materials show formation under very high temperatures.
7. Why the compositions and ages of planets need not match the composition of the parent star or its proto-star disk or its satellites.
8. Why the Titius-Bode Law does occur for the Sun's planets and is common to all single star systems; and, why each orbit defined by this law is generally occupied. What this law really represents in mathematical terms.
9. How a star and its planets have both aligned orbits and spins.
10. Why rogue and minor planets exist that caused the solar system's anomalous conditions including the collision that created synchronized orbits of the Earth and Moon.
11. How a very plausible explanation is presented for the solar system's Late Heavy Bombardment (LHB) period.
12. Why there are periods of Great Dying on Earth.

B. Periods of Great Dying on Earth

These periods are well shown by a Wikipedia file, Extinction_Intensity.png. [jjj] This figure shows the fraction of marine genera that are present in certain intervals of time but not existing in the following intervals for the past 550 million years. *The data is taken from Rohde & Muller (2005 Supplementary Material), based on* the Sepkoski's *Compendium of Marine Fossil Animal Genera (2002).*[kkk] Marine genera are easily preserved and are more consistent as fossils. The figure indicates periods of great dying occur every 10 to 40 million years from the beginning of the Cambrian Period about 540 million years ago.

Another Wikipedia file, Phanerozoic Biodiversity.png [lll] which shows all genera for the Phanerozoic Eon indicates periods of dying, but not as dramatically. This figure demonstrates the so-called "Big Five" extinctions that occurred 445, 375, 254, 203, and 65.5 million years ago (mya). The better known K-T or K-Pg extinction event that occurred 65.5 mya and ended the age of the dinosaurs was caused by a large impact or several impacts that aggravated climatic changes and increased volcanic activity.

Since the K-T boundary with its discovery of an iridium layer known to exist in meteorites and since the break-up and collision of the Shoemaker-Levy 9 comet with Jupiter, these extinction events are popularly thought to be caused by celestial events, especially asteroid/comet impacts with Earth. These major impacts and cluster of impacts could easily have been the cause of large scale mass extinctions. Impacts can easily cause climatic changes by creating atmospheric dust that either shields the radiation of the Sun to cool the Earth's surface or create a greenhouse effect that overheats the surface. These effects in turn can affect sea level and glacial periods. Geological effects created internally can accelerate volcanism and increase continental drift with its related tectonic activity. This increased volcanism, in turn, pours more dust and/or greenhouse gases into the atmosphere.

Other possible, but more unlikely, causes of extinction events are large swings in releases of radiation energy from the Sun, periodic volcanism from purely internal changes of the Earth's mantle and crustal interface, and extreme gamma ray radiation from nearby supernova explosions as the Sun orbits the galaxy. The regular periodicity of these extinction events from the above referenced figures begs for some cause that has a more natural frequency of every 10 to 40 million years. The probability of Earth as an inner planet sweeping up a large asteroid or cluster of asteroids that were left behind after the planets formed and found their respective orbits is such a cause. These smaller objects are continually perturbed by the other planets over billions of years into changing their highly elliptical and inclined orbits causing possible close encounters and collisions.

Another idea is that a large planet with its own satellites or a undetectable brown dwarf with its own planets are orbiting the Sun taking thousands of years for each extremely, elongated, elliptical orbit. This idea has less appeal since the frequency of collision events should be a lot less than 10 to 40 million years.

The fossil record does not reveal itself for much over 500 million years. Before that time the Earth was surely getting pelted with asteroids of various sizes but the continuing tectonic plate movement and wasting of continents removed any older fossil record. Also, life forms were smaller and less robust making fossilization difficult both to create and detect.

Enormous bombardments of Earth as recently as 1.8 billion years ago matches the story told by tiny impact spherules formed after giant impacts ejected plumes of vaporized rock. The size of asteroids can be estimated by determining the thickness of spherule layers. These layers linger long after the craters have been erased by tectonic activity. The dating of these spherules suggests a gradual decline of impact activity from the end of the LHB period ending about 3.7 bya and another decline rate after 1.8 bya. [mmm]

The fossil records with their long span extinction events all point to corroborating the CSP hypothesis. The CSP claims that while the planetary orbits were being filled during the formation of the solar system, collisions of medium size objects, preferably called planetoids, with planets occurred. These collisions invariably created all the irregularly shaped bodies that man calls asteroids, comets and irregular satellites. These smaller denizens of the solar system either continue to orbit the Sun being constantly perturbed by other planets, collide or join each other, fall into the Sun, are captured as satellites, or are swept up by the planets and their satellites. This process of sweeping up collision debris continues but lessens over the life of the solar system. Any ejecta of collisions created during the lifetime of a planet that escapes its gravity field generally creates an orbit that eventually returns close to its origin unless perturbed by other planets.

The huge outer planets certainly decrease but never eliminate the chances of terrestrial planets still having collisions over time. It is known that Jupiter's gravity field corrals a majority of asteroids and comets around 5.2 AU. Jupiter also maintains the average orbiting distance of the Main Belt of asteroids at around 2.7 AU via resonances and perturbations. Let's not forget Earth's large Moon that can aid in sweeping up or perturbing space marauders from hitting Earth. From dating Moon mares and from crater counter, it appears that the Moon is doing its job as one of Earth's protectors.

As early as 11,500 years ago some catastrophic event occurred to change Earth. The event ended Earth's last glacial period of the current ice age. This event is given the name of Younger Dryas Period. [nnn] It also ended the lives of the wooly mammoth and the saber-tooth tiger. A baby wooly mammoth is preserved in a natural history museum in Saint Petersburg, Russia. It was "freeze-dried" by some very extreme weather condition with daisies in its mouth. This journal will take a swing at a guess of what happened. Earth had a close encounter with a very larger planetoid; their magnetic moments briefly locked and tugged on Earth's crust/mantle combination and displaced it by a 10 or 15 degrees from its liquid and solid core. This phenomenon led to re-adjusting the oblateness of Earth's surface and climatic condition with a sudden severity. The main artifact of this event is the difference between the Earth's spin axis and the magnetic dipole axis which is offset and slowly migrating toward the spins axis poles. This journal is not supporting partial pole shift, but only grasping for a likable guess. You are welcome to choose your own guess, too. Nevertheless, if mankind was developing a civilization at that time, it got clobbered. Civilizations did start possibly a second or more times about 8000 years ago in one place called the "cradle of civilization". Archeologists do not freely admit, but this one early regional starting point of mankind is a major mystery.

Mankind's longevity was until recent times measured by how much longer the Sun can fuse hydrogen which is a few more billion years. But knowledge gained about all the flying debris within the inner solar system and more planetoids coming from the solar system's perimeter greatly increases our chances of a major impact event occurring on Earth. The fossil record has shown great periods of dying every 15 to 40 million years. Our demise could as well be tomorrow, the next day, the next month, or the next year as opposed to a few billion years.

We need to wake up and build a "gravity machine" that can be transported to any asteroid or comet that is threatening our existence. This grand machine would divert its path away from the ecliptic plane and into interstellar space never to be heard from again. Man needs to embark on this required space mission now to assure his longevity.

The Earth has been pummeled ever since it found an orbit around the Sun. Earth will continue to be pummeled because that is the nature of our solar system. Hopefully, the span of time between now and the next major collision(s) is thousands if not millions of years long. The longevity of mankind has until recently been measured by the remaining 4 to 6 billion years that our Sun will supply adequate radiation. Actually, the life of our Sun does not even enter the equation that determines man's longevity. Our extinction is very likely determined as for all other animal life in the past when the planet is struck by a huge asteroid/comet. There is a remote chance that some supernova will occur next door to the Sun's orbit that could destroy all life on Earth, but that would be like winning the lottery which is an extremely high probability.

There is more to say about our ultimate revelation. Let's amuse ourselves and pretend that mankind had several other advanced civilizations that were totally wiped out by asteroid strikes. All traces of earlier civilizations were removed due to continental wasting. Each time man and his other animal brothers rise from the ashes he must begin all over again from a very primitive status with almost zero knowledge of what had been learned in the past. But, this time man realizes his fate and prepares for it. Man builds hardened "Asteroid Shelters" in various parts of the globe as insurance against such apocryphal disaster. These shelters are located at various latitudes, longitudes, on high mountains, on polar ice caps, beneath the ocean surface and are designed to protect the inhabitants against major flooding, volcanism, earthquakes, and long dramatic climatic changes. These shelters are equipped like a small city with power, water, food, and domesticated animals to be sustainable for at least 10 years. The people represent each major race. Their libraries possess all the present knowledge available; electronic memories and communications are protected from external, severe magnetic storms.

Several of these "Asteroid Shelters" may survive the onslaught of impacts, crustal upheavals, flooding, and severe sea level changes, and other destructive aftermath effects. The people of these surviving cities could then carry on man's pursuit for more knowledge and learning, thereby expanding Creation's consciousness, without having to start over again as a primitive primate. Only two sovereignties exist which are spaceship Earth and mankind's combined, growing knowledge. This project of "Asteroid Shelters" can bring all the races and ethnic groups together to pursue one common good and defeat man's only other enemy, besides fate, which is the Devil. The Devil, that pulls men apart and befuddles our species, can be defeated. A common goal is now identified that all mankind together can focus on.

XII. Endnotes

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