

## The First Ten Million Millennia or So

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# THE FIRST TEN MILLION MILLENNIA OR SO

Don L. Anderson

In the "beginning," nothing

No time, no space, no matter.

No energy, no strings

nothing

not even a point, not even a void  
nothing

No laws of physics

no myths, no gods;

nothing, absolutely nothing

Then, a singularity . . .

Call it a bang, call it a Big Bang, call it light, call it God.

Perhaps a thought.

In the beginning, the Laws of Logic begat the Laws of Physics.

The rules.

From Nothing, expansion,

false vacuums, phase changes, beginning of time, and space.

Potential for something, Everything.

Energy, potential.

Waves, strings;

vibrating strings

monopoles, sheets, threads

webs.

From the void, chaos

out of vacuum, Genesis.

Condensation, knots,

cosmic freezing,

wrinkles in time, defects, domains,

Bubbles, foams. A detergent universe.

Strong force, weak force,

symmetry breaking; machos, wimps,

tubes of energy, gigantic loops.

A pasta universe.

Plasma mist, quarks, gluons, muons

nuclei, electrons

protons

collisions, bouncing

binding

Deuteronomy.

Add neutrons—

Tritium;

plus proton, Transmutation!

Helium 3, Alchemy.

Tritium swallows proton

Helium 4!

3 billion degrees or more.

A helium universe

three minutes gone.

Aeons more to go  
before the Rest.

A Quantum world. The Dreams that Stuff are made of.

4 minutes into it

mostly light, photons swarm; electrons,

positrons annihilate

positrons gone.

A proton-electron world  
of ghostly neutrinos and their anti's.

Lots of light, but no where to go; opaque.

Universe rests at helium,

but time goes on,

cooling the first millennium,

space expanding,

great attractors,

gravity.

Still opaque

300 000 years

3000 degrees

electrons and protons

hydrogen and photons

atoms

protons and electrons unite  
mate.



Create, annihilate

create, annihilate

cooling universe, changing color.

In the beginning, lurid gamma, off the spectral scale;  
shades to x-ray

fades to UV, then violet and blue

3000 degrees, yellow.

Visible matter, not the half of it,

dark matter, the cosmic glue . . .

dark invisible matter, holds the cosmos together

not baryonic

but what?

gravitino, photino, axion faith?

Invisible dark matter  
closes the universe  
gas and dust and that. Clumps.

Then, The Stellar Delivery Room  
The crucibles of elements, the "metals."  
Mostly nothing, a few dense spots,  
patches made of "less nothing"  
in a spider web of strings,  
galaxies  
clusters of galaxies,  
150 million years into it.

Translucency;  
light moves off.  
Dense clumps  
nebular womb  
globules  
embryos  
Star birth! Here and there.  
Condensing, collapsing, heating.

Hydrogen, helium fuse  
150 million years into it  
Matter everywhere, Energy (kinetic)  
Flat whirling disks  
Black holes  
The Whole Shebang  
Quasars  
Ellipticals  
Spirals

Space, flat and isotropic and clumpy,  
burning stars  
the Philosophers' Stones  
hydrogen coal to helium gas  
helium coal  
carbon coal  
coal coal  
real coal for middle-aged stars.

Silicon cores  
Finally, iron  
The end of the road.

Superstars  
Collapse, rebound  
Supernova!

All the rows and columns of Mendeleev's Table  
Periodic.  
Stable, unstable.  
Scattered to space.

The stuff of fable  
two millennia ago, at 3 BC  
a beacon in the east.

Cobalt, nickel, xenon  
strontium, platinum, uranium and the rest  
blasted to space  
Stuff of Stars.  
Building blocks of us

Movie Stars and railway cars  
blown to a distant eddy  
a new congealing gas-dust cloud,  
on the edge of a spiral,  
gravity attracts  
rotation shapes  
knots and eddies  
a central star seed  
ignites, lights  
driving off its dust.

A disk  
a gassy ring  
condensing, cooling  
Ice at edges.  
In bulbous middle  
gas balls grow,

The Giant Gods of Legend  
Jovial, Neptunian, Saturnalia.  
Uranian.



Fe and Ni to dense cores of embryo planets, proto Earth  
Then rocks, oxygen, silicon, aluminum  
A growing world,  
Dante's Inferno, layer by layer.

Earth emerges, Gaea  
Bright it gleams, molten,  
heated by energy within and without  
Uranus and Thor's Daughters,  
Alpha and Beta,  
And stoned by Jove and Oort,  
Pebbles from space.

A hot birth  
volatiles boiled off, gone  
blown away by sunlight  
rarely, giant impacts  
towering walls of ejected lava,  
liquid craters  
magma oceans  
Dante's nightmare  
violent rebirths, Begin again.

Time . . .  
cooling, congealing  
. . . heals all  
rafts of rock, floating under  
a moonless sky.  
a cinder, healing,  
a cooling lump.  
A lonely sky.

Another world, passing by  
Perturbed, no doubt, closes in  
smashes, crashes,  
splashes molten mantle to orbit.  
A moon made out of Earth  
drying out our planet,  
already bone dry.

All gases, long gone; never there.