Evidence For Design In The Universe

from *Limits for the Universe* by Hugh Ross, Ph.D. in Astronomy

1	Gravitational coupling constant	If larger:	No stars less than 1.4 solar masses, hence short stellar life spans
		If smaller:	No stars more than 0.8 solar masses, hence no heavy element production
2	Strong nuclear force coupling constant	If larger:	No hydrogen; nuclei essential for life are unstable
		If smaller:	No elements other than hydrogen
3	Weak nuclear force coupling constant	If larger:	All hydrogen is converted to helium in the big bang, hence too much heavy elements
		If smaller:	No helium produced from big bang, hence not enough heavy elements
4	Electromagnetic coupling constant	If larger:	No chemical bonding; elements more massive than boron are unstable to fission
		If smaller:	No chemical bonding
5	Ratio of protons to electrons formation	If larger:	Electromagnetism dominates gravity preventing galaxy, star, and planet formation
		If smaller:	Electromagnetism dominates gravity preventing galaxy, star, and planet formation
6	Ratio of electron to proton mass	If larger:	No chemical bonding
		If smaller:	No chemical bonding
7	Expansion rate of the universe	If larger:	No galaxy formation
		If smaller:	Universe collapses prior to star formation
8	Entropy level of universe	If larger:	No star condensation within the proto-galaxies
		If smaller:	No proto-galaxy formation
9	Mass density of the universe	If larger:	Too much deuterium from big bang, hence stars burn too rapidly
		If smaller:	No helium from big bang, hence not enough heavy elements
10	Age of the universe	If older:	No solar-type stars in a stable burning phase in the right part of the galaxy
		If younger:	Solar-type stars in a stable burning phase would not yet have formed
11	Initial uniformity of radiation	If smoother:	Stars, star clusters, and galaxies would not have formed
		If coarser:	Universe by now would be mostly black holes and empty space
12	Average distance between stars	If larger:	Heavy element density too thin for rocky planet production
		If smaller:	Planetary orbits become destabilized
13	Solar luminosity	If increases too soon:	Runaway green house effect
		If increases too late:	Frozen oceans
14	Fine structure constant*	If larger:	No stars more than 0.7 solar masses
		If smaller:	No stars less then 1.8 solar masses
15	Decay rate of the proton	If greater:	Life would be exterminated by the release of radiation
		If smaller:	Insufficient matter in the universe for life
16	^{12}C to ^{16}O energy level ratio	If larger:	Insufficient oxygen
		If smaller:	Insufficient carbon

17	Decay rate of ^{8}Be	If slower:	Heavy element fusion would generate catastrophic explosions in all the stars
		If faster:	No element production beyond beryllium and, hence, no life chemistry possible
18	Mass difference between the neutron and the proton	If greater:	Protons would decay before stable nuclei could form
		If smaller:	Protons would decay before stable nuclei could form
19	Initial excess of nucleons over anti-nucleons	If greater:	Too much radiation for planets to form
		If smaller:	Not enough matter for galaxies or stars to form
20	Galaxy type	If too elliptical:	Star formation ceases before sufficient heavy element buildup for life chemistry
		If too irregular:	Radiation exposure on occasion is too severe and/or heavy elements for life chemistry are not available
21	Parent star distance from center of galaxy	If farther:	Quantity of heavy elements would be insufficient to make rocky planets
		If closer:	Stellar density and radiation would be too great
22	Number of stars in the planetary system	If more than one:	Tidal interactions would disrupt planetary orbits
		If less than one:	Heat produced would be insufficient for life
23	Parent star birth date	If more recent:	Star would not yet have reached stable burning phase
		If less recent:	Stellar system would not yet contain enough heavy elements
24	Parent star mass	If greater:	Luminosity would change too fast; star would burn too rapidly
		If less:	Range of distances appropriate for life would be too narrow; tidal forces would disrupt the rotational period for a planet of the right distance; uv radiation would be inadequate for plants to make sugars and oxygen
25	Parent star age	If older:	Luminosity of star would change too quickly
		If younger:	Luminosity of star would change too quickly
26	Parent star color	If redder:	Photosynthetic response would be insufficient
		If bluer:	Photosynthetic response would be insufficient
27	Supernovae eruptions	If too close:	Life on the planet would be exterminated
		If too far:	Not enough heavy element ashes for the formation of rocky planets
		If too infrequent:	Not enough heavy element ashes for the formation of rocky planets
		If too frequent:	Life on the planet would be exterminated
28	White dwarf binaries	If too few:	Insufficient fluorine produced for life chemistry to proceed
		If too many:	Disruption of planetary orbits from stellar density; life on the planet would be exterminated
29	Surface gravity (escape velocity)	If stronger:	Atmosphere would retain too much ammonia and methane
		If weaker:	Planet's atmosphere would lose too much water
30	Distance from parent star	If farther:	Planet would be too cool for a stable water cycle
		If closer:	Planet would be too warm for a stable water cycle
31	Inclination of orbit	If too great:	Temperature differences on the planet would be too extreme
32	Orbital eccentricity	If too great:	Seasonal temperature differences would be too extreme
33	Axial tilt	If greater:	Surface temperature differences would be too great
		If less:	Surface temperature differences would be too great

34	Rotation period	If longer:	Diurnal temperature differences would be too great
		If shorter:	Atmospheric wind velocities would be too great
35	Gravitational interaction with a moon	If greater:	Tidal effects on the oceans, atmosphere, and rotational period would be too severe
		If less:	Orbital obliquity changes would cause climatic instabilities
36	Magnetic field	If stronger:	Electromagnetic storms would be too severe
		If weaker:	Inadequate protection from hard stellar radiation
37	Thickness of crust	If thicker:	Too much oxygen would be transferred from the atmosphere to the crust
		If thinner:	Volcanic and tectonic activity would be too great
38	Albedo (ratio of reflected light to total amount falling on surface)	If greater:	Runaway ice age would develop
		If less:	Runaway green house effect would develop
39	Oxygen to nitrogen ratio in atmosphere	If larger:	Advanced life functions would proceed too quickly
		If smaller:	Advanced life functions would proceed too slowly
40	Carbon dioxide level in atmosphere	If greater:	Runaway greenhouse effect would develop
		If less:	Plants would not be able to maintain efficient photosynthesis
41	Water vapor level in atmosphere	If greater:	Runaway greenhouse effect would develop
		If less:	Rainfall would be too meager for advanced life on the land
42	Ozone level in atmosphere	If greater:	Surface temperatures would be too low
		If less	Surface temperatures would be too high; there would be too much uv radiation at the surface
43	Atmospheric electric discharge rate	If greater:	Too much fire destruction would occur
		If less:	Too little nitrogen would be fixed in the atmosphere
44	Oxygen quantity in atmosphere	If greater:	Plants and hydrocarbons would burn up too easily
		If less:	Advanced animals would have too little to breathe
45	Oceans to continents ratio	If greater:	Diversity and complexity of life-forms would be limited
		If smaller:	diversity and complexity of life-forms would be limited
46	Soil materializations	If too nutrient poor:	diversity and complexity of life-forms would be limited
		If too nutrient rich:	Diversity and complexity of life-forms would be limited
47	Seismic activity	If greater:	Too many life-forms would be destroyed
		If less:	Nutrients on ocean floors (from river runoff) would not be recycled to the continents through tectonic uplift
*(A function of three other fundamental constants, Planck's constant, the velocity of light, and the electron charge each of which, therefore, must be fine-tuned)			