The Origin of Binary Stars

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Introduction

The book of Genesis tells us that the stars were created by God on day 4 of the creation week [Genesis 1:14-19]. The evolutionist theories have many unsolved problems. The origin of Binary and Multiple star systems is powerful evidence for design on the same scale as the origin of the DNA molecule or the origin of sight. Creationist astronomer Sir William Hershel [1802] was the first astronomer to make mention of them:

"If, on the contrary, two stars should really be situated very near each other, and at the same time so far insulated as not to be materially affected by the attractions of neighbouring stars, they will then compose a separate system, and remain united by the bond of their own mutual gravitation towards each other. This should be called a real double star; and any two stars that are thus mutually connected, form the binary sidereal system which we are now to consider." [1]

Frequency In The Milky Way Galaxy

According to current estimates over 50 percent of stars in the galaxy are in binary or multiple [three or more] systems. If we accept that there are a trillion [million million] stars in the galaxy, that would mean over 500 billion stars are in such configurations. If we include binary or multiple systems other known galaxies the number of them would be in the countless trillions.

“Triple star systems are believed to be very common.” [2]

“It is well known that the majority of main-sequence stars are in binary systems.” [3]

According to this article 15 to 25 percent of stars are in systems containing three or more stars. That would mean that over 250 billion stars in our galaxy alone:

“They are frequent, 0.15-0.25 of all stellar systems.” [4]

“Most stars in our Galaxy are binaries.” [5]

“Stars are known to have a binary frequency in excess of 50 per cent, both in the field and in clusters. For pre-main-sequence stars this frequency seems to be even higher.” [6]

If these systems [7-17] cannot form by chance, then their existence is powerful evidence for creationism.

Formation Problems

Evolutionists believe that binary stars are the product of the Big Bang explosion and random evolution. They currently admit that there is no consensus as to how they formed:

Binary Stars

“The formation of binary stars remains a subject of active research and debate.” [18]

“There are two primary reasons for this lack of predictive power. First, the results of fragmentation calculations depend sensitively on the initial conditions, which are poorly constrained. The second problem is that of accretion.” [21]

“The relative frequency of stable hierarchies in our simulations is generally comparable to those observed in MSC, but with some notable exceptions.” [22]

"Even if every disc undergoes an interaction, as might happen during dynamically triggered star formation, then the capture rate is extremely low unless the stars initially have a very low velocity dispersion." [23]

"The magnitude of the energy transfer calculated in our simulations is greater than that of the binding energy of material exterior to periastron by a factor of two in the prograde case, and up to a factor of five in the case of the retrograde encounter. The destructive nature of the encounters indicates that a non linear treatment is essential in all but the most distant encounters." [24]

"With the currently available limited sample we are having problems constraining the evolutionary parameters." [26]

"The question of binary star formation is now regarded as the central unsolved issue in star formation, given the observational evidence that the majority of stars are in binary systems both during the main sequence (e. g. Duquennoy and Mayor 1991, Fischer and Marcy 1992, Abt 1983) and pre main sequence stages" [50]

Short Period Binary Stars

"We have no idea how short period binaries with periods much shorter than 3–5 days form. In fact, such binaries, particularly those with periods shorter than 1 day, should not exist: indeed, even if some unknown process formed contact binaries at the T Tauri stage, the relatively large sizes of the component stars would imply that the resulting orbital periods be longer than about 3–5 days." [19]

"The formation of close (1 AU), or even spectroscopic binaries (< 1 AU), which contribute a significant fraction to the observed binary populations, is less clear." [34]

"Forming close binary stars systems, is difficult even amongst lower-mass stars." [42]

"The formation of close binary stellar systems is an as yet unsolved problem in the field of star formation." [41]

"The interplay between stellar dynamics and stellar evolution, as external and internal factors modifying the binary properties, is highly complex, and many details of these processes are not well understood" [33]

"The available cloud-collapse calculations have not been able to reproduce the wide range of observed periods and, in particular, do not lead to short-period ($P<10^3$ days) systems." [47]

Multiple Star Systems

"Formation of binary and multiple stars is a subject of active research and debate, still remaining one of the major unsolved issues." [20]

"A comprehensive theory of binary star formation is still lacking, including explanations for the observed statistical properties of binary and multiple systems – such as multiplicity fractions, periods, eccentricities and mass ratios." [34]

Binary Pulsar Systems

"There are a comparable number of double neutron star systems compared to isolated recycled pulsars. We find that standard evolutionary models cannot explain this fact, predicting several times the number of isolated recycled pulsars than those in double neutron star systems." [25]

"The main problem arises from the fact that the pulsar's magnetic field needs to be quenched without a significant spin-up. Possibly our understanding of the accretion physics is incomplete and future studies could solve the problem with spinning up those mildly recycled pulsars." [26]

"How the spiral-in of the neutron star in the common envelope goes in detail is not known, and more extensive calculations are needed to pin this down." [27]

"We do not know whether the neutron star in spiral-in tidally disrupts the core, or whether it merges with the core, before or after turning into a black hole, etc. However, it is clear that essentially no neutron stars survive the spiral-in." [27]

"Our arguments may suggest that in the standard evolutionary model for, e.g., PSR 0655 + 64 the neutron star would not survive a common envelope with the companion star, as the latter evolved."

"Our calculations and estimates suggest that the standard scenario for forming binary pulsars, in which the neutron star from the first explosion spirals in through the hydrogen envelope of the secondary, does not, in general, work." [27]

According to two different articles the gas cloud accretion theory is flawed. [28, 29]

"Unfortunately, the current state of theoretical models falls short of the present and upcoming data. At the root of the theoretical difficulties is the range of extreme physical conditions encountered in many of the observed systems: high magnetic fields, angular momentum, degenerate matter, neutrino effects, etc." [30]

"That the merging rates derived from evolutionary calculations are higher, by two orders of magnitude, than those based on binary pulsar statistics only." [31]

"We wish to answer the question of why estimations of merging rates obtained from pulsar statistics are systematically less, by two orders of magnitude, than those obtained from evolutionary calculations." [31]

"We repeat, however, that the Maxwellian kick velocity distribution would be in strong disagreement with binary pulsar fractions even at low kick velocities." [31]

Massive Binary Stars

"The formation of massive stars is one of the major unsolved problems in stellar astrophysics. However, only few if any of these are found as single stars, on average massive stars have more than one companion." [32]

"The third problem is that the formation of massive binaries seems to require an extreme fine tuning, especially in terms of the impact parameter." [32]

"Therefore, disk fragmentation cannot yield nearly equal mass spectroscopic binaries which are so prevalent among the observed massive binaries. Also, disk fragmentation produces only wide binaries, of order 10 - 100 AU, comparable to the radial disk extent." [32]

"The second problem with this model is the difficulty to first promote and then to avoid stellar mergers." [32]

Massive Stars

"The birth of massive stars remains one of the outstanding problems in star formation." [35]

"The origin of the initial mass function (IMF) has been extensively debated in the literature." [35]

"There are currently two competing ideas as to how massive stars form." [40]

"The formation of high-mass stars is a large unknown in modern astronomy." [42]

"Despite this importance, massive star formation is a poorly understood process. Observational studies are hampered by the distance to massive star-forming regions, and the high degree of obscuration in such regions. From a theoretical point of view, the very existence of massive stars presents a challenge." [48]

"Unfortunately, numerical simulations of the growth of the bar mode into the non linear regime have repeatedly shown that fission does not occur for compressible fluids such as stars." [51]

"In terms of forming close binaries, star-disk capture is unlikely to play a large role as the capture cross section is the disk size and thus would generally result in binaries of 100 AU." [51]

"The remaining capture mechanism, tidal capture, also requires high stellar density which is unlikely to be a general occurrence." [51]

"However, the fragmentation hypothesis, and in particular the numerical calculations which support it, also have a number of problems." [52]

No Category

"However, a quantitative prediction of the star formation rate and the initial distribution of stellar masses remains elusive."[36]

"The process of star formation, particularly the origin of the stellar initial mass function (IMF), is a fundamental problem in astrophysics."[37]

The binary-star problem is thus potentially worse in less dense clusters, because binary systems survive for longer."[38]

"The comparison with observational data also illustrates two problems with the simulation results."[43]

"We can hope that various uncertainties in the model may be clarified by a careful comparison of the models with such observed quantities as rotation periods."[44]

"Not only do we have to guess more initial quantities, including spin periods and eccentricity as well, but we also have considerable uncertainty in the coefficients governing the tidal friction and dynamo models."[44]
"Most stars – especially young stars – are observed to be in multiple systems. Dynamical evolution is unable to pair stars efficiently, which leads to the conclusion that star-forming cores must usually fragment into ≥2 stars."[45]

"It has been shown that it is not possible to reproduce the observed f_{mult} through the dynamical evolution of star clusters that are born with a single-star population. Dynamical interactions are able to disrupt many wide binaries, but are not able to pair stars efficiently or significantly change the properties of close binaries. This leads us to the conclusion that the majority of stars must form in multiple systems."[45]

"The generally high f_{mult} for pre-main sequence late-type stars uncovers an elementary discrepancy between observation and star-formation theory if cloud cores produce N > 3 stars."[45]

"These conclusions place strong constraints on theories of star formation. For any theory of star formation to match observations the majority of cores *must* fragment into multiple objects. However, they can usually only fragment into 2 or 3 stars. The currently available theoretical results appear to be inconsistent with this, as the cloud-core fragmentation calculations typically form $N = 5-10$ fragments per core."[45]

"The observational result that poses the greatest challenge to theory is that both the inferred delay time between cloud formation and star formation and the ages of the young stars present can be considerably smaller than the lateral crossing time or dynamical time of the star formation region, suggesting that some kind of external 'triggering' must be involved."[46]

"Another important constraint casting doubt on the possibility of planet formation by GI even at 100 AU comes from comparing observed masses of extrasolar giant planets."[49]

"We have shown that disks capable of producing giant planets by GI at 1 AU cannot exist on dynamical grounds—to cool efficiently, they must be too hot to be bound to the central star. This rules out the possibility of an in situ formation of close-in extrasolar giant planets by GI."[49]

Short Period Binary Stars

According to current calculations, if binary or multiple systems formed by chance they should have very wide orbits with very long periods [19, 32, 34, 41, 42, 47, 51]. In close orbits with short orbital periods [Less than a week] would be the exception and not the rule. They should not even exist. When we download catalogues [61-68] off the internet and look at the statistics we see that between 35 to 100 percent of binary stars have orbits between one to six days long. That supports creation not evolution.

1. Binary Star Periods

Catalogue	Days	< 1	1	2	3	4	5	6	Total
Bondarenko	Quantity	61	28	3	3	2		1	
53	Percent	61%	28%	3%	3%	2%		1%	98%
Brancewicz	Quantity	289	236	169	102	68	31	30	
54	Percent	28%	23%	16%	10%	6%	3%	3%	88%
Svechnikov	Quantity	1097	921	624	394	209	135	85	
55	Percent	29%	24%	16%	10%	6%	4%	2%	91%
Chara	Quantity	188	137	157	124	95	80	66	
56	Percent	8%	6%	7%	6%	4%	4%	3%	38%
Pourbaix	Quantity	419	188	219	171	133	111	84	
57	Percent	11%	5%	6%	5%	4%	3%	2%	35%
Pribulla	Quantity	351	10						
58	Percent	97%	3%						100%
Csizmadia	Quantity	151			5	1		1	
59	Percent	95%			3%	1%		1%	99%
Bulut	Quantity	1	19	18	19	10	11	10	
60	Percent	1%	15%	15%	15%	8%	9%	8%	71%

Binary_Stars\Catalogue\Periods.xlsm

Binary Star Capture Probability

If we shrink the search area down to the size of Earth's surface area, what will be the surface area of the bullseye target? On average, the two sand grain size stars must both come within 276 centimetres of each other for capture to happen.

Imagine I hide a marble somewhere on Earth. What is the probability of a blind folded person throwing another marble and it lands within 276 centimetres of another marble? How long would it take on average before you get a bullseye. We take the average velocity of stars travelling through the galaxy at 100 kilometres per second. The circumference of the Earth is 40,000 kilometres. You can only throw the marble at 0.098 millimetres per second. [**Binary_Stars\Catalogue\Multiple.xlsm**] That is 35centi metres per hour!

To find the average distance between stars we divide the volume of the galaxy by the number of stars in the galaxy. We find the number of galactic cubic meters per star. We then use the formula for the volume of a sphere and rearrange that to get the radius of a sphere of equal volume. If we take D as the average distance between stars in the Milky Way galaxy where R as the radius of the galaxy in metres, n = number of stars and d = the depth of the galactic disk in metres

$$D = \sqrt[3]{\frac{(\pi d R^2) \div n}{4\pi \div 3}} \qquad \textbf{1}$$

If we imagine a star travelling through the galaxy and the orbital radius it is now in as part of a binary system is an imaginary bullseye. If there is an average distance of 4.3 light years between stars in our radius from the centre we can work out a target hit probability. If we take P as the Area Probability, D = distance between stars in the galaxy and r = Orbital distance between the binary pair

$$P = \frac{\pi D^2}{\pi r^2} \qquad \textbf{2}$$

If the capture chance is one in ten thousand [Formula 2] how long will it take to get one capture? If a star is moving through the galaxy at v metres per second the capture time will be:

$$T = \frac{\pi D^2}{\pi r^2} \times \frac{D}{v} \qquad 3$$

The time it takes to travel 4.3 light years, 10,000 times. We can arrange formula three to give:

$$T = \frac{\pi D^3}{v \pi r^2} \qquad 4$$

If A is the surface area of the Earth, the orbital cross section area P is thus

$$P_e = A \div [\frac{\pi D^2}{\pi r^2}] \qquad 5$$

The orbital cross section radius R is thus

$$R_e = \sqrt{\frac{A \div [\pi D^2 \div \pi r^2]}{\pi}} \qquad 6$$

How many binary systems with orbital radius r could form in ten billion years in our galaxy? There are approximately 10^{12} stars in the galaxy.

$$N = \left(\frac{\pi D^3}{a v \pi r^2}\right) \div 10^{12} \qquad 7$$

Where N equals the number of formations in 10 billion years and a equals the number of seconds in 10 billion years. A major problem with the origin of binary stars is that they are so close together. If we look at an online catalogue [61] it has 3,796 binary star systems. Below we can see the maximum and minimum orbital radius in the list. If we download a typical binary star catalogue and run the data through Microsoft Excel we get the following results:

Capture Statistics	Encounter Chance [1/x]	Bulls Eye Radius Centimetres	Search Time Billion Years	Formations In 10 Billion Years
Average Chance	104,144,851,942,942	276	1,342,539,161	92,189
Maximum Chance	38,269,219,128	6,521	493,331	7,103,386
Minimum Chance	1,461,534,648,750,770	33	18,840,753,673	759

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Astronomers believe 50% of stars in our galaxy are in binary systems. Since there are at least two stars in each system, that would mean at the most 250 billion. If we look at another catalogue [62] it has 62 binary star systems. Below we can see the maximum and minimum orbital radius in the list. If we run the data through Microsoft Excel we get the following results:

Capture Statistics	Encounter Chance [1/x]	Bulls Eye Radius Centimetres	Search Time Billion Years	Formations In 10 Billion Years
Average Chance	430,455,142,181,120	69	5,549,029,787	2,686
Maximum Chance	24,608,814,839,260	257	317,234,093	31,522
Minimum Chance	1,370,496,098,085,520	34	17,667,168,833	566

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If we look at another catalogue [63] it has 1,048 binary star systems. Below we can see the maximum and minimum orbital radius in the list. If we run the data through Microsoft Excel we get the following results:

Capture Statistics	Encounter Chance [1/x]	Bulls Eye Radius Centimetres	Search Time Billion Years	Formations In 10 Billion Years
Average Chance	87,923,927,586,909	467	1,133,433,999	830,133
Maximum Chance	3,463,710,241	21,674	493,331	223,959,398
Minimum Chance	1,067,790,162,373,420	39	18,840,753,673	726

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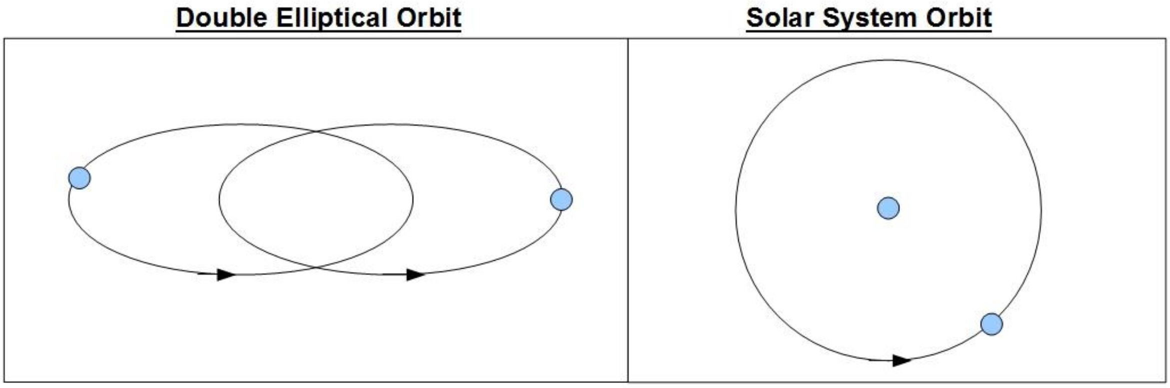
Since there are billions of such systems in our galaxy and trillions elsewhere, the probability of so many chance formation is zero. We know that binary stars spin on their axis. [64, 65] How wide would the accretion nebulae be for these stars? The two nebulas overlap each other? If this happened it would destroy the angular rotation of each star. As we can see the nebula would overlap each other and destroy each other's rotation. The fact that the stars spin on their axis shows that they did not form by accretion. The radius of a nebulae sphere is

$$R = \sqrt[3]{\frac{M \div p}{4\pi \div 3}} \quad 8$$

Where M equals the cloud mass in kilograms and p equals the density in kilograms per cubic metre.

The Double Ellipse Problem

Many binary stars are in a double ellipse orbital configuration [66-78]. If the binary system formed form a similar nebula to the one the Sun came from we would expect a similar orbital configuration. The nebular hypothesis for the formation of the Solar System [79-81] upholds a different mechanical system than the double ellipse could form from. A system forming form a typical rotating nebula would only have one rotational centre, not two.



The Formation Of Massive Binary Systems

According to current calculations, if binary or multiple systems formed by chance they should have very wide orbits with very long periods [19, 32, 34, 41, 42, 47, 51]. In close orbits with short orbital periods [Less than a week] would be the exception or not even exist at all. The formation of massive stars is also a major unsolved problem

"The problem of massive star formation (O & B stars with masses >8 M) still represents a challenge from both a theoretical and observational point of view." [82]

"Our current understanding of massive star-forming regions remains poor, despite their importance in the structure and evolution of galactic systems, due to their strong feedback." [83]

"The lack of a detailed, observationally based evolutionary sequence for massive young stellar objects (MYSOs) limits our understanding of the early stages of high mass (M >8 M⊙) star formation." [84]

“Although high-mass (> 8 M⊙) stars are clue pieces in the Universe and galaxy evolution, many questions remain open concerning their formation process. The root of the problem is that the Kelvin-Helmholtz timescale for a high-mass star is much shorter than the free-fall timescale of the natal core, and thus the star reaches the main-sequence while still accreting matter.” [85]

“The onset of massive star formation is not well understood because of observational and theoretical difficulties.” [86]

“The second drastic problem in the context of massive star formation is how to avoid fragmenting the massive cores in many objects.” [87]

“Though they are important, in the shaping and evolution of their host galaxies, the physics of the formation and evolution of massive stars is unclear.” [88]

“We identify a “supernova rate problem”: the measured cosmic core-collapse supernova rate is a factor of 2 smaller (with significance 2) than that predicted from the measured cosmic massive-star formation rate.” [89]

“The exact steps that lead to the formation of a high-mass star are not completely understood.” [90]

“The formation of massive stars is currently an unsolved problems in astrophysics.” [91]

When we download catalogues [92-117] off the internet and look at the statistics we see that there are many massive binary systems with very short orbits. This is a double problem that supports creation not evolution.

Stars	Mass A	Mass B	Radius A	Radius B	Orbital Radius	Orbital Period	Magazine
Name	Sun = 1	Sun = 1	Sun = 1	Sun = 1	Million Km's	Days	Reference
Dh Cephei	39	35	12.3	11.7	6	2	92
HD-152248	24.2	25.8			17	6	93
HD 199579	45	11			28	49	94
R136-38	56.9	23.4	9.3	6.4	26	3	95
R136-39	24.5	18.5	8.1	7.1	25	4	95
R136-42	39.9	32.3	7.4	6.7	23	3	95
R136-77	28.3	25.6	5.8	5.8	16	2	95
DN Cas	19.2	13.9	7.4	5.4	15	2	96
BD +60 497	11.1	8.6			19	4	96
HD 17505Aa	17.6	16.6			37	9	96
LH 54-425	53	32	11	9.7	21	2	97
V382 Cyg	37.3	26.3	10.1	8.4	15	2	98
TU Mus	23.5	15.8	6.8	5.5	10	1	98
HD 93205	31	13			24	6	99
CC Cassiopeiae	18.3	7.6	10.08	4.02	17	3	100
SMC 5-038089	19.1	17.1	6.1	6.1	14	2	101
SMC 5-202153	19.9	12.5	9.5	12.8	22	5	101
SMC 5-316725	17	8.9	6.1	7.7	14	3	101
SMC 6-077224	15.9	13.1	8.9	11.5	18	4	101
SMC 6-158118	16	7.9	7.6	7.4	14	3	101
SMC 6-215965	16	17.2	9.9	10.4	19	4	101
SMC 7-243913	18.6	10.5	8.2	8.3	15	3	101
SMC 9-175323	23.6	16.2	10.2	8.5	14	2	101
SMC 11-30116	14.3	7.7	7.4	8.1	15	3	101
SMC 11-57855	12.4	8.2	5.2	3.7	8	1	101
Cygnus-OB2-B17	60	45	22	19	33	4	102
WR20a	70.7	68.8	19.8	19.5	35	4	103
WR 140	54	20			2,244	2,899	104
WR 137	20	4.4			1,794	4,766	105
BAT99-129	24.6	15	7.1	3.4	7	3	106
WR 98	28	27			40	48	107
SMC WR7	34	18			26	20	108
V455 Cygni	5.5	14	7	9	31	9	109
HD 93205	31.5	13.3			10	6	110
EM Car	22.89	21.42	9.35	8.34	22	3	111
GL Car	13.5	13	4.99	4.74	15	2	112
QX Car	9.27	8.48	4.29	4.05	20	4	112
Y Cyg	17.57	17.04	5.93	5.78	19	3	112
V478 Cyg	16.6	16.3	7.43	7.43	18	3	112
HD 47129	86	72	21.5	13.8	38	14	112
HD 37366	13.8	10.5			34	32	112
HD 152219	18.6	7.3	11	5	6	4	113
NGC3603-A1	116	89			35	4	114
HD 37366	13.8	10.5			34	31	115

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The Formation Of Multiple Star Systems

Multiple star systems [Three or more per system] are much less likely to form than just doubles. If we have a quadruple system of two pairs, what is the formation probability? If pair one has an orbital radius of r_1 and pair two ahs an orbital radius of r_2 then

$$n_1 = 10^{12} \div \left(\frac{\pi D^3}{av\pi r_1^{\ 2}} \right) \quad \textbf{9}$$

n_1 = Number of formations in 10 billion years.
a = seconds in 10 billion years
D = Average distance between stars in the galaxy
r_1 = Orbital distance [Pair 1]
D_1 = Average distance between binary pairs (with r_1 orbital radius) in the galaxy

$$D_1 = \sqrt[3]{\frac{(\pi dR^2) \div n_1}{4\pi \div 3}} \quad \textbf{10}$$

R = The radius of the galactic disk in metres

$$n_2 = 10^{12} \div \left(\frac{\pi D^3}{av\pi r_2^{\ 2}} \right) \quad \textbf{11}$$

$$D_2 = \sqrt[3]{\frac{(\pi dR^2) \div n_2}{4\pi \div 3}} \quad \textbf{12}$$

D_2 = Average distance between binary pairs (with r_2 orbital radius) in the galaxy

$$P_1 = \frac{\pi D_1^{\ 2}}{\pi R_3^{\ 2}} \quad \textbf{13}$$

R_3 = Orbital distance between both binary pairs
P_1 = r_1 Area capture Probability

$$P_2 = \frac{\pi D_2^{\ 2}}{\pi R_3^{\ 2}} \quad \textbf{14}$$

P_2 = r_2 Area capture Probability
The formation time (seconds) will equal T.

$$T = \frac{R_3}{v} \times P_1 \times P_2 \quad \textbf{15}$$

The number of formations in ten billion years is N.

$$N = 10^{12} \div \left(\frac{T}{a} \right) \quad \textbf{16}$$

Even many triple systems are too complicated to have formed by chance in ten billion years. With triple systems the best you could get with all the stars in the galaxy racing around at 100 kilometres per second is just one system in 40 billion years. For Quadruple systems the best you could get is one system in 38,459 billion years. A sextuple system would take over on trillion trillion years to form.

Systems Name	Systems Type	Formation Time Billion Years
T Tauri	Triple System	38
BD 22-5866	Quadruple System	833,333,333,333
V819 Herculis	Triple System	8,333,333,333,333
88 TAU A	Quadruple System	129,870,129,870
HD_98800	Quadruple System	8,818,000
Mu Orionis	Quadruple System	66,944,638,377
O Andromedae	Quadruple System	38,459
Castor C	Sextuple System	1,873,527,606,064,580,000
SZ Herculis	Quadruple System	4,317,584

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Systems Name	Systems Type	Encounter Chance In 10 Billion Years [1/x]	Number of Formations In 10 Billion Years	Magazine Reference
T Tauri	Triple System	4.00E+12	0.26304	119
BD 22-5866	Quadruple System	8.00E+22	1.2E-11	120
V819 Herculis	Triple System	8.00E+23	1.2E-12	121, 122
88 TAU A	Quadruple System	1.00E+22	7.7E-11	123
HD_98800	Quadruple System	9.00E+17	1.13404E-06	124, 125, 126
Mu Orionis	Quadruple System	6.69446E+21	1.49377E-10	127
O Andromedae	Quadruple System	3.84588E+15	0.000260018	128
Castor C	Sextuple System	1.87353E+29	5.33752E-18	129, 130
SZ Herculis	Quadruple System	4.31758E+17	2.31611E-06	131

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If N is the probability and Z is the actual number formed what is the probability P of Z number forming?

$$P = \left(\frac{Z}{N}\right)! \qquad 17$$

The answer is the factorial of the number. If there are 50 million times too many, the answer is all the whole numbers from 1 to 50 million times each other! If 50% of stars are in binary/multiple systems and there is a trillion [132] stars in the local group alone, the probability of formation becomes less than a DNA molecule forming by chance.

How many sextuple systems in the Milky Way galaxy? There are 400 million stars in our galaxy [133]. 50 percent of stars are in binary systems and 25 percent of those are in multiple systems. This would approximate to 8 billion such systems.

$$S_x = \left(\frac{n \times 0.5 \times 0.25}{6}\right) \qquad 18$$

Systems	Systems	8 Billion Systems
Name	**Type**	**Formation Chance (10^{-x})**
T Tauri	Triple System	4,639,825,633
BD 22-5866	Quadruple System	87,366,550,032
V819 Herculis	Triple System	95,366,550,032
88 TAU A	Quadruple System	80,908,074,199
HD_98800	Quadruple System	47,562,960,759
Mu Orionis	Quadruple System	78,605,726,399
O Andromedae	Quadruple System	28,679,966,880
Castor C	Sextuple System	138,181,280,774
SZ Herculis	Quadruple System	45,081,926,540

Binary_Stars\Catalogues\Multiple.xlsm

If you type zeroes in Microsoft Word with Times New Roman font at size 10 [Zero margins] you can fit 8,687 zeros [119 per line] per page. One line in A4 paper format is 21 centimetres long. How long a sheet of paper [Kilometres] would you need to type this number on a single line?

$$L = 0.00021\left(\frac{P}{119}\right) \qquad 19$$

Systems	8 Billion Systems	Pages	Lines	Numbers Length
Name	**Formation Chance (10^{x})**	**A4 Size Paper**	**A4 Size Paper**	**Kilometres**
T Tauri	4,639,825,633	534,111	38,990,131	8,188
BD 22-5866	87,366,550,032	10,057,160	734,172,689	154,176
V819 Herculis	95,366,550,032	10,978,076	801,399,580	168,294
88 TAU A	80,908,074,199	9,313,696	679,899,783	142,779
HD_98800	47,562,960,759	5,475,188	399,688,746	83,935
Mu Orionis	78,605,726,399	9,048,662	660,552,323	138,716
O Andromedae	28,679,966,880	3,301,481	241,008,125	50,612
Castor C	138,181,280,774	15,906,674	1,161,187,233	243,849
SZ Herculis	45,081,926,540	5,189,585	378,839,719	79,556

Binary_Stars\Catalogues\Multiple.xlsm

The probability of 8 billion V819 Herculis type systems forming in our galaxy in ten billion years is 1 in ten to the power 96 billion! If you type zeroes in Microsoft Word with Times New Roman font at size 10 [Zero margins] you can fit 8,687 zeros [119 per line] per page. To type this number you would need 11 million pages of single sided A4 paper. Typed on one line would be over 168 thousand kilometres long!

Since 15% to 25% of all stellar systems [4] are like that that is a reasonable quantity. In the Local Group there are about 1.29 x 10^{12} stars [132]. The Andromeda Galaxy has an estimated one trillion stars [134]. The most massive galaxy found has 100 trillion stars [135, 136].

The Formation Of Binary Pulsars

With binary stars, they would have had such large accretion clouds in their original form that it would be impossible for them to have formed their axial rotational motion. The clouds would overlap and destroy each other's rotation. If evolution were true their angular momentum must have an entirely different origin to that of the Sun. The close proximity of these prevents this from being a possibility. If they were rotating clouds in the beginning they would have overlapping radius and destroyed each other's rotation.

A theory [137, 138] to circumvent this is the binary pulsar recycling theory. According to this theory the two stars do not form from massive stars and go through the supernova process but start off as stars the size of the Sun. For the system to have a stable orbit the inward gravitational force must equal the outward centripetal force. The gravitational force is given by the following formula:

$$F = \frac{GMm}{r^2} \qquad 20$$

F = Gravitational force
M = Parents mass, kilograms
G = Gravitational constant
m = Satellite's mass, kilograms
r = The distance between the centre of the both objects

The centripetal force [139] is given by the following formula:

$$f = \frac{mv^2}{r} \qquad 21$$

f = the centripetal force and v = the orbital velocity in metres per second.

$$f = \frac{m[(2\pi r)/T]^2}{r} \qquad 22$$

T = the orbital period in seconds. To have an orbit that obeys Kepler's Laws [140] the orbital period the orbital period will equal T.

$$T = \sqrt{\frac{4\pi^2 a^3}{G(M+m)}} \qquad 23$$

When we look at this theory we notice that the parent experiences a large and very rapid mass loss. This would make the whole system collapse. In the first scenario [138] the outward force becomes over three times stronger than the gravitational force.

Ratio Of Forces
Centripetal Vs Gravity
1
1
1
1
1
3.441342124
1
1

Binary_Stars\Double_Pulsars\Roche_Lobes.xlsm

In the second scenario [141] the outward force becomes nine times stronger than the gravitational force.

Ratio Of Forces
Centripetal Vs Gravity

1
1
1
1
1
9.674315266
1
1
1
1

Binary_Stars\Double_Pulsars\Roche_Lobes.xlsm

The fastest binary pulsar system [141] has two stars (0.5 and 0.2 solar masses) with an orbital period of 321 seconds. If we rearrange formula 23 we remove the square root sign:

$$T^2 = \frac{4\pi^2 a^3}{G(M+m)} \qquad \textbf{24}$$

We the isolate the semi major axis:

$$a^3 = \frac{G(M+m)T^2}{4\pi^2} \qquad \textbf{25}$$

The cubed root gives us the semi major axis:

$$a = \sqrt[3]{\frac{G(M+m)T^2}{4\pi^2}} \qquad \textbf{26}$$

Using these formulas [**Binary_Stars\Double_Pulsars\Pulsar_Capture.xlsm**] we find the orbital radius is 55 thousand kilometres. There are many binary pulsars [142] with in close orbits. This is evidence for creation. The binary pulsar J0737-3039 [143, 144] has two stars with masses greater than the Sun and an orbital radius of only 420 thousand kilometres. Since the orbit is only 2.4 hours long, it must be orbiting at over 300 kilometres per second.

Conclusion

The Genesis creation account in the Bible lines up perfectly with the scientific evidence of so many intricate systems being designed by God. As far as them forming by chance the probability is Zero. The close binary pulsars [144] are strong evidence for creation.

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