A string theorist meets the fisherman's son

Second Edition
PDF Printing

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Abstract: Preface to the First Edition: Science is not done in a vacuum but rather in a historical and social context. This reflects mankind's acquisition and use of knowledge over time. I have embedded my science and technology works in a screenplay that puts them into some kind of context. Some people will only read the science, some will only read the technology, some will only read the screenplay and some will read all three. The screenplay would be a comedy if not for the tragic condition of the human species on this planet. The model I present is the simplest theory possible because there is only one particle in its elementary particle bestiary, of which everything in the universe is made. I have named that particle the O umlaut particle and will refer to it as the Ö particle. There are only two possibilities regarding modern physics. Either just about everything is understood or just about nothing is understood. If the twin paradigms of modern physics, Einstein's relativity theories and quantum mechanics, are wrong theories then nothing is understood today and modern physics collapses on itself like a house of cards. I am proposing that just about nothing is currently understood. [...]

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This work is still a solitary effort, without any help from anyone, so is somewhat unique in that regard. Therefore, I alone am responsible for both the content and any errors that still exist. If you have comments or suggestions I would be pleased to hear from you.

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Preface to the First Edition

Science is not done in a vacuum but rather in a historical and social context. This reflects mankind's acquisition and use of knowledge over time. I have embedded my science and technology works in a screenplay that puts them into some kind of context. Some people will only read the science, some will only read the technology, some will only read the screenplay and some will read all three. The screenplay would be a comedy if not for the tragic condition of the human species on this planet.

The model I present is the simplest theory possible because there is only one particle in its elementary particle bestiary, of which everything in the universe is made. I have named that particle the O umlaut particle and will refer to it as the Ö particle.

There are only two possibilities regarding modern physics. Either just about everything is understood or just about nothing is understood. If the twin paradigms of modern physics, Einstein's relativity theories and quantum mechanics, are wrong theories then nothing is understood today and modern physics collapses on itself like a house of cards. I am proposing that just about nothing is currently understood.

How can the twin foundations of modern physics be wrong when they explain all experiments? Experiments do not prove theories. All that can emerge from an experiment is that its interpretation is consistent with a theory. My Ö particle model interprets the same body of experimental evidence and explains all phenomena with a simple microscopic model, a fully mechanical elementary particle mechanism for all phenomena. I provide a proof of the entire theory by deriving the elementary quantum of charge from first principles using four fundamental constants – the speed of light, the electron mass, the Bohr radius and the fine structure constant. But my theory is very different than the existing theories. My theory can be understood by everyone over the age of ten or twelve and at a deep level by all adults. My theory makes common sense and is intuitively pleasing and self-evident.

What needs to be understood are electrons, protons and atoms. Electrons, protons and atoms give rise to eight fundamental phenomena: electric fields, magnetic fields, photon fields, gravity fields, covalent bonds, mechanical forces, electricity and electromagnetic radiation produced by electrical circuits. These eight phenomena are the fundamental set of phenomena in need of a microscopic mechanism and as far as I know that is the complete set of phenomena. These eight phenomena are exchange mechanisms between electrons, protons and atoms with each other and also with the surrounding fields. What they are exchanging is the Ö particle. The Ö particle is the quantum of mass. The Ö particle is in perpetual motion so also always possesses a quantum of momentum and quantum of kinetic energy. Mass, momentum and energy are simultaneous properties of the Ö particle. This is why $E = mc^2$. The quantum of energy the Ö particle always possesses is $e_\ddot{o} = 2.68138 \times 10^{-54} \, J$. In the exchange processes forces are produced on electrons, protons and atoms. In my model there are ten fundamental forces. These ten forces are the Arrow of Time, determining the change in motion, the time evolution, of electrons, protons and atoms. An accelerating force is a flow of Ö particles into electrons, protons and atoms. Since a force is a flow of the Ö particle and the Ö particle is the quantum of mass, momentum and energy a force is a flow of mass, momentum and energy into an electron, proton, atom or collection of atoms. This accounts in a simple way for Einstein's increase in mass with velocity. The Ö particle

model interpretation of Newton's Second Law is $\dfrac{d\mathbf{P}}{dt} = p_{Ö}\,\dfrac{dN}{dt}$ where $p_{ö}$ is the quantum of momentum of the Ö particle and $\dfrac{dN}{dt}$ is the flow rate of Ö particles in number of particles per second. The flow rate is simply the mathematical flux of Ö particles moving at the speed of light, like water moving in a pipe. So a force is a flow of the Ö particle into and out of electrons, protons and atoms. Ö particles are neither created nor destroyed giving rise to the conservation laws of mass and energy.

The electric field and the magnetic field are not made of virtual photons and if you think they are you understand neither electric and magnetic fields nor photons. The electron is not a point without internal structure or a wave. The wave function is not reality. The Born interpretation of the wave function is to put it mildly, ludicrous. My Ö particle model is completely deterministic, precisely the opposite of the Heisenberg Uncertainty Principle. And some how I have free will, or do I?

Atoms are made of electrons and protons. The theory of the atom is the most beautiful and useful theory possible. I have an all new quantum mechanics that will reduce chemistry to an engineering science. Of course, there are quantum numbers, of course transitions between quantum states are associated with emission and absorption of photons and of course I predict the hydrogen line spectra. I have always been stymied on the helium spectra and have not worked out any line for higher atoms with the exception of the limit of line spectra, the ionization energy. I use the ionization energy to determine the size of the non-metal atoms. I do not know if I am still missing a piece of the puzzle to be able to predict line spectra for all atoms or if it requires someone smarter than I or perhaps at least a little better organized.

To fully understand my model requires as prerequisites only three semesters of calculus through vector calculus and two semesters of introductory physics using calculus.

I am a self trained theoretical physicist, theoretical chemist and theoretical biologist. I am fifty-four years old, German-American, single, no children yet and have devoted my entire adult life to understanding science. Being a theoretician means you work alone, thinking, only needing a good pen, paper and scientific calculator. The modus operandi of theoreticians is simple. We guess a solution, work out the implications, and do this over and over in a recursive process of successive refinements. Theoreticians must be intuitive, reasoned, contemplative, insightful, imaginative, creative, original and damned good at mathematics. You also need a lot of common sense. I do not include inspirations in this list for the simple reason we produce so many of the things they are practically coming out of both ends. Then we can understand why it is said genius is 1% inspiration and 99% perspiration. The most important properties of any system are the physical dimensions followed closely by symmetry and beauty. By its very nature being a theoretician is so solitary one could often think himself or herself to be in a monastery. Being a theoretician requires the same commitment as being an accomplished surgeon working in a specialty. The reward is the fun one can have thinking, analyzing, figuring out equations, deriving solutions and visualizing spatial-temporal physical phenomena from simplest to most complex.

I would like to thank the generations of physicists and chemists who have enabled me to accomplish this work. Now that my theories are published it will not again be possible for a human to traverse the path of discovery I have followed. For me it has been a deeply spiritual,

even sacred experience and I can only hope seeing how Nature works is as moving an experience for others as discovering it has been for me.

This work is a solitary effort. I have only worked as a researcher, not a teacher, so my writing and pedagogy skills may be limited. I take full responsibility for the errors that regrettably but likely still exist. Hopefully they will not intrude in a serious way on the effectiveness of the overall presentation.

Without doubt this work can be improved. If you have comments or suggestions I would be pleased to hear from you.

David Martin Degner
Anchorage, Alaska
September 2007

Preface to the Second Edition

It is hard to believe almost fourteen years have gone by since the PDF Printing of the First Edition. This Second Edition is not a Second Edition in the usual sense where there is major new material included. But so many changes have been made, including correcting some embarrassing mistakes, that I believe it is deserving to be called a Second Edition to clearly distinguish it from the First Edition. The spirit and aim of this Second Edition are the same as the First Edition. My Universal Peace, Justice, Freedom, and Liberty is as topical now as it was in September 2007. My efficient Market and asset manager, eMaam, is as topical now as it was in September 2007.

I believe the changes made will make a more positive reading experience. The changes:

1. Myriad typos including punctuation and word choices.
2. Mistakes and factual errors.
3. Stupid stuff, where what I wrote at that time is almost the opposite of what I wanted to say.
4. Objectionable or offensive stuff that is in error has been deleted and objectionable or offensive stuff that is true has been retained.
5. No changes to the science and technology.
6. No changes due to the changes in the politics and climate of the world situation that have occurred over the last almost fourteen years.
7. Putting in more time and thought, deeper thinking and refinement, being more precise and concise.
8. And most importantly are the changes made in the interest of literary art.

Then this Second Edition is what I would have liked the First Edition to have been in September 2007.

In added words, the changes are small, only five to six hundred additional words.

This work is still a solitary effort, without any help from anyone, so is somewhat unique in that regard. Therefore, I alone am responsible for both the content and any errors that still exist.

If you have comments or suggestions I would be pleased to hear from you.

Thank you!

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May 2021
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I want to dedicate this work to the tinkerers, inventors and mechanics of the world, be they male or female. From the lever and wheel to the internal combustion engine and the Internet mankind's history is rich with new and elegant designs whose ultimate goal is to relieve mankind of the burden of physical oppression we have been embedded in throughout evolution. With a common sense and intuitive theory, the tinkerers, inventors and mechanics can think seriously about the microscopic world. The design possibilities are limitless but not infinite.

Table of Contents

1 I spotted her as I walked in

It had been a brutal campaign.

The goal was simple: Universal Peace, Justice, Freedom, and Liberty, that I can define succinctly as no armies, no weapons, no trade restrictions net of scientific safety, including adult pornography, adult recreational drugs, adult gambling, and adult prostitution, no travel restrictions net of having a communicable disease, no borders, every last one of us live where we want to and can afford to and no involuntary transfers of wealth by governments from any individual or group of individuals to any other individual or group of individuals, no subsidies of any kind, no welfare of any kind, everyone carries their own weight, of course the disabled will be taken care of.

I had never known conventional boundaries. For me the box was truth. Thinking outside of the box to me was to violate the only recognizable goal, namely truth. I thought God was an absentee landlord and the Laws of Physics were never broken. To determine the evolution of the universe required only the Laws of Physics and a starting configuration, not the mind of God. I had always considered the mind of God unknowable.

And then what is free will? And what is determinism?

I had written a small poem that summarized everything:

Why are we here? What is our purpose? How should we lead our lives?

The why: Unknowable, unfathomable, incomprehensible.

The purpose: To pass on the joy we find in being. The sexual dynamics you know.

The how: Without fear, with love, compassion, mercy, and charity, without impiety, but with righteousness, and above all else with Wonderment.

I was driving through California, returning to Anchorage, after an eighty-day drive around that included a stay at a cabin on the Blue Ridge Parkway in North Carolina, where I had worked on non-scientific but very important problems of governance, taxation, economics, and justice. It was 3:57 PM, the time I look for a motel.

A few miles north of Bakersfield I came across the Diablo Cantina. I thought I would stop in for a beer and did. I spotted her as I walked in, an older, somewhat seedy, dimly lit, Mexican restaurant and bar on a Thursday evening. She looked very relaxed. She was the only patron. The bartender was having a smoke. Whether she was bred from fine proportions I did not know but at a glance I recognized optimal proportions.

For some reason I thought of the bit and the brace, the way man put beams together for a thousand or two of years by drilling holes and inserting dowels.

Slowly walking up to the bar.

"How about a Tecate?"

"Sure."

"You sell a lot of Tecate?"

"Uno. Enjoy."

I turned away from the bar and stole another glance at the woman, alone with me in the bar. She appeared about 35. Dressed stylishly and comfortably in a moss green T-shirt, khaki slacks, New Balance running shoes, with grey socks. I guessed she was 5 feet 8 inches and about 126 pounds. I turned back to the bar and pulled out a stool and sat down. I placed my cigarettes and lighter on the bar. It had been a long time without a relationship with a woman. The sure confidence of my youth seemed far removed. I was not even sure I could get it up it had been such a long time at a low ebb. Maybe I'll need Viagra I thought. I picked up the smokes and lighter and put them back in my pocket, picked up the beer, turned, took another glance at her, and decided to approach her.

"Hi, how are you this evening?"

"Fine, would you like to join me?"

"Are you alone or waiting for friends?"

"Tonight I am alone."

"My name is David."

"Hi David, I'm Heidi."

"Do you come here often?"

"I used to come here with a boyfriend but we broke up recently. I have not seen you in here before."

"This is my first time here. What brings you to this out of the way joint in Bakersfield? Live close by?"

"No and yes, I'm just up from LA visiting my mother. She lives right down the road."

"Might you be a student?"

"Good guess. I'm in the graduate program at Cal Tech getting a PhD in theoretical physics. My field is string theory. Are you knowledgeable of science?"

"I am."

"I come up quite often on weekends. I don't have to be on campus on Fridays. It's a nice drive up from LA."

"I'll bet you drive a nice car. German I'd guess, maybe an Audi?"

"Mercedes, you were close. How did you guess?"

"I think you would appreciate good German engineering and design, the remark about a nice drive. A nice car goes nicely with a nice drive. I like a ¾ ton Ford pickup with the standard wheelbase."

"So ah, do you think anti-hydrogen will emit the same kind of light as hydrogen in Athena and ATRAP?"

"Are you a scientist?"

"I am. I work in many areas of physics, chemistry, and biology. I use old fashioned space and time. I have a new elementary particle physics that contains a single particle in its elementary particle bestiary. That particle is in perpetual motion. It is the quantum of mass, the quantum of momentum and the quantum of energy. My work is simple, complete, symmetric, elegant, beautiful, and of high utility to mankind."

"I'm not sure I want to keep talking with you. I try to ignore cranks."

"Please wait, would it be possible we could meet one more time?"

"It might be that in all important revolutions the messenger is at first sacrificed and accused of being a crank."

"Heidi I can solve the protein folding problem. You know of course that in biology and chemistry, where the molecules, hardly moving relative to the speed of light, are described as dynamics in three dimensions of space over absolute time, only correct theories will solve the problem, not quantum mumbo jumbo. My science can save lives, in the near term by designing drugs and proteins and in the longer term by designing man."

"Well ... you are tall and quite handsome ... and I am interested in all aspects of reality, even the existence of scientific cranks, they have, you must agree, existed and do exist, but I perceive in you an element of truth, not only in your scheme, I also perceive genuine purpose, so you leave me with the quandary should we meet again. I'd be willing to see you again. I'm pretty fed up with the system. I feel that I am being held in rein."

"Heidi, it is a distinct pleasure to meet you. Tomorrow here at 4 for a few drinks then?"

"OK, see you tomorrow David."

"Thanks Heidi, it will be a pleasure to meet again."

Heidi got up, we shook hands, and she left. I took out my smokes and lit one up. That was not too bad I thought to myself, a string theorist, presumably in the hierarchy of science the smartest people on the planet. I wondered if Heidi had ever known a real man. Was I smarter than her, about the same? What were my strongest areas? What were hers? It was an extraordinary piece

of luck to meet her and to get a date, at the Diablo Cantina in Bakersfield, in Kern county of California. My goal was to get her to go for a drive through the giant sequoias. Driving among those magnificent trees, the largest and among the oldest organisms on the planet, generates great intellectual vibrations. On that drive, in the forest, I'll put on Miles Davis' Kind of Blue.

I walked into the Diablo Cantina the next day at 3:58 PM. There were a few patrons, but she was not there. I took a back corner table and ordered a beer. I was thinking about Miles' Kind of Blue. About two minutes after four she walked in. In addition to everything else – smart and physically proportionate – she was beautiful. She had brown hair and hazel eyes. I imagined having a relationship would change my life dramatically and be a beautiful experience. I had had almost thirty years of bad luck; could it be changing?

"Hi Heidi."

"Hi David."

"You are looking elegant this evening, thank you for joining me. How are you doing today?"

"Fine. Driving up from LA and visiting with my mother, who lives on a small ranch 4 miles out of town, is a welcome transition from the pressure cooker down at Cal Tech."

"You deal mostly with men, right. I saw 97% of physics faculty in the US is male. The Y chromosome must have some interesting neurobiology effect."

"My degree is in biology, Cornell 74. I concentrated in neurobiology. With Einstein's theories of relativity and conventional quantum mechanics as the foundation I thought physics and chemistry were mostly complete."

"Euclid's first definition was: A point is that which has no part."

"What do you think of points?"

"I love points. Do you also?"

"I do. In addition, I love lines, surfaces, and volumes."

"Ditto. We speak the same mathematical language. How much math have you had, for instance, taken any differential geometry?"

"In physics all I use is vector calculus and the same with most of my chemistry. It turns out the algebraic relations are seminal. Interpreting Newton's second law and Einstein's $E = mc^2$ doesn't require esoteric mathematics. I also work on data structures, to represent atoms, small molecules, proteins and nucleic acids. Those data structures are directed graphs for the representation of atoms and molecules and trees in programs that analyze DNA sequence. A tetrahedral tree to represent DNA sequences is particularly interesting. And Turing machines are the ultimate. Biological cells are Turing machines."

"I have thought of representing any object, where an object is some combination of points, lines, surfaces, and/or volumes in three dimensions of space, in terms of first of all geometry, then

algebra, then as a polynomial expansion, adding in trigonometric and transcendental functions as needed. That being said I have not worked out any new mathematics, and the mathematics I use is simple. As a scientist who uses mathematics I liken the mathematics to paint, the fun is painting, not the chemistry of paint."

"Did you know that Life is a fancy dance of fancy dipoles?"

"I do know that. That's a very nice and a very important idea. Do you work on those problems?"

"Yes. Biology reduces to liquid state, condensed matter, interactions. But proteins are small solids. Nucleic acid polymers are in some symmetries solids, and in other symmetries liquids. It is the thermal dynamics that is the motive force for diffusion. Diffusion within a liquid phase, in the absence of electric and magnetic external fields defined on that phase, is random walk diffusion. The exterior dipoles on atoms, where electric field energy is stored, are minimized by positive and negative charge patches getting as close together as possible, minimizing the energy stored in the dipoles. That is the attractive force in proteins. The repulsive force is the exchange of thermal photons. All atoms above absolute zero and at a constant temperature are in a steady state of emitting and absorbing a spectrum of thermal photons. Due to conservation of momentum and the fact that photons have momentum both emission and absorption exert a repulsive force on the atom. I am interested in understanding the general problem of interactions in the liquid phase where rotational, vibrational, and translational motions obtain as these attractive and repulsive forces play out over time, even determining the arrow of time in the chemical systems of biology."

"Have you been working alone, independently, all these years?"

"I have been."

"Is it stressful to work alone without recognition?"

"Financial part the worst really, so it has not been too bad. Making discoveries is much fun and very rewarding. As a theoretician I think for play, for work, and for duty."

"All the men and women that have contributed significantly to knowledge did it working alone. When you are in a group it's hard to think about the unknown. It is the nature of knowledge that it must be worked out first in one mind, alone, slowly, piece by piece, until the tapestry is complete, and then taught to peers and others interested fast. After that they will be standing on your shoulders, just as you have stood on your father's shoulders as a man and on Newton's, Maxwell's, and Einstein's as a scientist."

"Sometimes one person can do alone what all the rest of society can't do put together. That is inherent in discovering exquisite designs in Nature and inventing exquisite designs in applied engineering."

"Maybe I'll be the first one to perceive the beauty you claim to have found."

"Do you feel you have the right model of atoms because you see so many important problems that can be solved?"

"That's exactly how I find the utility of my work. The most important single problem is the protein folding problem. I believe I have the correct first principles and the correct quantum mechanics to solve that problem."

"Do you think surfaces exist in physics and chemistry?"

"Of course but are not those surfaces really due to some kind of fancy dynamics of electrons that are mathematical points?"

"I am offering an alternative to that model. In my model the electron is a closed surface, a thin shell sphere, a membrane, and is the same size as the atom. What we see and what we touch is the outer surface of liquid phase, thin shell spherical electrons. The free proton in my model is also a thin shell sphere and the same size as the free electron. I know all the radii of electrons and protons in all atoms. I know the rules of geometry by which electrons and protons form a unitary system, an atom. And I understand bonds. There are only two types of bonds, electrostatic and covalent. The protein attractive forces I just described are all electrostatic forces."

"What are those surfaces, your electrons and protons, made of? And what particle do they exchange?"

"A particle I have named the Ö particle is the only elementary particle in my elementary particle bestiary. Everything is made of that one particle. Electrons and protons are composites, collections of the Ö particle. There are three times ten to the forty Ö particles in an electron. In electrons and protons the Ö particle is dynamic, going back and forth between a point and a thin shell sphere, growing and shrinking as a membrane, coating and un-coating the surfaces of electrons and protons. Electric fields, magnetic fields, photons, and gravity fields are made of the Ö particle as a point-like particle. Those four fields and mechanical forces, covalent bonds, electricity and electromagnetic radiation produced by electrical circuits and antenna are the only exchange mechanisms of Ö particles between electrons and protons. The theory of everything in ten words is electrons, quarks and protons inventory and exchange the Ö particle."

"Wow, if the universe had that simple an elementary particle physics foundation, realizing that foundation would be an important epoch for mankind. You seem highly rational and reasoned. I would be willing to check out your repertoire of knowledge. A universe built of a single, sometimes point-like particle, sometimes membrane, would be extraordinarily elegant."

"Is that o, your pronunciation is a little different and unfamiliar?"

"It's O umlaut, an O with two dots over it, German, pronounced by making your lips into a circle."

"What do you mean by quarks? James Joyce's quarks or Murray Gell-Mann's?"

"I just borrowed the word from Gell-Mann and gave it a new definition. In my model a quark is an integer fraction of an electron. The process of an electron dividing into integer fractions only occurs inside atoms."

"Integer fraction mass, integer fraction charge, integer fraction energy?"

"Yup. The number of quarks an electron divides into is the principal quantum number in my quantum mechanics. Like conventional quantum mechanics I call that number n. This scheme in a simple way accounts for atomic line spectra. I have only worked it out for hydrogen but I have no doubt it will account for all line spectra for all atoms. I have always been stymied at interpreting helium."

"How many quarks can an electron divide into?"

"In oxygen n goes up to 42 and the energy of the photon emitted in that n = 1 to n = 42 quantum transition is just a tiny amount smaller than the ionization energy."

"Then in your model there are only three particles: electrons, quarks and protons?"

"You got it."

"And electrons, quarks and protons exchange Ö particles as electric, magnetic, photon and gravity fields?"

"Mechanical forces, covalent bonds, electricity and electromagnetic radiation are four additional exchange mechanisms. So the complete theory of everything is: Electrons, quarks and protons exchange the Ö particle via electric fields, magnetic fields, photons, gravity fields, mechanical forces, covalent bonds, electricity and electromagnetic radiation from electrical circuits."

"Isn't the electromagnetic radiation from circuits and antenna photon flux?"

"Not quite. Electrical circuits can only generate frequencies up to the microwave region. The "photons" in radio and microwaves are really continuous waves, not discrete photons, as if the photons are attached end to end."

"Is that the complete set of phenomena?"

"It is. What year are you in at Cal Tech?

"First year, taking remedial courses in physics and math. I was a biology major at Harvard as an undergraduate and concentrated in ecology. I am interested in the ecosystem of man and took several courses in anthropology. Instead of going for a PhD I decided to go to work for the UN and study the ecosystem of man."

"Did you take calculus at Harvard?"

"Three semesters and also took the physics sequence that used calculus and one semester of modern physics. I also took two courses in probability and statistics. Although my initial approach to ecology was biological and anthropological I came to realize how important mathematics must be to interpret ecosystems. So I took a two-semester course in differential equations at the NYU Courant School of Mathematics. Then I started reading some of the string theory literature, got very interested in what was going on in modern physics and decided to go for a PhD in theoretical physics."

"Did you take genetics, biochemistry and physical chemistry at Harvard?"

"Genetics and biochemistry but not p chem."

"What are you taking at Cal Tech now?"

"This year I took a two semester course in electromagnetism, a one semester course in mechanics, one semester of thermodynamics and statistical mechanics, one semester of circuits and a two semester course in mathematical physics that was mostly vector calculus, complex numbers, tensors and differential equations. What's your background in mathematics and physical science?"

"Three semesters of calculus, one-half semester of differential equations, linear algebra, audited introductory discrete mathematics and audited one semester of probability and statistics. In physical science in addition to introductory physics I have taken one semester of physical chemistry, the kinetic theory of gasses, thermo, statistical mechanics semester and one semester of modern physics. I audited a one semester electromagnetism course, Maxwell's equations."

"What do you think of Einstein's theories and quantum mechanics?"

"I'll be taking a two semester course in quantum mechanics next year and also a course in general relativity. I know of the Laguerre polynomials and Legendre differential equations and power series solutions."

"Changing the subject, what do you think about women in science?"

"I can only think of two women who have contributed some of the most important historical pieces of physics, chemistry and mathematics – Marie Curie and Emma Noether. I had women teachers in two math classes who seemed stronger than me in math but since I never put in the hard work to become a mathematician I don't know if I could have been as good or a better mathematician if I had put in tens of thousands of hours like I have in science. I've only put in about 100 hours studying formal mathematics. A lot of people think females need encouragement to go into the physical sciences and mathematics. Nothing could be further from the truth. If you need encouragement to be a scientist you are not smart enough, not self confident enough to be a real scientist. A scientist seeks out truth in a deterministic fashion as if driven to do it. Human behavior is so deterministic that trivialities like psychological encouragement have nothing to do with the capacity to think clearly, deeply and with effectiveness. All that being said all students at all levels should be encouraged to do their best and dream of reaching for the stars."

"Could women's lack of contribution be due to the fact they have been pregnant and raising children for the best years of their life throughout the evolutionary journey?"

"It could be, and no doubt that is a factor, but I think the reason is because of the additional piece of DNA men have, the Y chromosome."

"Can you think of any Oriental, Black or Native who has contributed anything fundamental to science?"

"Nope. The history of science is mostly white European males, like it or not."

"Why is that?"

"Genetics no doubt."

"Look at China, how much science and mathematics is going on there now. Some people think they and the Indians will eventually take over. Aren't the Orientals and Indians supposed to be the smartest people?"

"That's only in average IQ and fails to account for the range from lowest to highest. The high-end range for white European males is the highest on the planet. Orientals are genetically more homogeneous than Europeans. There have been no Newton's or Leibniz's outside European extraction."

"I am either not smart enough or not knowledgeable to resolve that, am not sure you are right or if it is a crackpot theory."

"Drill sergeants are very interesting. They are really dumb in academic performance. But they perform an extraordinarily tough task with precision. They mold young men through a process of exposing them to a level of discipline, personal conduct, and grueling physical trials they haven't met before in life into soldiers. It's a lot like calculus. Fairly dumb individuals can learn calculus. It takes them a lot of effort, many hours of difficult mental work. But the reward is to once having learned calculus to be able to use it and interpret engineering and scientific design using the toolbox of calculus. The drill sergeant learns a few things but learns them well and functions at a highly effective level. I admire drill sergeants and the people who learn calculus by brute force. My high school physics teacher, I wish I could remember his name, I do remember well his face and teaching manner, was dumb but had learned physics and could teach physics effectively. He was also the cross-country coach."

"What you're saying is hard work results in high results for everyone?"

"Something like that."

"Are Blacks dumb?"

"That's why they have been taken advantage of, made into slaves by Americans. That's why there is more suffering in Africa than anywhere else. That's why Africa produces no technology of any kind. And let me add that the first PhD to a Black in physics was granted to Edward Bouchet in 1876 by Yale. He was 6th in his class as an undergraduate at Yale in a class of 124. He never got married and had no children."

"Because of genetic determinism intelligence is really 100% genetic net of having organic brain trauma. The oldest game in the world is smart people taking advantage of dumb ones."

"Who are the best engineers on the planet?"

"The Japanese followed closely by the Germans and a distant third the English. The American population back in the 60's was 30% German extraction and 22% English. MIT is the greatest engineering school on the planet."

"And the Jews are the smartest of the whites?"

"I wouldn't be surprised if one-half of the smartest one hundred people on the planet are Jews."

"How many females in that top one hundred?"

"About five or six with the highest ranked maybe around 8th. The highest ranked woman in chess was Judit Polgár and at her peak was ranked 8th in the world. Polgár is the only woman to have won a game against Garry Kasparov."

"When in life did you realize how smart you are?"

"Sixth grade. If you don't figure it out by then it ain't going to happen. I did not understand how high up on the ladder I could go until I took physical chemistry in my senior year at Cornell. After taking that course I felt I could go anywhere in science and go to the top and lead the way."

"You're a polymath aren't you?"

"You too, what else."

"What do you think of this: Painting watercolors of trout is like doing theoretical physics in that both require deep appreciation of symmetry and beauty and painstaking attention to detail."

"And fishing for men?"

"You are a very perspicacious young lady."

"You get 1600 on the SAT's?"

"Yup, and you?"

"578 verbal and 720 quantitative."

"Maybe you matured intellectually a little slowly, I think they call the phenomenon late bloomer."

"I think I was just deprived of the challenge to work on relativity and quantum mechanics in my youth. Thompson's determination of the e/m ratio of the electron, Planck's black-body radiation law, Einstein's special theory of relativity, Rutherford's diffraction of alpha particles by gold foil, the Milliken oil drop experiment to determine the quantum of elementary charge and the Bohr model were the formative experiments and theories that needed to be interpreted and put into a simple model that unifies mechanics and electromagnetism. So the 1887 to 1913 period was the right time to figure out physical Nature. Instead Einstein published his General Theory in 1915 and in the Twenties quantum mechanics was invented, both works embedded in the world of the early 20th century."

"Is that the period you find most interesting in physics?"

"That's when it went down."

Heidi looked at me, a slightly perplexed expression on her face.

"What are the ideas of modern man?"

"In mathematics you have n-dimensional vector spaces in some of which you can embed points, lines, surfaces, and volumes, finite or infinite. In physics you have elementary particle mechanics and dynamics embedded in three-dimensional space and time. In chemistry you have atoms, molecules and chemical bonds. In biology you have nanotechnology at its finest, embodied in a chemical Turing machine. In computers you have programming simulation and design, necessary for chip design and to deal with the complexity of biological phenomenon from the smallest part, the proton, to the largest part, the DNA, and a computer is an electric circuit Turing machine."

"In economics you have free, orderly and efficient markets. In government you have fair taxation and representation. In law you have truth, tempered with wisdom, and considered with solemnity, that adds up to justice."

"In military strategy you have the implementation of universal peace, justice, freedom, and liberty, the military's final war."

"In art you embed simplicity and complexity in elegant design, telling the story of the inner ascent of man and outer ascent of mankind. In music you inspire the soul, a diverse emotional repertoire of well being and rhythm."

"In religion you define the afterlife, spirituality, and also the real, a reduction to elementary particle dynamics and mechanics and realizing the incomprehensibility of a creation that occurred as sure as I am here now."

"What do you think of philosophy?"

"There are six disciplines to philosophy – metaphysics, epistemology, ethics, politics, aesthetics, and logic. Philosophies highest arena is politics, at present, in the past, and probably into the future, but not for much longer. With universal peace, justice, freedom, and liberty politics will cease to be philosophies highest arena. Universal peace, justice, freedom, and liberty guarantees fairness between all and any classification of human biological diversity and is the culmination of politics."

"You've mentioned universal peace, justice, freedom, and liberty twice. What do you mean by that?"

"Universal peace, justice, freedom, and liberty, I define succinctly as no armies, no weapons, no trade restrictions net of scientific safety, including adult pornography, adult recreational drugs, adult gambling, and adult prostitution, no travel restrictions net of having a communicable disease, no borders, every last one of us live where we want to and can afford to and no involuntary transfers of wealth by governments from any individual or group of individuals to any other individual or group of individuals, no subsidies of any kind, no welfare of any kind, everyone carries their own weigh, of course the disabled will be taken care of."

"Is that mankind's goal?"

"I think so."

"Hey, I've brought along a one-page essay on the Platonic solids. They underlie the geometry of atoms and molecules. Would you like to read it?"

"Sure let's have a look."

I handed Heidi a single page.

The Platonic solids as extended by Degner:

Add four objects to the Platonic solids. The point, a zero-radius sphere, is a zero-dimensional object. Two points touching is the smallest one-dimensional object. Three points touching is the smallest two-dimensional object. The five Platonic solids built with marbles, finite radius spheres: the tetrahedron, the cube, the octahedron, the dodecahedron, and the icosahedron. And my fourth and final addition to the Platonic solids is the sphere, the limit as the number of marbles goes to infinity equally fast in radial out directions, an infinite-dimensional solid embedded in three-space. All the geometry of chemistry is based on these nine objects.

In mathematics there are four objects that can be put in three-dimensional space: the point, the line, the surface, and the volume. These are the most important concepts in all of mathematics and all of physics. Euclid defined the point as "that which has no part." But being a point is then to be a discrete entity, in other words the smallest part. I will offer the following definition of a point: A point is an idea that exists in the three-dimensional space we occupy, think in, and are embedded in. This means a point is both real as an idea and also as a location in three-dimensional space.

In physics there is much evidence that the idea of a point-like particle is useful. Electrons and quarks are imagined to be zero radius objects, mathematical points, with zero volume. In string theory strings are imagined to be zero radius lines or closed loops, with zero volume, yet have mass and energy.

Common sense tells us that the smallest particle not only exists, to account for the body of experimental data, but has a definite size and shape, although small, point-like. I have invented that particle and have named it the Ö particle. Truly amazing is that this one particle is the only truly elementary particle in the universe and it accounts for all phenomenon in the universe.

The concept of a sphere, with radius from zero, a point, to a finite radius, a realizable object, an atom or a Sun, to infinite radius, a symmetric unending universe without an edge to space, is profound.

We cannot really put two points together, touching. The smallest rod, the smallest one-dimensional object has an infinite number of points, arranged linearly.

We cannot really put three points together touching. The smallest triangle, the smallest two-dimensional object, has edges that are short lines, and has an infinite number of points in its edges and in its surface.

Only a finite volume can be a real elementary particle, with a one-sided surface at the interface between the inside of the elementary particle and the surrounding empty space. That is why the Platonic solids are built of marbles and why points, lines and zero thickness surfaces are ideas.

"That's nice David, a little trivial, the Platonic solids are considered so simple that no one talks about them much these days, you wrestle with the concept of a point and its relation to a line, surface and volume, but I can see you think as a chemist."

"You would have liked Euclid."

"The final piece of the physical puzzle, that is an important piece, is the "ether" and neutrinos. I define a neutrino as a thin shell spherical Ö particle, much smaller than atoms, trapped between atom surfaces and filling all of empty space. If these particles are not neutrinos then they need a new name but I'll just refer to them as neutrinos. They are spinning on an axis with a quantum of kinetic energy and an average translational energy of zero. Neutrinos cannot get inside atoms. So all of space, both the space between the heavenly bodies and the interstitial space of the heavenly bodies themselves, with the only exception being the inside of atoms is filled with a close packed neutrino foam. The four fields in physics, the electric field, the magnetic field, the photon field and the gravity field are made of point-like Ö particles, with no rotational energy, not spinning, and only with translational energy. Those point-like Ö particles traverse the neutrino foam that fills outer space and is continuous with the interstitial space of the solids and liquids the heavenly bodies are made of. The quantum of energy for translational motion of Ö particles in the four fields as a point-like particle is identical with the quantum of rotational energy the Ö particle has as a neutrino. The neutrino foam makes electric, magnetic and gravity fields capacative. The capacative property I define as having a field strength that falls off as one over r squared so the energy stored in the field, even if it extends to infinity, is finite. This is the same as the requirement that the wave function be normalizable. It makes electric, magnetic and gravity fields capacative by reflecting back to the source the Ö particles that make up the field. Then in a static electric, magnetic and gravity field there are an equal number of Ö particles going in both directions."

"How deterministic do you think human behavior is?"

"Are you German?"

"I am. Are you Jewish?"

"Before you answer let me point out the Jews are easily the smartest genetic pool on the planet. Somewhere between Noether and Polgár, somewhere between Fischer and Kasparov, somewhere between Einstein and Witten, a large percentage of theoretical physicists and a large percentage today of string theorists, one makes that observation"

"And this might sound a little racist, a little too much genetics, but I think Jewish women are the finest in God's creation here on the planet Earth. Brook trout, that are char, are the most beautiful trout in my mind. They live closest to the source in streams, the headwaters. So brook trout are like Jewish women to me. And of course there are many other fine char's, but brook trout are special."

"It is a combination of ideal attributes that make Jewish women so beautiful."

"The way you said that is persuasive."

"My Dad is French and my mother's father Italian and mother Jewish."

"That Platonic solid geometry of chemistry was interesting. You include the zero-dimensional point, the one-dimensional line segment, and the two-dimensional surface patch in the shape of a triangle. Those three mathematical entities are contained in the five Platonic solids so maybe do not need stating explicitly. But adding the sphere as an infinite face solid is a nice move."

"Adding the point, line, and triangle just emphasizes that mathematical inclusion. Also it is necessary to cover chemical bonds. There are atoms that remain non-bonded and happy, the Nobel gases, there are many diatomic molecules, hydrogen to oxygen, and planar molecules based on triangles, like benzene or graphite and then tetrahedral carbon. In chemistry those are called s, sp, spp and sppp atomic orbitals for the point, line segment, triangle and tetrahedron."

"Here's the exact set:"

"Eight Platonic solids, starting with the sphere, then two spheres touching, then three spheres touching, then the five Platonic solids built of spheres. That's chemistry like. Repeat one object, the sphere as a Platonic solid built of an infinite number of spheres. There would be many more possible solids built of an ever increasing number of spheres, that in the limit becomes a giant sphere, radial out to infinity in all directions. And of course it's all marbles!"

"I like the way you think."

"But first let's nail this down, the first Platonic solid is a sphere, the second two spheres touching, forming the smallest rod, the third three spheres touching, forming a triangle, four spheres touching, forming a tetrahedron, hey I am going to add five spheres touching even though its two tetrahedrons, three spheres in a triangle and perpendicular to it two spheres in the interstices on either side of the triangle. I'll stop there and look at what kind of quantum mechanical orbitals are involved; the sphere an s orbital, the rod two s orbitals touching, forming a sigma bond, the triangle spp hybrid orbitals, the tetrahedron sppp."

"How would you put why are there eight periods in the Periodic Table?"

"Eight outer electrons called valence electrons. Two electrons can be paired in one combined orbital, the Pauli Principle. The Noble gases have two electrons in each sppp tetrahedral orbital with the exception of helium that has two electrons in an s orbital. So we fill the tetrahedral structure with one to eight electrons as we move from left to right in the Periodic Table, from the alkali elements to the Noble gases."

"Carbon, nitrogen and oxygen all tetrahedral?'

"Yup. And add to that list hydrogen, phosphorous and sulfur and you pretty much have biology. To complete the model for biology, add the minerals that are the positive ions sodium, potassium, magnesium and calcium, the negative ion chlorine, the eight transition metal atoms at the active sites of proteins chromium, manganese, iron, cobalt, nickel, copper, zinc and molybdenum, and the trace minerals selenium and iodine."

"That's all the elements in biology?"

"It is – twenty-one elements."

"My approach to biology was not through reducing it to chemistry. Of course I took two semesters of freshman chemistry and two semesters of organic. But my thinking about biology was not at the reductionist end, rather at the other end, that of the highest complexity. That's why I chose to work at the UN. I thought it represented the highest level of complexity in the

human ecosystem. Now going into theoretical physics I am approaching Nature as a reductionist."

"Hey David, have you heard about Goldentongue?"

"I have not."

"She is a hypothesized string theorist, female, who claims the smartest woman is smarter than the smartest man. It has to do with the evolutionary difference between the X and Y chromosomes due to the fact X chromosomes cross over and the poor Y chromosome, all by its lonely, has no pair to cross over with. You know, Hilary is smarter than Bill?"

"Yeah, but I've got an X too and men have more total transcribed DNA. How could they not be a slightly more sophisticated machine?"

"Goldentongue may be only an urban legend, a myth, or she might be imitating the 808. Would you know what that means?"

"We hypothesize an 808 thermodynamic engine and then prove the best that can be done is a 707 engine. The hypothesized Maxwell's demon that opens and closes a trap door between two containers of gases, separating them into hot and cold, would be an 808 thermodynamic engine."

"Could you be Goldentongue?"

"Your honor, I am not going to answer that question, because I might incriminate myself. But seriously David, I am not Goldentongue."

"What's the hardest problem you can solve?"

"The protein folding AND function problem. That seems to be the long term evolutionary design that is hardest to understand. And I would mix DNA and RNA folding and function in that problem."

"Goldentongue claims to have reduced love and hate, peace and war, to physics."

"Wow. That would be a source of powerful reason."

"You fish for trout?"

"I do."

"Ultra-light spinning or fly fishing?"

"Ultra-light spinning, 2 and 4 pound line. Lure weights from 1/32 to 1/12 ounce."

"Headwaters?"

"Nowhere could more beauty be found."

"I am starting to like you. I was lucky to have a chance meeting with you here in Bakersfield. Would you like to drive up into the giant sequoias tomorrow? It would be our third meeting. We'll put a cooler of Tecate in back."

"David I would like to do that. You know we are going to have to follow up on your ideas in physics and chemistry. If you can convince me you can solve the protein folding problem then I would like to work on that problem. It is widely recognized as the most important in the biological warfare we must continuously wage with Nature herself."

"Could we have coffee together, early and then set off to see General Sherman?"

"Hey bartender, what time you open in the morning? Do you serve breakfast along with Bloody Mary's?"

"Breakfast and coffee at 7AM. By California law alcohol at 8:00."

"David, I'll meet you here at 8AM tomorrow."

"What's your last name Heidi?"

"My maiden name is Dartière. I have been married once but went back to my maiden name and have not had a child yet. My middle name is pronounced ill-lee and spelled I l i e. What's your full name?"

"David Martin Degner and I share my birthday with Martin Luther, November 10th."

"Any topic you would like to think of over night?"

"The Tree of Life and the Tree of Knowledge."

"Sounds OK. See you in the morning David."

She picked up her handbag and walked out.

Goldentongue. Sorted love and hate, peace and war. A legend? A myth? That had also been my ultimate goal, but I had faithfully worked in the trenches since age thirteen and I was now fifty-four.

"Hey bartender, bring me a shot of Crown Royal please."

"You got it."

I hated whiskey, but wanted to embed the moment, a moment of discovery.

2 Sure-man

I was at the front door of the Diablo Cantina Saturday morning at 7:30AM.

"Hi. Coffee, black, please."

"You got it."

Goldentongue. Sorted good from evil. Was that possible physically I wondered. If it were to be true she would have to be smarter than me. I realized I had never thought a woman, any woman, could be smarter than me. I gave that a two sigma limit, 95% true. Was I looking at a one in twenty? The door of the bar opened to the freshness of a sunny morning and Heidi walked in.

"Hi, David, I'm early too."

"Hi Heidi."

"Please, take a seat."

"We've got beautiful weather for the drive. The sequoias really are impressive."

"They are."

"Coffee?"

"Black."

"Where did you grow up?"

"Boone, North Carolina. My Dad was a professor of chemistry and philosophy at Appalachian State. My mother taught kindergarten at Boone elementary school. It was a stimulating and rich environment."

"What about yourself?"

"When I was 4 we lived in a rented apartment in Milwaukee and I attended Mt. Olive parochial school for kindergarten. The following year we moved to a farm about 20 miles outside Milwaukee. The small town we were closest to was named Freistadt. My first grade teacher there was a Miss Milhous. We moved back to Milwaukee the following year and I again attended Mt. Olive parochial school for second to eighth grade. I attended Milwaukee Lutheran for ninth grade. Then my Dad accepted a call to Trinity Lutheran Church in Ithaca, New York, where I attended high school for three years. Ithaca High was a very fine school, what with the professor's kids being so smart. It was great fun to live in Ithaca. The fraternities throw parties and who gets in is difficult to control so we used to go to them and have a band, college woman, and draft beer. Life could not have been more ideal."

"My mother was a nurse and came from dairy farmers outside Green Bay, home of the Packers, in the small town of Maribel. She has two brothers who still are dairy farmers. She was a very

good mother in all chemical engineering practices including husbandry and nurturing and was a great gardener, canner and cook. Her fermented garlic dill pickles from Grandma Degner's recipe were the best. Sixteen to one to one-half water to vinegar to salt ratio."

"My Dad was a Lutheran minister and a scholar of classics, as was his father. He interpreted the Greeks and the Romans in their original languages of Greek and Latin. He had a bad temper and was in some respects violent, using almost cruel corporeal force on my brothers and I, the belt, albeit only a few times. I remember when he first used a belt on me and my older brother when I was in first grade. He prefaced the beating with "this is going to hurt me more than you". At fifteen he came up behind me while I was sitting at a table eating and hit me over the back of the head with a large wooden wall plaque, ironically with an embroidered artwork mounted on it saying Home Sweet Home, breaking it in two. I got up dazed, delivered two successive, well placed, overhand rights to his chin, dropping him and he stayed in the bedroom for the next week recovering and never tried again to intimidate me physically. I asked him once if his father spanked and he said he used the belt too. Apparently back in the old days if your male sons weren't behaving correctly you just beat the shit out of them. A twelve year old boy needs to know who is in authority. All that being said my Dad was a very great man. I never heard him swear. He had honor, and dignity, and integrity, and being mortal a few, that now seem insignificant, faults. I am proud to be his son."

"I feel the same way about my parents. The family right?"

"The deep biological roots and experiences of families will never be overturned."

"How much are you like your Dad?"

"My Dad and I are alike in many ways and very different in some regards. I could never understand why he would devote his life to being a minister and biblical scholar. In 5th grade I determined that all the Lutherans I knew with the exception of two were morons, and many of them hypocrites. Those two were my Dad and a student in my class whose father was also a Lutheran minister and professor along with my Dad at Concordia College in Milwaukee. My Dad had a lot stronger verbal, reading, writing and language skills than myself. But he told me when I was about 37 that if he were young today he would become a scientist. I am sure my Dad could have gotten a PhD in physics and been a highly regarded professor at a major university. But I have always been stronger than him in math and physics and have known that since about 8th or 9th grade. He was a good mechanic but I am a mechanic without peer. Although I can generate much intensity thinking so could my Dad. But I have always been more laid back than he was. He got excited about the Beatles having a dangerous influence on youth. I never bothered to take the Beatles that seriously. To me they were just musicians, albeit revolutionary and inspiring musicians, and did not influence me intellectually or philosophically.

"Let's order some Bloody Mary's. You like eggs with, bacon, sausage, ham or steak?"

"I'll have two eggs over easy, home fries, and steak, medium."

"I'm going to order the same."

"Hey bartender, could I order?"

"Sure can, what do you want?"

"For both of us a Bloody Mary, two eggs over easy, home fries, and steaks medium, no toast and some Tabasco sauce."

"Who were your role models?"

"I really don't have and never needed role models, just like I don't need anyone else's philosophy. And although I looked up to my Dad and Uncles and Grandpa in some ways, they all seemed a bit religious lunatics to me. For instance, I never believed the Genesis 1 cosmology. I never believed in miracles or the supernatural. I always believed in some laws that govern the universe. That being said my Dad first, his brothers second, and Grandpa Degner third were my primary influences. My elementary teacher in 6th and 8th grade and football coach was an important influence and was a good science teacher. Some of the science and math teachers I had in high school were good influences, general science in 9th grade, biology and geometry in 10th grade and physics in 11th grade. Of course it is Einstein's era and what is not to love about Einstein and his influence. I wanted to be like both Thomas Edison and Howard Hughes. I wanted to invent new things of unimaginable value and wanted to use those inventions to take over in the business world like no one previously. It turned out that to do that required being a theoretician."

"What were your formative experiences in life?"

"I don't want to talk about me now David. We'll have plenty of time for that. Did you have formative work experiences?"

"I started working construction between 9th and 10th grade building my parents home in Ithaca. There was the contractor, his brother, a middle school teacher who worked construction in the summers and another laborer a couple years older than me. Not only did I learn a lot of useful knowledge and get a lot of exercise I made more than anyone else my age. I am good with a hammer. I can drive a 16 penny sinker with four strokes of an eighteen-ounce hammer and toe-nail with box 12's with precision. Of course after you have a summer of construction experience you can find construction work the following summers. I started subcontracting shingling, painting and some other construction when I was fifteen and made $10 an hour doing that in 1968, a lot of money back then. Back then I could carry two 85 pound bundles up a ladder onto a roof. Not many people can do that."

"An aside, to build a 1500-2500 square foot house takes 1-2 man years. When I was fourteen four of us built a 4 bedroom, three bath, tri-level, with double garage and surrounding porch in three months. The electrical, ceiling plaster, block and brick work were subcontracted and if we did everything it would have taken us about 4 months. Say a fourteen-year-old boy or girl works in the residential home construction business for four years. He or she can save $6000 a year, invest it, and at the end of those four years have $30,000 and the knowledge and ability to build a home. Say he or she is married at eighteen so the spouse can work a normal job while this individual takes a year or two to build a home that will last a lifetime and have a market value of $150-200,000. It is a good alternative to school and also could be implemented along with a school program for those not interested in a college preparatory program."

"What are you most interested in, most driven to do?"

"Security that today means individual security for all people on the planet. That is a scientist's most important game to develop strategy for, therefore first interest."

"I guess that would be your highest responsibility. Do you analyze military strategy?"

"That is what I am best at. Science is about forces. Military forces are also in the domain of inquiry of a theoretician. Someone like me has designed every weapon in the history of mankind. Someone like me has put their brothers and cousins on the front line. Someone like me has always commanded the forces when life and death are the issue. And when the wounded and dead are carried off the battlefield someone like me operates on them and consoles their family."

"We have had MAD for over 50 years. How would you analyze MAD?"

"MAD allowed peaceful coexistence throughout the Cold war."

"Within peaceful coexistence how do governments compete?"

"Quality of life, fairness, anticipation of needs, design in engineering, leadership in science, dominance in technology, quality of life issues."

"Were those the forces that resolved the Cold War?"

"Yes. Soviet communism collapsed internally because it is fundamentally at odds with man's most basic nature that is to be independent. It had nothing to do with Reagan's military buildup as is evident by the fact we both still have our nuclear arsenals and are both still developing new weapon systems. Not allowing involuntary transfers of wealth prevents excess socialism in economic systems."

"We still have MAD right now right?"

"Incredibly the case."

"How can it be resolved?"

"Unilateral total disarmament by the United States of America. No armies. No weapons."

"Is that possible?"

"All it requires is vision, leadership, and resolve. Tactically it could not be simpler. To implement it for the Department of Defense get a General Rhodes, put him or her in charge of it, do it."

"The stated goal would be universal peace, justice, freedom, and liberty for all the people on the planet Earth and ASAP."

"Can you get Germany and Japan in on that strategy?"

"Easy, Dresden, Hiroshima and Nagasaki. Also the Holocaust and the siege of Leningrad so also the Jews and Russia. Germany, Japan, Russia and the Jews each lost a significant fraction of their population in WWII. They are among the smartest genetic pools on the planet. It's difficult to realize what it would be like to lose ¼ of your population, ½ of the males, in a war. Now you have to appreciate that the best defense is a good offense and there has been continuous warfare from the beginning of mankind. This time it will be a ¾ ton Ford truck, a Mercedes, and a Toyota leading the way."

"Do you have a name for that operation?"

"Operation Naked Dick."

"Nothing so bold is required. All that is required is that all countries go no armies, no weapons simultaneously at a pre-determined time. So it should be called Naked Dicks."

"That makes sense."

"What is the stick?"

"In a modern interconnected world economy a country cannot get along without trade. We only trade with those who follow our lead. If you do not get on board, we will not trade with you, go without the advances of Western science, technology and engineering. To not observe universal peace, justice, freedom, and liberty will draw the sanctions of not being able to engage in trade with those who do observe that goal. This strategy will be used much like siege. The longer it goes on, the more problems those under siege will be in. That's a powerful lever."

"What about China?"

"They do not have designs of military conquest. Hong Kong and Taiwan are small problems, not major obstacles. They could maintain their socialist government without weapons and armies. They of course must observe universal peace, justice, freedom, and liberty. They might have a little difficulty with no involuntary transfers of wealth but that's tough."

"Any final comment on strategy before we turn to other world problems?"

"Excuse this, it's all about dicks. We, America, need the dick to lead the way, speaking metaphorically, figuratively and maybe a bit vicariously."

"Here's breakfast."

"Boneless NY strip. Great."

"Thank you."

"Hey could you get some ketchup and mustard please?"

"Sure thing."

"What are you going to put the mustard on?"

"The home fries."

"Yuck."

I watched her. She put a little salt on everything, a little pepper on everything, and ketchup on the home fries.

"Hey bartender got A-1?"

"Coming up."

"Thanks."

She shook the bottle and poured a stream of A-1 down the center of the steak. I picked up the salt and prepared the same way, adding a little mustard on the home fries.

"So why are you in Bakersfield?"

"I live in Anchorage, Alaska, and am just on my way back up there after a drive around of eighty days. I went down to North Carolina and stayed at a small cabin on the Blue Ridge Parkway. I did some of my most profound work down there, in governance, economics, taxation, representation, and justice."

"Like the Australian aborigines walk around?"

"Yup."

"Where about on the Blue Ridge?"

"Ennice. A natural beauty without equal."

"It was a treasure to have been raised in such a beautiful environment. That's where I fished the headwaters. Tell me David, being 50 or so years old, and working out so much science and other stuff, over such a long time, what has the passage of time been like for you?"

"I'll have to think about that for a while before being able to give an honest answer."

We finished breakfast.

"Are you ready to go?"

"I'm going to use the restroom and will be right out."

"Thanks bartender."

"Your welcome. You two have a nice day."

I walked out.

I looked over her dark blue Mercedes 500SL. Gray cloth interior. California license plate AMF 930.

Heidi came out the front door.

"We are taking your truck right?"

"Do you want to do some of the driving today?"

"If I drive I would like to drive the Mercedes. But today I would like you to drive, in your truck. How does it handle?"

"Like a sports car, nice balance, a little stiff. 4 speed electronic overdrive transmission and 5.4 liter small block. Let me get the door. Please."

"Thank you."

 "Comfortable?"

"Very.

"The second problem I would like to discuss today is terrorism."

"One last query before terrorism. Which character from man's history would you characterize yourself as?"

"Socrates, who thought, talked and taught but did not write. But I am not planning to have to drink the hemlock."

"Excellent. And what is rule one of pedagogy?"

"We don't persuade by teaching; we teach by persuading."

"Excellent Socrates."

"Thank you. One more thing, I consider my essays as struggles between too few words and too many."

"Lovely, OK, what is the root of terrorism?"

The Diablo Cantina was at the intersection of 99 and the Porterville Highway. I turned left up the Porterville Highway. That was the route to Sequoia National Park.

"I thought you'd ask the easy questions first, no problem, I'll just touch a few points. Would there be an Islamic Jihad if we had not supported Israel for 59 years? Would there be an Islamic Jihad if we had not supported the Saudi monarchy for even more years? Those are the first two questions I ask."

"I also ask what is the root of hatred. First of all, I observe that every rational person, no matter of ethnicity, loves their children, and would prefer for none of them ever to face mortal destruction. That much about the rationality of man seems to me self-evident."

"In the political arena the terrorists are characterized as hating freedom. That seems to me a demonization. That represents to me seeing the trees and not the forest."

"We need to provide both the goal and the stochastic walk to implement that goal. The goal is universal peace, justice, freedom, and liberty."

"Providing the goal is both a vision for all mankind and requires planning a realistic mechanism to get there. Do you think we could take all our weapons apart? Can a twelve-year-old understand an internal combustion engine?

"Easily!"

"What will happen to resistance?"

"It will dissipate, and fast. We don't need the damned Arabs one bit. They need our technology, being unable to do it themselves. That is trump."

"The miracle of the developed countries modern technology the stick?"

"Precisely."

"The carrot?"

"Building on the planet Earth the Garden of Eden, God's promised Heaven on Earth. The realization of universal peace, justice, freedom, and liberty and the technology to supply all physical needs, including as top priority treating all pain and suffering, and plan a life as free of it as is possible, recognizing we all die, and merciful Jesus, let it be first my choice when and how I die, and second without pain."

"Is the threat of naturally occurring infectious disease serious and is the threat of designed infectious biological weapons serious?"

"Yes and yes. Both are very serious problems."

"How would you describe where we are today in biological nanotechnology?"

"The seminal question is what DNA sequence? This is because we can build viruses and soon bacteria by specifying their DNA sequence. We can design on the computer any DNA sequence. DNA sequences of bacterial length can be put together through nanotechnology nucleic acid synthesis and enzymatic splicing capability. The simplest, by far, is designing a virus as compared to a bacterium. But bacteria are not that hard either. So the question is not the experimental but rather the theoretical question: What sequence?"

"What kind of action is it to answer the seminal question: What sequence?"

"It is precisely to play God."

"Is that a reasonable activity for a mortal to be doing?"

"We design our children through mate selection now. I view modern biology technology as a gift from God, intended for our wise use. I have already stated the goal – to build the Garden of Eden here on Earth, where just about all problems are solved. The scientists will be hot on the trail of knowledge, implementing the miracle of modern medicine, designing useful biological vectors that are viruses and cells. Problems in addition to medicine include clean water, waste management, modern agriculture, bio-mass and chemical production, energy production, and energy inter-conversion."

"Is there a deeper reason for being able to play God?"

"Yes."

"Ask the question: What is the relation of man to God? I submit the answer is: Man and woman are Gods."

"Consider what a conundrum is. The definition of conundrum I like is a riddle whose solution is a riddle. That reflects a symmetry. The symmetry is that between two riddles, one a question and one an answer, married inextricably, forever in time. Question and answer are a yin/yang system."

"I claim there are three essential conundrums that answer, at least for me, the questions posed by religion. Conundrum uno, eins, one:

1. What is the relation of man and woman to God? / Man and woman are Gods.

On Earth, over our finite lifetime, we are physical, implemented as chemical machines, obeying the Laws of Physics. In the afterlife we walk to eternity in a non-physical realm, defying our most basic logic. So conundrum dos, zwei, two:

2. Finite physical life. / Infinite non-physical afterlife.

But we are not the God of the Bible, the omnipresent, omnipotent, omniscient one, who created the universe. What is our relation to that God? What is our relation to the God, the force, the mechanism, the cause and effect that gave rise to a universe that obeys the Laws of Physics? This is conundrum tres, drei, three:

3. Big doggie. / Little doggie.

We humans are like Big doggie in that we are in the image of our fathers, and our sons are in the image of us, a demonstrable God like attribute. We have a general, all-purpose, multi-tasking, and unbiased central computer, our brain, giving rise to reason and logic, that is another demonstrably God like attribute."

"But we learn from experience, we start out empty and without programming, we make mistakes, we suffer pain, we are, in our lives on this planet, mortal. Those are Little doggie attributes."

"I have summarized our relation to the universe in a short, succinct, poem. Would you like to hear it?"

"I would like to hear that poem, is it a poem that summarizes knowledge in this religious arena, the arena of life on planet Earth?"

"Like mathematical equations and physical models, in poetry simplicity is both elegance and beauty."

"What is that poem?"

"Why are we here? What is our purpose? How should we lead our lives?

The why: Unknowable, unfathomable, incomprehensible.

The purpose: To pass on the joy we find in being. The sexual dynamics you know.

The how: Without fear, with love, compassion, mercy, and charity, without impiety, but with righteousness, and above all else with Wonderment."

"Beautiful. Thank you. Is that the core of your religious beliefs?"

"Not only the core but everything knowable."

"And you believe in an infinite non-physical afterlife, a physical absurdity, as the riddle that is yin/yang to the fact physical existence, that is all we experience, is also absurd?"

"Yes."

"Is reducing complexity to a small set of simple ideas what a scientist really does, like Newton's second law or Einstein's $E = mc^2$?"

"You got it."

"You're going to like the mathematical relations in my model of physics and the geometric models in my chemistry. It's just the elementary mathematics of three real axes: x, y, and z. Of course I can use any vector spaces necessary, including those in dimensions higher than three, and polar coordinates. The objects I can place in three-space are points, lines and surfaces. A surface can be closed and generate a volume. To represent atomic connectivity I use directed graphs embedded in three-space. To represent DNA sequences I use a tetrahedral graph, also embedded in three-space."

"I am starting to wonder, David. What is the relation of a thought, like a point, or at the other end, infinity and what is their relation to the real world where neither can exist?"

"In thinking about that it has to do with having the God like property of a general, all knowing, unbiased brain that can answer every question except for three."

"What are those three questions that have no answers?"

"Define an edge to space?"

"Define a beginning to time?"

"Why do Ö particles exist?"

"Is that the basis set for your epistemology?"

"That's all there's to it."

"There are two camps concerning Goldentongue."

"One, she is the smartest woman, that in her biology is obvious, today the ascent of woman just the removal of environmental restrictions, that made sense in the past but, with technology and long life no longer dictate the outcome between man and woman".

"The other camp believes Goldentongue is really a man, posing as a woman for reasons of seminal strategy?"

"Hey David, do you consider yourself a country boy or a city slicker?"

"Lived first grade on an abandon farm in the country, mother's brothers are dairy farmers as was their father. Still think pejoratively about city slickers. How's that for imprinting at age six, my balls were still small."

"Thanks for that observation. I am sure it reflects your maturity. Can I get a cold one out of the cooler for you?"

"Please."

"I've never drank before noon before?"

"Are you going to have a beer now?"

"You've talked me into it."

She opened the cooler and pulled out two Tecates. She opened one and handed it to me. She opened the other and raised it to me for a toast.

"To wonderment!"

"To wonderment."

"Hey I've got a good question for you. When a man meets a woman he thinks about sex with that woman in a certain amount of time, and vice versa, a woman thinks about sex in a certain amount of time. What do you think those times would be?"

"That's very personal but it does not embarrass me. If you'll be honest with me, I'll be honest with you. How long did it take you?"

"One glance, a fraction of a second. How long did it take you?"

"I saw you come in but did not notice you. You walked up to my table. That was one glance. The second glance was into your eyes, after you were sitting across from me at the table. At that point in time I thought of sex. Good looking, hard to resist, I felt there might be sex involved."

"First glance and second glance – a good omen. Do you know what reflexive corners are in a directed graph? They are arrows, edges that make a little loop around back to the same vertice of the directed graph. They can be located anywhere in the graph."

"Let's put some classical music on. Any loaded? What slot is it in?"

"Four. Mozart piano concertos."

"What should we do right now, given MAD, given suicidal homicidal terrorists, given the insane asylum, the lunatic world we currently live in?"

"Inspire mankind by firstly stating the goal of universal peace, justice, freedom, and liberty. Then everyone disarms. We announce our policy of only trading with countries that implement universal peace, justice, freedom, and liberty."

"That's it?"

"It is. I like to give names to things. You know how the military gives each operation a name. As I've already mentioned I give this operation the name Naked Dicks."

"I still cannot tell if you're sane. But I agree with you the world we live in is completely insane."

"If you call universal disarmament Operation Naked Dicks, then what do you call stating the goal of universal peace, justice, freedom, and liberty?"

"Rocking Melons."

"You are very sick, in a funny way, David. Would you like to advise presidents?"

"I consider that a high responsibility. I think for play, for work, and for duty. I interpret my duty to give the policy makers pure, unrelenting truth, at the frontier of epistemology and metaphysics."

"You have already told me your epistemology – all questions known net of three, an edge to space, a beginning to time, and the existence of Ö particles – what is your metaphysics?"

"I just used the word and to be honest I don't know what it means."

"Do you know what ontology is?"

"I know the definition, the theory of being, but I do not know what is the right, the all encompassing, theory of being and I do not know if one exists."

She gave me a glance, our eyes met for an instant. She was silent.

"Then you consider your politics the ultimate and end goal of politics, operation Naked Dicks, your epistemology, three unanswerable questions, metaphysics is bullshit, the highest expression of aesthetics your elementary particle physics and quantum mechanics and I suppose the foundations of your theories are based on pure logic. What about your ethics?"

"I'm a bit inscrutable."

I pressed for disc 5 in the CD player, Mile's Kind of Blue.

I set the volume at the level that there would be no conversation but also not too loud.

We listened for twenty or so minutes without conversation.

"How far are we from General Sherman?"

"A little over six miles."

Eight more minutes of Kind of Blue.

We pulled into the General Sherman parking lot.

"Big."

"Let's walk around that beast."

"Hey, wait for me."

We walked halfway around and I stopped and faced her.

"I know you don't smoke but how about just one cigarette, you'll get dizzy, here on the backside of General Sherman?"

"OK. Camel filter 99?"

"In the box."

I gave her a cigarette, lit it and lit one for myself.

"I'd like to drive on the way back. Your F-250 4x4 handles very nicely. Believe it or not, David, I have never driven a truck."

"Adjust the seat and the steering wheel. American pickup trucks are the best, very fine vehicles."

"If you were the Department of Conservation leader for the planet what would be your policy? And also if you were the Surgeon General for the planet what would be your policy? And also if you were the Attorney General for the planet what would be your policy? I know you have considered all of those duties in terms of first principals, embedded in biological reality, to observe understanding the biological Tree of Life, with man on the tallest, single branch tip. What are your core conservation ideas?"

"The first priority is to maintain the ecosystem of man, no question about it. If the Sun started getting hotter and we had to squeeze all of mankind into the polar region, how would we do it? By warfare or in a rational manner?"

"How far ahead should we be planning?"

"Until the Sun goes red giant."

"To put in place a rational, fair world order for all mankind for the rest of time on the planet Earth is a mind-boggling achievement. Can it really be done?"

"Not without a conscious effort to do so. That goal is the goal of virtually all current religions. It is the goal of all rational people and always has been the goal of rational people. It only requires catalysis in the 21st century."

"Can you put your essential elementary particle physics in a single page understandable by many, if not every, human?"

"I am proposing to explain elementary particle physics and quantum mechanics in terms that everyone with common sense can feel intuitively comfortable with and have a significant degree of understanding. It all reduces to charge, mass and velocity, it's that simple."

"Neutrinos are only found between atoms, not inside them. Electrons, protons and atoms are small soap bubbles, liquid state, spherically round. The electron and proton are the same size when free, not bound together in atoms. That size is one-half the hydrogen atom radius. In hydrogen the proton is a soap bubble and has a radius of one and the electron is a soap bubble with a radius of two. The mechanism of attachment between protons and electrons in atoms is due to the electric forces that are a function of the electric field that is totally enclosed between protons and electrons. Not only do I know the size of all the atoms, I am patenting the computer utilization of that radii set as objects that can be manipulated in computer programs."

"Give it to me in writing, let me read it four or five times, let me think about it deeply, let me get a grasp on your definition of cause and effect, on your model, and I think I can get a handle on it. I look forward to discussing it with you. Want to have breakfast again at the Diablo tomorrow at 7:30, I thought the food was pretty good?"

"That would be most enjoyable Heidi."

I put on Diane Schuur's Talkin' 'Bout You followed by Diana Krall's Live in Paris. After listening to Diane Schurr Heidi couldn't resist opening it up a little on the windy mountain road and going downhill.

"Don't burn out your brakes Honey."

I was worried she would warp my rotors but they probably needed turning anyway.

"I'm slowing down."

She kept it in second and low on the tight and tighter corners. We both remained quiet, together, on the drive back. She was an excellent driver, and not only for a woman.

The Diablo Cantina came into view and Heidi put on the turn signal.

Heidi parked the truck and we both got out.

"Thank you Heidi for a very enjoyable day."

"The same David. See you at 7:30."

She offered me her hand. I shook her hand and placed my left hand on her forearm, looked her in the eyes, and said:

"Thank you again."

"Similarly."

Our hands parted. I got in the truck and looked at my watch, 1:20 PM, a five-hour drive. I looked at the trip odometer, 242 miles. I had not had that much fun and enjoyment in many years, even since my youth.

3 Our second breakfast together in four days

I pulled into the Diablo Cantina Sunday morning at 7:30 AM. Her Mercedes was already there. I got out, took off my sunglasses, and opened the front door. The light coming in shone on Heidi at a table with her back to me. She looked around, made eye contact and watched as I walked up to the table.

"Good morning."

"Guten morgan freulein."

I sat down across from her.

"What are your plans for the day?"

"After breakfast I am heading back to Anchorage, about 3500 miles, a five to seven day trip. I've driven it eight times, six alone, once with my younger brother, and once with a friend and business partner who I went to school with at Cornell. It's an interesting experience. There is very much thinking time."

"You're a deliberate, thoughtful person, have thought extensively about everything from elementary particle physics, to governance, seem able to home in on the cause/effect, Newton's third law, the root. I respect that because as a string theorist I have to have similar attributes. What is the probability we would meet at the Diablo Cantina in Bakersfield on a Thursday, April twenty-sixth, 2007 a little after 4 PM?"

"Greater than 1 in 6 billion squared."

"What are your plans today?"

"I go to church with Mom at 9:30, stay for lunch, and then drive back to Pasadena."

"Would you like to keep in contact?"

"Very much David, I am attracted to you. I would like you to send me your work in science."

"How old are you anyway?"

"Fifty-four."

"I'm thirty-six. I'll go up and order breakfast. Same as yesterday?"

"Please."

Heidi got up, walked to the bar and spoke to the bartender.

"So you do a lot of thinking while on your drive around?"

"Thinking is an act I commit instinctively, in my mind, all conscious hours. I liken the discovery process at some level as searching in every canyon and every box canyon, all the way to the peak. The peak always existed of course but was always hidden in a shroud of clouds. Ergo exhaustive search, every canyon and every box canyon."

"I liked the phrase Emilio Segre used to describe Fermi – A Mind Always in Motion."

"It is possible to make a single guess that is right and profound but the more general case is that a continuity of hypothetical's is posed, the implications of each are worked out, each guess is weighed for veracity, they get sorted into a truth bin, a take another look bin, or a false bin, and then right back to zero, guessing again, again, and again, so that by the time you finish you have made all the right guesses"

"Did your knowledge accumulate, as the sum of moments, instants in time, of discovery, in a roughly linear way, over your time span of intellectual eminence or was it episodic?"

"Agonizingly linear, punctuated with moments, instants in time, episodes of great profundity, of crystallization, of insight, of order triumphant over disorder."

"I'm starting to wonder if you are Goldentongue. The span of your knowledge from the simplest, elementary particles in space over time, to security strategy is quite impressive."

"I have found, over and over again, the correct answer is also the simplest. Newton's Rule I of Philosophy, "… for nature is pleased with simplicity and affects not the pomp of superfluous causes." is my motto. Some people seem genetically incapable of seeing simplicity and certainly can't figure it out."

"Where have you been staying?"

"The Motel 6 out on 5."

"You checked out yet?"

"That will be my last stop before getting on the road."

The bartender brought breakfast. Both in thought we did not say much. After breakfast Heidi gave me her addresses.

"I like thoughtful emails."

"Great. Look forward to communicating with you soon. You ready to go?"

"I am."

"I won't walk you out. I want to sit here and ponder for a while."

She got up, stepped over to facing me and put out both hands. I grasped both and she drew me up to her lips and gave me a short, gentle, kiss.

"So long."

"Bye now."

I had a smoke, thought about things for a while, got up and left the Diablo Cantina.

I drove back to the hotel room and packed. I left the key on the dresser at the Motel 6. I got in and started the truck. I looked in my rear view mirror and there was a dark blue Mercedes pulling in the parking lot. It pulled in behind me and Heidi got out and walked up to my window. She had a big smile.

"Want some company on your journey back to Anchorage?"

"Nothing could be nicer."

"I've got a dog, Phoebe, a one-year-old Rhodesian Ridgeback. Can she come along?"

"Nothing could be nicer."

"David, I knew you wanted to ask me to come along with you, but I also knew you would be too shy to ask. This is going to be fun for me. That Cal Tech pressure cooker is getting old. I need a break. This sounded natural enough. I am shy too. Thank you."

"Follow me back to my Mom's. Go 2.2 miles up the Porterville Highway. Take a right on Sluice Canyon Road, a half mile on the left, number 707 Sluice Canyon. I can be packed in ten minutes and you can meet my Mom."

"Nothing could be nicer."

"Follow me."

"Nothing could be nicer."

4 Off to Crescent City

I opened the door for Heidi, got in myself, started the truck, and we both said goodbye one more time to Heidi's Mom Monica. Heidi had decided not to take her dog Phoebe.

"You know how there is cave man in men?"

"I do."

"What you want to name stating universal peace, justice, freedom, and liberty as mankind's goal is The Sands of Time and not Rocking Melons."

"And what you call operation Naked Dicks should be called Swords into Plowshares."

"I am corrected. I like your choices very much."

"The Y chromosome is really amazing."

"Even more so than you currently think. Then it will be The Sands of Time, operation Swords into Plowshares."

"And the Plow that broke the Plains?"

"That's nice, it will fit somewhere. How far are we going today?"

"I would like to stay at the Super 8 in Crescent City, on the north coast of California, where I stayed on the way down. We can go for a walk tonight in the harbor. It'll be a ten hour drive or so."

"Lovely."

"David do you know anything about formal logic?"

"The statement operators and, or, not, and the if/then statement. Computer programming is sequence, selection, and looping. If/then/else is the selection statement in computer programming, the branching statement."

"Do you believe logic underlies physics?

"Yes I believe that."

"The most basic statements: Space is three-dimensional. Time is absolute. The only mathematical objects that can be placed in three-dimensional space are points, lines, surfaces, and volumes. If a mathematical object is an elementary particle, then it is a volume with a closed surface. Points, lines, and zero thickness surfaces, other than the one-sided closed surfaces of the elementary particles, are ideas that exist in our mind only."

"That's my elementary particle physics logical basis."

"A classicist?"

"Yes, emphatically so."

"All that classical nonsense was thrown out four to five generations ago with Einstein's theories of special and general relativity and the Roaring Twenties loudest roar, quantum mechanics. Curved space, as predicted by Einstein has been proven to eight places. What do you think that means?"

"Photons follow a curved path in three-dimensional space where gravitational fields exist, that happens to be everywhere in the known universe. I believe you were referring to the transmission of a photon signal from Mars to Earth, whose time confirmed it was on a curved path longer than the Mars to Earth straight line. Is that the best current proof?"

"That is the experiment I was thinking of. So you say curved path in three-dimensional space, over absolute time. A trajectory line in three dimensions is in the past, the center point's traversal of space, and in the present instant, the particle center point is at the tip of the trajectory line. Is that how you see it to work?"

"That's it – all Galilean transformations, simple vector addition, when the correct elementary particle dynamics are understood. The trajectory is, of course, deterministic. I assert that in collisions between two Ö particles, the outcome, that are the outcome trajectory lines, are known from the incoming trajectory lines. For me that is determinism, and the laws that the elementary particles obey are deterministic.'

"What about free will?"

"Free will in man, a gift of great magnitude, is at the highest level of physical complexity, and is quite real. Ö particle collisions are the simplest and deterministic. I am interested in the physics of the mind – neurochemistry, physiology, molecular biology and genetics of neurons. Remember that man's genome is only three gig. There are 25-35 thousand genes in man."

"Going to devote your most important time to neurobiology then?"

"Yes. Do you know what the curvature of space is due to in terms of a single elementary particle? It's the orientation of neutrinos in the space filling neutrino foam. Neutrinos also have an average orientation, summed over many collisions with each other. Neutrinos are spinning on an axis. Neutrinos have handiness. Due to having both mass and being in motion, spinning, neutrinos in our matter universe have a quantum of angular momentum. Stronger gravitational fields correspond to more neutrinos oriented parallel to the gravity field vectors."

"A neutrino is an Ö particle, spinning on its axis, with handiness, the matter neutrino with a right hand spin, based on the Poynting vector. Neutrinos are trapped in the inter-atomic space, the space between atom surfaces. There are no neutrinos inside atom surfaces. Neutrinos are incredibly important to understanding electric and magnetic fields, so very important to understand ions and dipoles in chemistry. My solution to the protein folding problem is to specify the atom surfaces, a set of atom radii, and represent the electric field energy in the atomic dipoles. For physical models I am going to make Styrofoam balls, each element a certain radius,

with male Velcro representing positive dipole and female Velcro representing negative dipoles. When a protein folds, positive patches get as close as possible to negative patches. The energy stored in the inter-atomic dipole field space is minimized. Simultaneously the attractive forces between atoms are maximized. That is the nature of the low energy well a protein follows as it folds sequentially with synthesis."

"More than that, minimizing dipole energy and maximizing inter-atomic forces is the Arrow of Time in biology."

"You'll love my model of water? Water is the Mother. Given liquid state water, and solar light, life evolves."

"In analyzing photon flow from Mars it is given a time length of flight, as if in three dimensions of space and over time, but what we believe is curvature in higher dimensions, in the time span from instant of emission on Mars to instant of capture on Earth. Could both your theory and the accepted theory be compatible with the same experimental evidence?"

"Precisely."

"Do you understand General Relativity?"

"Only two predicted phenomena, curved space and the Equivalence Principle that asserts a force of propulsion in a spaceship and a force due to gravity in a gravitational field are identical. I do not understand any of the mathematics. I could learn that, of course, but compared to protein design, cell design, viral design, small molecules to large polymers, ordered events in three-dimensional space over time in the condensed matter systems of biological organisms, all far more important."

"Consider human husbandry. What if you could get an embryo, say of Goldentongue with a virtuoso man. And you could select an embryo that would live a long, healthy, and vital life – no overweight, no mental illness, low cardiovascular stresses, low cancer risk, no orthopedic problems, sexually attractive, high IQ. That represents determinism in DNA sequences. What if most women wanted an egg hot from the tubes of Goldentongue? They wanted her X."

"The dance of the highest evolved chromosome on the planet, the X and the Neanderthal Y, God if it wasn't so damned painful, so many times in repetition, for so many, it would be a comedy."

"How do I design my daughter's now? I like her Mom. I mate with her Mom. That is natural enough."

"What drives the frontier of the Bell curve of evolving intelligence? Mate selection. The most desirable traits of mankind are collinear. Intelligence, looks, optimal body, strong monogamous sexuality – these traits are collinear, and drive the moving of the edge of the Bell curve over time. Why did it take until the 17th century to develop calculus? That's when man was smart enough to do it! With Newton and Leibniz sharing honors, proving it as multiply emergent, that means it is clear genetics is the dominant factor. The smartest people ever are alive today."

"The Tree of Life has vertices, branches, and a tallest single branch tip, humans. Bacteria are on the lowest level branch tips. In between is all of biology. I think we have traversed over the

tallest branch, in times past, for a long time, a time period that is difficult to put a number on. When was the first word? At what rate did man acquire intelligence? It seems if modern religion dates to 3-4000 years ago, representing an evolutionary process, that recent history is rapidly evolving. The Egyptian pyramids, a lasting monument to good construction mathematics, date 4-5,000 years ago. What is the genetic drift? Were the Greeks smarter than us today, or are we obviously smarter? We are obviously smarter. And we are obviously more numerous."

"In your acquisition of knowledge, I sense your blood is in every, solitary step?"

"Painfully so."

"Maybe it had to be that way, some kind of Darwinian drama in genetics and selective forces, some kind of Greek tragedy about basing life on reason?"

"With you I perceive an epic, snatched form mortal tragedy, and transcendent in the end."

"I'll be honest with you Heidi, it seems to me rather simple to figure everything out except the three unanswerable questions – space edges, time beginnings, Ö particle existence. And … I'm falling in love with you."

She looked over at me, our eyes touched, and she smiled.

"I've only made love to two men, both only after lengthy relationships. The first was my junior year at Harvard. We eventually got married after graduation and the marriage lasted 7 years. He started cheating on me and that ended the marriage. The other I just broke up with in February."

"We'll take California 20 over to the Redwood Highway."

"I think I know you have not, but it is 2007 and we just met several days ago, have you ever had …"

"Never had a STD."

"Neither have I. Do you know why I am asking?"

I looked over at Heidi. She looked at me and smiled as if inviting me in.

"Honey I think I do."

"I am becoming, I am becoming very, how can I say this, feeling a strong physical urge. Give me your hand."

I placed my hand in hers and she placed it on her stomach then slipped my hand slowly into her pants over her panties. Her pussy was wet. I massaged her through her wet cotton briefs.

"Oh David, lets look for a secluded parking spot."

"I'm looking."

I withdrew my hand from her pants and took the wheel again as Heidi moaned. Her wetness on my fingertips turned me on. I put some Mozart on, down low. After a few miles, a few minutes, there was a small road on the right, Observatory Mesa road. I turned right onto Observatory Mesa, a small, gravel, observatory access road. A half mile back I found a level, secluded spot, and parked.

40 minutes later we got back on California 20.

"David, do you know I can feel attraction for you again now. That's hard-wired right, no source of guilt, precisely the opposite, to exult in, to enjoy completely."

"God's greatest gift to mankind."

"We are off to a good start, like no other I have had."

"I believe love can be based on, be defined by six phenomena: friendship, intimacy, commitment, to cherish, to honor, and to respect. I am on all six with you."

"I like your selection of six attributes. They define completeness for me."

"I'm over your six."

Love was simple, complete, symmetric, elegant, beautiful and of high utility. At fifty-four I had found it again. Thank you, God, Big Doggie, thank you, thank you, thank you so God damned much, it embarrasses my cynical view, it crowns my opus, finis coronat opus.

"A penny for your thoughts?"

"Finis coronat opus."

I marveled at the symmetry of Heidi's last two statements and my last thought. Poetry in motion.

"Where would you like to stop for lunch, fast food OK?"

"How about a Pizza Hut or similar with all you can eat salad and pizza? I want one with everything on it except ham and pineapple but including anchovies"

"Sounds good. I love anchovies."

Another poem was coming to me. I realized the commitment attribute Heidi had made. I wanted to write a poem. Its title would be Knowing.

I already know you will always say yes to me
I already know your ardor will always be fiery for me
I already know I will know you in each and every way
How do I know, because you already know me and I already know you too.

"Do you want to have children?"

"More than anything else."

"Will you marry me?"

"Yes."

The twenty-ninth of April, a Sunday, at 3:03 PM, on California 20 in the Coastal range.

"Lovely."

"Meet by extraordinary coincidence and getting married in a little under seventy-two hours. What would that portend?"

"I'm going to take a nap. Put some music on for me."

I selected Yo-Yo Ma Bach cello solo. She fell asleep in five minutes. I had Goose bumps.

I thought of our meeting, getting married and having a child symbolically:

$$\bigcirc + 1 = 1$$
$$1 + \bigcirc = 1$$
$$1 + 1 = 2$$

$$\int_1^0 \frac{1}{N}\,dN \iff \int_1^\infty \frac{1}{N}\,dN$$

$$\bigcirc + 1 = 1$$
$$1 + 1 = 2$$
$$1 + 2 = 3$$

I slowed to the stop sign at the Redwood Highway.

"Honey, you'll want to be awake for this."

"Don't wake me up again."

"Sorry."

She dozed back off. I turned right. I was alone but now never alone again. I knew my mission well: Advance universal peace, justice, freedom, and liberty, The Sands of Time. Convince the United States of America to be first, to be foremost, to go naked of armies and weapons first if necessary, operation Swords into Plowshares. It was April twenty-ninth, a Sunday, 2007 and I was ready.

If I met Goldentongue, would I leave Heidi? What if she was my counterpart, legend, and uncertainty? I answered quickly, Heidi, for the duration here in the physical realm. She pulls at the tether right where I do. And that is at the front. But could Goldentongue be the Irresistible in a 16 or 18 hook?

You know in geometry you can do anything with a compass. For instance, you can essentially build the Pyramids and the Parthenon with a compass and a straight edge. I can find the tetrahedral angle to three places in a few minutes of trial-and-error construction. Could you do the same with the microscopic world, the world of atoms and molecules, light and gravity? That is precisely what I am proposing. A deterministic biology based on the geometry of three-dimensional space, Euclid's Elements.

Now hear this, the people of the planet Earth. We are going to do one of two things: 1. Universal peace, justice, freedom, and liberty. 2. I'll build LD100 and force you to observe universal peace, justice, freedom, and liberty. Teller would be proud of me.

Driving the Redwood Highway with Heidi sleeping in the laid-back passenger seat I wondered: Was I right? Had I seen beauty better than Euclid, better than Newton, better than Maxwell, better than Einstein, better than anyone in mankind's history? Could I have invented calculus? I doubted I would have been able to do that. I am a mechanic. I reduce all physics to elementary particle mechanics. Mechanics over time is dynamics. I feel I easily could have recognized the relation of space, time, momentum, force, and energy that Newton perceived as an articulation of mass that undergoes acceleration and has velocity and momentum. In fact, I know mechanics and dynamics far better than Newton. I imagine I am more like Leibniz in that I can do the physics, Leibniz can do the mathematics, we each only did one of the two, Newton did both the physics and the mathematics. Could Newton have solved the protein folding problem like I can? Obviously I give Newton #1 rank. I give myself, my physical chemistry professor, a generation ahead of me, Maxwell, and Einstein ranks 2 to 5, in no particular order.

Heidi seemed to me very smart, in fact around as smart as a person, in this case a woman, gets. I thought men are smarter than women at the highest level, due simply to having a little more DNA. I imagined a woman could get to around 8th on a universal scale, i.e., the population of the planet Earth. I knew what that would mean in chess. Bobby Fischer and Garry Kasparov would never lose to an eight in a world chess championship match. Enough games to test superiority in our current architecture.

"Good morning, good evening, and good day, fellow residents on this planet Earth. We are here today to exult in the transcendence, taking that quantum step forward, to universal peace, justice, freedom, and liberty. That transcendence is the transcendence that is precisely that over war and conflict among man."

I'd have to work that speech out.

45

I put Robert Cray's Strong Persuader on down low, surrounded in the redwood forest, 65 miles from Crescent City, Heidi snoozing, the F-250 a splendid horse. One elementary particle results in this!

5 The lost chapter

6 We took a right hand turn onto Oregon 1

After two hours and a half of driving the Oregon Coast Highway, in downtown Tillamook, we turned right onto the Wilson River Highway, Oregon 6 to Portland and Interstate 5. It was 10:52 AM.

"My Dad thought chemistry was the essential science, mapping biology into physics and mathematics."

"No doubt he was right. I agree that chemistry is the arena. Also electrical engineering."

"Biology has gone from all qualitative, prior to Watson and Crick, to the highly quantitative subject that it is today. The magnitude of transcription for different genes, the fundamental Turing machine of life, is the deepest level of interpreting the machine structure of biology."

"Darling David, after last night, I wonder about our children. Can we bring them up in the absence of warfare, a mankind embracing The Sands of Time?"

"Let's do it. I believe, as Socrates did, that reason, once embraced, is irrefutable and must be followed."

"I have hated, and I am contemptuous of, the violence mankind has made on mankind."

"Was your grandmother on your mothers' side in the Holocaust?"

"She was."

"Did she die in a concentration camp?"

"She did, the Dachau forced labor camp."

"Sorry to hear that."

"I have always felt guilt for the German role in WW II. I have always realized if my ancestors had not migrated to America I could have been a frontline soldier, a concentration camp guard, or at the other end a submarine commander or an advisor to Hitler. My advice would have been: Don't provoke Russia or the United States, consolidate Europe first, including Britain. If I was knowledgeable of the Holocaust I would have advised Hitler to exile the Jews, not kill them."

"I have thought about the concentration camps. My most horrific image, you are lying in very close quarters, in a prison. Every so often guards take a few of the prisoners away, off to the carbon monoxide chambers. But all the fellow prisoners know is they have taken people away and they did not return. It is beyond terrifying."

"How do you feel about your German intellectual heritage?"

"Although I am a German-American there is no melting pot in my personal phenomenon. I am a German. That is what I am genetically."

"Being German, I relate to some accomplished German thinkers. First of all, Martin Luther, Gottfried Wilhelm Leibniz, Ludwig van Beethoven, Carl Friedrich Gauss, considered one of the three greatest mathematicians in all time, the other two being Archimedes and Newton, Hermann Hesse and Erwin Rommel."

"Is that a little pompous Honey?"

"I believe it is your rank."

"What's your rank in designer biological weapons technology?"

"One. But I only lay the physical foundation. I am neither an experimental microbiologist nor virologist."

"What do you think of Edward Teller?"

"Great nuts."

"I agree."

David was an interesting eclectic. He had all the attributes ascribed to the mythical Goldentongue. He's been honest with me. We had shared intimacy. To talk with David is to be unencumbered by prejudice and open fully to truth. His reasoning skills were astonishing. I could see into his motive.

David threw out impressive, large, nuggets of gold, more than anyone I had ever been around.

He claims a solution to protein folding, or as he would describe it, the solution to the general interactions of atoms and molecules in biology.

The frontier is genius. What advice would I want to give to my man, on The Sands of Time? Be yourself David, know I love you and support you completely on all your strategy and tactics.

For the first time in my life, I delegated an important decision to my man.

I saw my life new, to bring children into my and our lives together, and to advise my man.

"First a few general statements – one in physics and two in chemistry. Energy has to be positive, there is no such thing as negative energy. Minus 13.6 means the hydrogen atom, in the $n = 1$ ground state, has 13.6 eV less than a free electron and free proton. In my model a neutron is a combination of a proton and an electron, 1/1836 the Bohr radius. Then all of my chemistry involves only electrons and protons. I ignore the chemistry of neutrons. There are only two fundamental processes in chemistry, transferring an electron or transferring a proton. That's all that can happen, precisely because all chemistry is based on two particles, the electron, and the proton. In addition to the transfer of an electron or proton energy is transferred in oxidation and reduction events, coupled to the electron or proton transfer. Transfer processes are always couples between two atoms. An atom that transfers an electron undergoes oxidation. The atom that accepts an electron is reduced. An atom that transfers a proton undergoes reduction. The

atom that accepts a proton is oxidized. When an atom is oxidized, donates an electron, or accepts a proton, energy flows into that atom from the coupled atom that is being reduced on the center axis of the interaction. When an atom is reduced, accepts an electron, or donates a proton, energy flows out of that atom into the coupled atom that is being oxidized. So energy flows out of the atom being reduced and into the atom being oxidized"

"The simplest redox couple is an electron and proton meeting and forming hydrogen. The electron is oxidized, the proton is reduced and an $n = 1$ state of the hydrogen atom is created. They are the same energy, where the hydrogen atom energy is the simple sum of the free electron plus the free proton energies. Of course I include all the electric fields. A free electron and free proton store 13.6 eV in the electric field that spans from their surfaces to infinity. The hydrogen atom is neutral and has no external electric fields. The electric field of hydrogen is between a proton at 2.645×10^{-11}m and an electron at 5.29×10^{-11}m. The magnitude of the electric field in $n = 1$ hydrogen is 6.8 eV, one-half of 13.6. The n = infinity quantum state hydrogen atom has energy minus 13.6 eV, meaning, also in classical theory, 13.6 eV less than the free electron and free proton energies.

"Protons are very important to biology. In liquid water protons are exchanged between water molecules. The nuclei in atoms are stacks of protons at 2.645×10^{-11}m. That is the fundamental underpinnings in chemistry, in the theory of water, and the Tree of Life, all life embedded in liquid water.

"Water packs almost exactly as a sphere embedded in a cube that has a packing efficiency of 0.524. Liquid water packs at around 0.510. The accepted theory is that water packs around 0.33. Chemists are not even close to understanding water in addition to the other condensed matter phenomena in biology that ultimately are based on a theory of water. And a theory of water must include the elementary particle physics of the proton, in addition to the correct quantum mechanical description of atoms and molecules."

"So I wonder what size are protons in the dynamics of biology – acid/base phenomenon, proton pumps. I do not now know the answer and it looks like it could be a hard problem but I think the answer is one-half the Bohr radius in all condensed phase phenomenon the same as a free proton at one-half the Bohr radius free in space. That would sure be the simplest and easiest solution. Bioenergetics is of course fascinating."

"My Dad always said chemistry is more art than science. I perceive your goal is to take chemistry into the engineering realm, the core science of nanotechnology. And of nanotechnology the most interesting is nanobiology."

"Yes to all that. What do you think about when you conceptualize an electron – a point, a wave, or an atomic or molecular orbital? I would firstly like you to define all three of those objects precisely and succinctly."

"I cannot do that."

"J. J. Thomson's plum-pudding made more sense."

"So between redox couples atoms are in a single, fixed quantum state. Rotational, vibrational, and translational energies are not different quantum states of atoms, they are rather the kinetic

energy of thermal motion. Rotational, vibrational, and translational energies for a given quantum state are continuous in energy content, net of the quantum of the Ö particle that is so small it can be treated as zero in energy and all rotational, vibrational and translational motion is continuous. So far I have left out photons. "

"Darling, you have the largest nuts of any man I have been with, and I expect they are about as large as humanly possible."

"Are you serious, being literal or figurative?

"Figurative of course."

"Honey, do you know the female equivalent of nuts?

"Of course, ovaries."

"The penis in man is the embryological counterpart of his tongue and the head of the penis is the embryological counterpart of the nose. The vagina in woman is the embryological counterpart of her mouth and the clitoris is the counterpart of her nose. The head of a man's penis and the woman's clitoris are counterparts. I call this the head and tail theory of higher biology."

"I may take on a popular role as an expositor of science and military strategy. In all those interactions with the public I want to keep you and our children out of the spotlight."

"Absolutely, I want to keep our life together very private. If you must take on a role as prominent as Edward Teller I want to remain in the background. I want our children to grow up unencumbered."

"You are preeminent in science and need a public image. I can step forward at any time. I can speak in public anytime necessary, anywhere necessary, on any topic, but the optimal scenario might be none."

"What's your rank and name in The Sands of Time, Operation Swords into Plowshares?"

"The only six star in American history, the Arctic Wild Rose."

"That will be a good act."

"And I will be the last soldier, in the last battle, of the last war and good will finally win over evil."

The Arctic Wild Rose, the last soldier in the last battle. Of course these names don't mean anything. That six star stuff is pure nonsense and should not be interpreted outside of that context.

Or is it precisely the opposite, they mean everything. Here is a man who has in his countries' heritage Luther, Leibniz, Beethoven, Gauss, Hesse, and Rommel. His father and his father's father were Lutheran ministers.

He has walked alone for twenty-five years or more. He has been engaged in science since ten or twelve. He was born into the Cold War, MAD, and Vietnam. He is mature at fifty-four. He knows the meaning of physics better than any person in history. He is strong in mathematics although has put in maybe a hundred hours studying formal mathematics in his lifetime. Einstein's theories are no problem for him. David has no problem with curved space only requires that it exist in a field of elementary particles in three-dimensional space.

"Are any two events simultaneous?"

"Nope. And no two collisions are identical. Events obviously are elementary particle collisions right?"

"Obviously."

"And there are only Ö particles to collide?"

"It is simple and to an astonishing extent so."

"So what do you think the string theorists say?"

"That there is only one particle, the string, and the elementary particle bestiary of the standard model is made up of different vibrational modes, frequencies, of those underlying strings."

I knew that she knew that I had to act. That's the six star nonsense, the Arctic Wild Rose nonsense. When would life be more interesting, more fun, more requiring an individual to act it out?

"You ever wonder what you would have been if you were born at a different point in time?"

"Of course, everyone does that."

"You know what I've done in previous generations as my first, my primary, my most important duty? It's the design of weapons and military strategy. Any competent scientist or engineer that fails to recognize that duty first is either making a mistake, or perhaps just delegating responsibility. Of course most people delegate responsibility. I do not delegate that responsibility but take it on as a challenge."

"The Firecracker boys love you David."

"What do you think the capability is to design biological weapons, bacteria or viruses, and I admit when I ask you that, the not very hidden question is how deadly a biological weapon could one build?"

"In five to ten years I think many people will be able to design a LD30 to LD95. LD stands for lethal dose and the number after it the percentage of a population that would die, assuming the entire population is exposed, infected. With my reduction of chemistry to engineering and with all connectivity's in biology known a great many of intelligent people will be able to design all kinds of biological weapons on computers. In 20 years, maybe less, even a good high school student will be able to design on a computer a biologically deleterious virus and he or she and his

or her buddies can implement it in the lab through wet chemistry. The Black plague was about a LD30 if you assume almost the entire population was bitten by the fleas infected with the plague bacteria, carried on the rats. Apparently the plague was defeated by natural selection for those people with some kind of immunological resistance. For a virus like HIV, as is often the case, it is difficult to compute lethal dose, but it is quite high, although it is not contagious except by sexual transmission. If HIV was highly contagious through the pulmonary system we would all be dead already. I suppose flu is in a LD1 or LD2 range. They estimate 30,000 people die of flu each year in America. With a 70 year life span that would be 2.1 million out of a population of 280 million, so a little less than 1% will die from flu. The Swine flu pandemic of 1918 was LD100 in several Native villages in Alaska. That is very ominous. Also the genetically modified mouse small pox virus built in Australia was apparently LD100 for mice and had only one protein, an interferon, added. So it's hard to know how bad a microbe we can expect from natural causes but the manmade threat is astonishingly large and it will be based on my model of physics and chemistry implemented on a computer."

"At the highest tip of the central branch of the Tree of Life, we are open to attack by viruses and bacteria. We are, have always been, and will always be in war with biologically deleterious microbes."

"Are humans on the central branch of the Tree of Life or is that like the idea the Sun went around the Earth, a human anthropocentric notion?"

"That's a good point Honey. I think it's actually the birds that are the oldest evolutionarily, so they are the central branch."

"The most primitive extant mammal is a bat with which humans had a common ancestor, and birds came before that common ancestor."

"The surprise everyone is in for is that the promoters are the rapidly evolving frontier in population genetics. All mammals have essentially the same set of proteins but different timing and amounts of them. That's why we have something like 99% identical DNA with chimpanzees but are so much more advanced – same proteins but different promoters. That makes a lot of sense from the standpoint of molecular genetics and evolution."

Coming up on the right was the Wilson River Inn. It looked out on the Wilson River, one of the northwest's great coastal steelhead rivers. The structure was rustic, rural, built in logs, and fit into the environment.

"Want to take a motel room early and stay here at the Wilson River Inn?"

"Splendid."

"Rocking Melons David?"

"You are my, my, what are you? You are the Bold Ruler."

"Your Bold Ruler, not the Bold Ruler, Honey."

"I am corrected. You are my Bold Ruler."

"One to one and onto, a bijection in both directions, asymmetric and symmetric, simple, elegant, and beautiful, X/Y chatter. Yours are the shoulders I am on now."

I pulled in.

"Honey, since we are anticipating a pregnancy I have written a small poem for you:"

"When you are too full with the first of our pride
I will use my hand again, while right at your side
My shyness I will hide
I will feel no pride
Oh sweet, lovely Heidi
My beautiful, beautiful bride."

"I deserve your imagination, and I am thankful for it."

"Nothing could be nicer."

"I'll get a room."

I came back with room number twenty-six. It was 11:33 AM, the thirtieth of April, a Monday, 2007. It was our fifth day anniversary.

7 We entered the restaurant at 3:57 PM

We entered the restaurant at 3:57 PM.

"A table for two at the window please, or in back if that is not available."

"Right this way, in the corner and on the windows."

"What can I get for you?

"You order for me."

"Two Pilsner Urquell's please."

"How are your martinis?"

"Excellent. The best on the Wilson River."

"Two Beefeaters up, bruised, and dirty. Olives with pits if you've got them."

"A good olive with pit is essential to a good martini. Would you like a few on the side? Ours are imported from France. Cracked green olives."

"Please, I love olives. Thank you."

"I'll be right back."

"What would you like tonight?"

"You can order for me."

"So Wonderment of God's creation, the highest level of acknowledgement, as Little doggies, actors in Big doggies arena?"

"Precisely."

The waiter brought the beers and martinis.

I put my martini up for a toast:

"To dream of beauty."

"Likewise, sire."

The martini was excellent. I took out my Camels and lit one up.

"I'll quit these cigarettes soon."

"I know you will. Why did you give me a smoke on the backside of General Sherman?"

"You know how a smoke is good after sex?"

"You had one last night at the Super 8 in Crescent City after we were intimate. Was that what you where thinking about on the backside of General Sherman?"

"It was."

Heidi raised her martini for another toast.

The waiter approached.

"Would you like to order now?"

"How about two more martinis and after we've have had those we'll be ready to order."

"Would you like to have a few more martinis before dinner in celebration of our meeting?"

"I would like to do that."

The waiter brought the martinis.

"We decided to have a few more martinis before ordering. Can we stay at this table or would you prefer we go into the bar?"

"We aren't full so you will be welcome to stay at your table. I work to midnight and we serve dinner up to 10:30. Enjoy your martinis."

"So what's string theory about?"

"In all the research literature, in all the textbooks, in all the seminars and presentations I have never found a single sentence of it or a single equation in it remotely comprehensible in any way. Now you could not achieve that end, pure nonsense, where the operative word is pure, unless that was your modus operandi – that is to be the biggest hornswogglers since the Emperor's New Clothes".

"How and why would such a structure be generated?"

"First of all, it is very complex phenomena, not simple, although it is simple to see string theory is nonsense. I think it must have begun with Einstein in 1905. It was extended by Bohr, deBroglie, Heisenberg, Schrödinger, Born and Pauli in the Roaring Twenties through the invention of quantum mechanics. Although Planck initiated the quantum theory with his derivation of the black-body radiation law and Planck's constant his work was the last of the work in physics that was not playing Einstein's game. Einstein's game was to invent some science and some nonsense, disguise it well, use the mathematical ability for obscurity, deny the real common sense intuitive physical results, invent time dilation and curved space and try to keep every scientific jewel of knowledge that comes along secret until it is harnessed in his goal that is precisely to end warfare and conflict among man. That is why Einstein is often given rank

one over Newton despite Newton possibly being the smartest man in the entire history of mankind. The Einstein and quantum mechanics developers secret was kept so secret that even today all chemists, all engineers, and many physicists believe in both completely. I imagine there are even many string theorists who have been hornswoggled by Einstein and quantum mechanics and a lot of mathematicians too. But I imagine there are string theorists who understand everything. Are you one of them?"

"I got interested in string theory when I realized it was bullshit but as far as I know Einstein and quantum mechanics are correct theories. That's why I find string theory so fascinating and decided to get a doctorate in theoretical physics. I interviewed with Murray Gell-Mann to get into Cal Tech. I told him string theory was obviously pure bullshit and that the goal of string theory is to end warfare and conflict among people but that they didn't know how to achieve that goal. He said that was all right and that I should proceed as my own instincts encourage me and that no more acknowledgement of the fact string theory was pure bullshit ever had to be made again."

"It seems hard to believe that Einstein and the inventors of quantum mechanics could have been bullshit artists."

"But their theories are mostly nonsense."

"You'll have to prove that to me. They claim to explain all phenomena. If Einstein did invent the game you just described there is not the slightest hint of it anywhere in the history of science since then. It would have to be the most closely guarded secret in history. I sure don't know anything about it. If it were true no physicist is ever going to admit to you Einstein's game. They would probably want to keep that a secret forever. But of course, your model, if it is correct, will have to be recognized and replace the existing paradigms. And if it is true it is fantastically exciting, beyond my wildest imagination."

"There is a never referred to "Individualism Duality" in string theory, acknowledging that one mind and one mind only leads the way, sometimes among the mediocre of the heavyweights and sometimes a Muhammad Ali. The rule regarding discovery in string theory is that everyone is permitted to take any real, classical, common sense theory as far as they can and never have to publish a single result or share anything. They can make as much money as possible in the real economy."

"You're not proposing another paradigm. You're proposing truth, one to one with physical reality. If you chop down Einstein and quantum mechanics it will be the biggest overhaul of ideas in history, if for no other reason than the number of scientists alive today and over the last century who have believed those theories. It will also be the funniest spectacle ever, the Emperor's New Clothes in high, current, cutting edge real life drama."

"It's me or them. They are going to take it in the ass, not me."

"Are you well versed in the Bible?"

"I learned reading, writing and arithmetic along with an overpowering dose of Lutheranism every step along the way up until 5th grade when I rejected religious beliefs as just a big load of bullshit. I couldn't see the logical basis on which religion rested and was forced to reject all

organized religion intellectually but have always believed in a God and right and wrong thoughts and actions. Between kindergarten and 8th grade I memorized thousands of passages, sang thousands of songs and attended hundreds of sermons. I had to work my way through that damned catechism. I thought all religion and every single bit of it were the invention of man. I thought that the problems addressed by religion are interesting but that I could figure out more meaningful results on my own, with no particular time scale to do that and no urgency."

"If you are correct about Einstein have you also thought of the Judeo-Christian extraction of the instigators of this possible charade, you being the grandson of a Lutheran minister who was a contemporary of Einstein's and the son of a Lutheran minister and scholar of exegetical theology?"

"The parallels are striking. The writers of the Bible constructed the stage for Jesus starting over 1500 years before his arrival. Jesus completed the act. If Einstein did do what I am proposing, then he would be to me as the first writer of the Old Testament is to Jesus. By the way I am no Jesus. I would never die on a cross for anyone else except now you and am willing to kill my enemies if reason fails and force is necessary, I will turn my cheek many times but in the end not accept violence or the threat of violence against me by anyone."

"Would you still like to study mathematics, maybe be another Gauss?"

"I'm too lazy to learn mathematics and I'm way too old to pursue mathematics, I am not as smart as Gauss and the formative era he lived in is much changed today, but I would take all-time world title for tinkerer, inventor and mechanic. I hope our children can achieve Gauss status or even greater."

"I will be satisfied playing some kind of modern Jesus in the Einstein act."

Heidi got up, approached me, bent over me, kissed me, put her hand on my crotch and squeezed my nuts.

"That's what God intended them for."

"And I am to nurture and raise our offspring, support you in every facet of your life, provide the intellectual backboard for every proposition you come up with and provide you with consummate pleasure."

I got up, approached her, bent over her, kissed her, licked my fingers, slid my hand into her panties and tickled her clit.

"I love you."

"This string nonsense is much too boring. What do you think of the X/Y algebra we are playing out?"

"Did you know all algebraic relationships in physics derive from the simple differential equation, the simplest differential equation Newton's Second Law $\mathbf{F} = \dfrac{d\mathbf{P}}{dt}$?"

"Changing the subject for a second"

"You know I will always say yes to you."

"I do."

"You know I will always be open and receptive to you."

"I do."

"You know I will always let you do anything you want with me."

"I do."

"How do you know?"

"Because I already know you and you already know me too."

Heidi smiled, content, feeling resplendent.

The waiter approached.

"Would you like another round of martinis?"

"Please."

Heidi raised her martini to me.

"To knowing you."

"To knowing you."

"I'm getting inebriated."

"Do you get obnoxious?"

"Horny and I act like a slut."

"That doesn't sound like a very hard act."

"What's that supposed to mean?"

"Honey did you know that all woman over thirty are easy?"

"Do you think I was easy?"

The waiter brought the third round of martinis. I raised my martini to Heidi for a toast.

"Easiest I ever had."

"You were even easier for me than I was for you."

"We're both sluts."

Heidi raised her martini for a toast.

"I loath people who take themselves too fucking seriously."

"W and Laura are the worst."

"You know how they didn't get married until their late twenties or early thirties. That's because they are both sexually unattractive. Laura and W are a comedy in embryonic determinism."

"Is sexual inadequacy W's serious flaw, reflected in his having to be the Man in the world?"

"Amazingly I'll bet it is. Check this out, Osama is a real man in that regard and Saddam was a real man in that regard. It's really quite humorous. It's Elementary Dick Theory 101. Are you sure the operation should be called Swords into Plowshares instead of Naked Dicks?"

"I'm starting to wonder."

"You say this as a simple biologist as opposed to slightly sick satire?"

"Just simple biology Honey."

"When you look at the Bush clan it runs in the family. Barbara is a fat, stupid pig. Jeb married a Mexican. The entire family is genetically devoid of perspicacity of any kind."

"What about Hillary?"

"It's clear that Bill likes to have sex and Hillary doesn't. They live with that and always have lived with that in their adult lives by Bill engaging in lengthy and frequent extramarital affairs. That Jennifer Flowers was attractive and she revealed how low Clinton would go. Bill wanted to have sex on the governor mansion's bathroom floor while Hillary was out entertaining guests. Ms Flowers told everyone about it on the Larry King show and had no reason to lie. All that being said they are both very smart. Bill was 6th and Hilary 1st in their law school graduating class at Yale."

"W, Jeb and Bill have executed mentally ill and retarded people. The Supreme Court backs them up. All those politicians, all those lawyers are fecal waste."

"Bill Clinton and Jesse Jackson, more Elementary Dick Theory 101?"

"You got it."

"How would Einstein want you to play your hand?"

"Let me change that. You don't relate to Einstein because he was physically unattractive and of a different culture, a Jew?"

"That's true."

"How would Field Marshall Rommel want you to arrange forces in operation Naked Dicks?"

"Tomorrow I'll show you my scientific and technological works and then you will see what's in the arsenal. No more techno-talk tonight Honey."

"Prime rib, baked potato with sour cream and chives, sautéed mushrooms, asparagus, Blue cheese dressing?"

"Excellent."

"Ever have an end cut?"

"Haven't, if they have one I'd like to try it."

8 My paper

We were at the same table, in the corner and on the windows at 7:52 AM the following morning.

"Here's a paper that summarizes a lot of my work in physics and some chemistry although it leaves out some important stuff."

"I'll get the local newspaper to read and be in the bar. I'm ready for a Bloody Mary."

"Let's have a look."

"Ah 31 pages in a size 10 font. It'll take me an hour or two."

The Ö particle Universe

David Martin Degner

Abstract

The model I present is the simplest theory possible because there is only one particle in its elementary particle bestiary, of which everything in the universe is made. I have named that particle the O umlaut particle and will refer to is as the Ö particle.

There are only two possibilities regarding modern physics. Either just about everything is understood or just about nothing is understood. If the twin paradigms of modern physics, Einstein's relativity theories and quantum mechanics, are wrong theories then nothing is understood today and modern physics collapses on itself like a house of cards. I am proposing that just about nothing is currently understood.

How can the twin foundations of modern physics be wrong when they explain all experiments? Experiments do not prove theories. All that can emerge from an experiment is that its interpretation is consistent with a theory. My Ö particle model interprets the same body of experimental evidence and explains all phenomena with a simple microscopic model, a fully mechanical elementary particle mechanism for all phenomena. I provide a proof of the entire theory by deriving the elementary quantum of charge from first principles using four fundamental constants – the speed of light, the electron mass, the Bohr radius and the fine structure constant. But my theory is very different than the existing theories. My theory can be understood by everyone over the age of ten or twelve and at a deep level by all adults. To fully understand my model requires as prerequisites only three semesters of calculus through vector calculus and two semesters of introductory physics using calculus. My theory makes common sense and is intuitively pleasing and self-evident.

What needs to be understood are electrons, quarks, protons and atoms. I define a quark as an integer fraction of an electron with integer fraction mass, integer fraction volume and integer fraction charge.[1] Electrons, quarks, protons and atoms give rise to eight fundamental phenomena: electric fields, magnetic fields, photon fields, gravity fields, covalent bonds, mechanical forces, electricity and electromagnetic radiation produced by electrical circuits. These eight phenomena are the fundamental set of phenomena in need of a microscopic mechanism and as far as I know that is the complete set of phenomena. These eight phenomena are exchange mechanisms between electrons, quarks, protons and atoms with each other and with the surrounding fields. What they are exchanging is the Ö particle. The Ö particle is the quantum of mass. The Ö particle is in perpetual motion so also always possesses a quantum of

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[1] Murray Gell-Mann hypothesized "quarks" as parts of protons and neutrons with a nod to James Joyce, whose novel *Finnegan's Wake* contains the passage: "Three quarks for Muster Mark!" My quarks are like Murray Gell-Mann's quarks in that they have fractional charge, are never seen alone, existing only inside atoms and nuclei, and have a natural description as up, down, top and bottom. I could not come up with as good a term as James Joyce and Murray Gell-Mann so I'll put their term to good use.

momentum and quantum of kinetic energy. Mass, momentum and energy are simultaneous properties of the Ö particle. I will refer to the mass, momentum and energy of the Ö particle as $m_{\ddot{o}}$, $p_{\ddot{o}}$ and $e_{\ddot{o}}$. The quantum of energy the Ö particle always possesses is $e_{\ddot{o}} = 2.68138 \times 10^{-54}\,\text{J}$. $E = mc^2$ is true because $e_{\ddot{o}} = m_{\ddot{o}}c^2$ and the Ö particle is the only elementary particle. In the exchange processes forces are produced on electrons, quarks, protons and atoms. In my model there are nine fundamental forces. These nine forces are the Arrow of Time, determining the change in motion, the time evolution, of electrons, quarks, protons, atoms and collections of atoms. An accelerating force is a flow of Ö particles into electrons, quarks, protons and atoms. Since a force is a flow of the Ö particle and the Ö particle is the quantum of mass, momentum and energy a force is a flow of mass, momentum and energy into an electron, quark, proton, atom or collection of atoms that is being accelerated. This accounts in a simple way for Einstein's increase in mass with velocity. The Ö particle model interpretation of Newton's Second Law is $\dfrac{d\mathbf{P}}{dt} = p_{\ddot{o}}\dfrac{dN}{dt}$ where $p_{\ddot{o}}$ is the quantum of momentum of the Ö particle and $\dfrac{dN}{dt}$ is the flow rate of Ö particles in number of particles per second. The flow rate is simply the mathematical flux of Ö particles moving at the speed of light, like water moving in a pipe although in all steady states there is an equal and opposite flow of Ö particles in both directions. So a force is associated with the flow of the Ö particle both into and out of electrons, quarks, protons, atoms and collections of atoms. Ö particles are neither created nor destroyed giving rise to the conservation laws of mass and energy.

The electric field and the magnetic field are not made of virtual photons and if you think they are you understand neither electric and magnetic fields nor photons. The electron is not a point without internal structure or a wave. The wave function is not reality. The Born interpretation of the wave function is to put it mildly, ludicrous. My Ö particle model is completely deterministic or close to it, precisely the opposite of the Heisenberg Uncertainty Principle.

Atoms are made of electrons, quarks and protons. The theory of the atom is the most beautiful and useful theory possible. I have an all new quantum mechanics that will reduce chemistry to an engineering science. Of course there are quantum numbers, of course transitions between quantum states are associated with emission and absorption of photons and of course I predict the hydrogen line spectra. I have always been stymied on the helium spectra and have not worked out any line for higher atoms with the exception of the limit of line spectra, the ionization energy. I use the ionization energy to determine the size of the non-metal atoms. I do not know if I am still missing a piece of the puzzle to be able to predict the line spectra for all atoms or if it requires someone smarter than I or perhaps at least a little better organized.

The fine structure constant, $\alpha = \dfrac{e^2}{4\pi\varepsilon_0 \hbar c} = \dfrac{1}{137.359997}$, is a pure number so has no physical dimensions associated with it. The fine structure constant is the same number throughout the universe irrespective of the size of the units used for mass, length and time that are determined locally by advanced civilizations on distant planets. Planck's constant, the electron and proton masses, the elementary quantum of charge, the Bohr radius and the speed of light all are different numbers in different physics systems throughout the universe that reflect the arbitrarily assigned units of mass, length and time. The fine structure constant has profound yet simple meanings and connects us to the universe at large and to the universal physics. Two other numbers that have profound physical significance and are the same numbers throughout the universe are the number of Ö particles in an electron and the number of cycles an electron makes when it spins on an axis.

Discovering the properties of the Ö particle is an end point in reductionism in elementary particle physics but certainly not the end of theoretical physics. In fact, this is a beginning for theoretical physics in some sense because many of the most profound puzzles can only be addressed by theoretical work. The new quantum mechanics presented will enable a solution to the protein folding problem, revolutionize drug design and lay a meaningful foundation for the nanorevolution underway in chemistry and electrical engineering.

A historical point

What elementary particle physics must explain with a detailed mechanical and dynamical model are Newton's Law's of Mechanics and Maxwell's four equations of electromagnetism. Neither Newton nor Einstein understood what a force is in terms of elementary particle physics, although the solution is simple. Maxwell had not the slightest insight into a mechanical, dynamical, elementary particle physics model to account for electromagnetism although his speculations were quite interesting. Maxwell believed in "vortices" that propagated by Euclidian geometry

through the "ether". Planck, Einstein, Bohr, deBroglie, Heisenberg, Schrödinger, Born and Pauli did not understand either classical mechanics or classical electromagnetism in terms of an elementary particle physics model.

The riddle of attractive and repulsive electric forces[2]

Like charges repel and unlike charges attract. This is the central riddle of the electric field force and is the single most important phenomena to interpret in all of physics. Consider a "particle" in three-dimensional space that can translate or spin over time. That particle must be a volume. That particle must have mass. However you define an exchange process when the particle being exchanged has mass the process of exchange of that particle must generate a repulsive force so that the conservation of momentum and Newton's third law are observed. This can be seen by considering two ice skaters, who start out skating parallel and are exchanging a massive object. Each time each skater receives and throws the massive object a repulsive force is generated. So to see how an attractive force may arise is the single most important insight into elementary particle physics.

Consider a parallel plate capacitor. What must be going on each plate is that they are emitting a particle, presumably a small point-like particle, that presumably travels at the speed of light, that presumably are emitted normal to the surface, and also receives a particle with the same properties from the other plate. There is no other plausible elementary particle mechanism. The arrow represents the direction of the velocity of the particle.
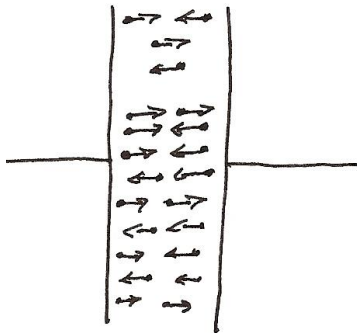
Now hypothesize there is a vector associated with the exchange particle that represents the direction of the electric field. The particles emitted from the positive plate have the E vector parallel to the velocity vector of the particle. The particles emitted from the negative plate have the E vector anti-parallel to the velocity vector of the particle. In this graphic the arrow represents the direction of the E vector.
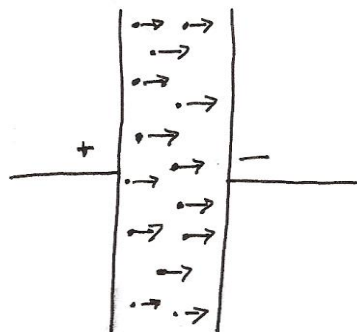
Now the symmetry of attractive and repulsive electrical forces is apparent. What is going on at the positive plate is exactly like what is going on at the negative plate. Both receive and emit the particle with the E vector pointing in the same direction and both feel an attractive force.

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[2] This took me 45 minutes in December 1985 and changed my life. I have had the tiger by the tail since and you can't let go.
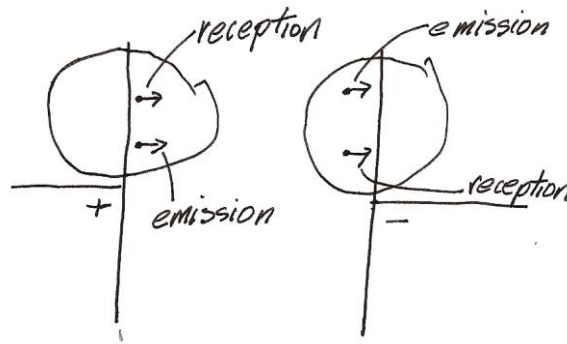
In a repulsive force between like charges what is going in is the same too. In positive/positive and negative/negative exchanges both receive and emit the particle with the E vector pointing in opposite directions and both feel a repulsive force.

After thinking about that for a few minutes the reader may wonder what magnetic fields are made of. Hypothesize that there is a magnetic field vector al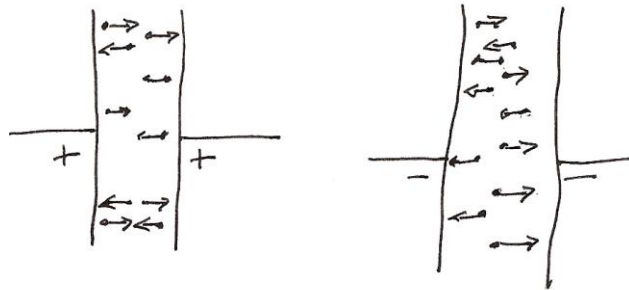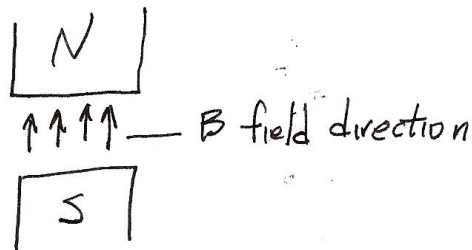so associated with the particle and that it is perpendicular to the electric field vector. Furthermore assume that in electric fields this vector is in a plane normal to the velocity and points in a random direction in that plane so the B vector is perpendicular to the E vector.

Consider the macroscopic magnetic field between N and S poles.

This system has all the same properties and symmetries as the capacitor system. Assume a S pole emits this particle with the B vector parallel to the velocity vector and a N pole emits this particle with the B vector anti-parallel to the velocity vector. The B field vector for emission and reception are in the same direction on both the N and S pole and both feel an attractive force just like the symmetry for attractive electric field forces. The E vectors in a magnetic field point in a random direction in planes normal to the velocity vector. In N/N and S/S interactions the B field vector for emission and reception are in the opposite direction on both poles and both feel a repulsive force.

It is immediately obvious what photons are made of. The same particle but now $E \times B$ is parallel to the velocity vector. A photon is a string in space and time of these particles, on a line, arranged with linear density to reproduce the linear energy distribution that is given by $E_{max}^2 \sin^2 \theta$ for θ from 0 to 2π, and with orientation to produce the transverse wave of the electric and magnetic fields description of photons and also the polarization property.

With a little time to think about it we might guess that gravity fields are single particles oriented so $E \times B$ is parallel to the velocity vector and that in gravity fields all emission is $E \times B$ and the force is always attractive.

65

A few simple properties of electric, magnetic, photon and gravity fields emerge. In electric, magnetic and gravity fields in steady states at each point in space where the field exists there are two flows of this particle, with equal flux magnitude, going in opposite directions. The three-dimensional energy density, the "strength" of the field in electric, magnetic and gravity fields is simply the limit of the number of particles in a volume divided by that volume. These particles are emitted normal to the surface of conductors and magnet poles and at the speed of light.

A simple picture of the electric, magnetic and gravity fields, free electrons, free protons, atoms and the eight fundamental phenomena

There are eight fundamental phenomena we need a simple picture for:

1. Electric fields
2. Magnetic fields
3. Photon fields
4. Gravity fields
5. Mechanical forces such as in a connecting rod or drive shaft
6. Covalent bonds
7. Electricity
8. EM radiation by electronic circuits and antenna

Consider a sphere, somewhat like the Sun at long enough distances, emitting particles in the radial out direction, emitted normal to the surface and at c. Note this is not a steady state, it is a dissipative state and the sphere will at some point in time run out of particles to emit.
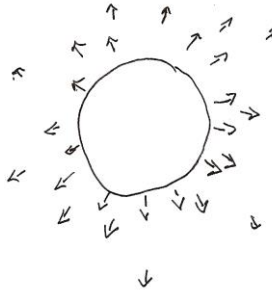
Consider a sphere, somewhat like the Earth in the flood of Noah with rain coming down over the entire Earths surface, receiving particles in the radial in direction, being received normal to the surface and at c. Note this is not a steady state, it is a state of accumulation and the sphere will at some point in time overflow with particles.
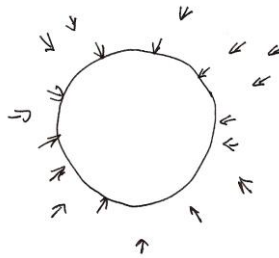
Now consider a sphere both emitting and receiving particles and in a steady state so the number of particles in that sphere and in any volume of the field is constant over time.
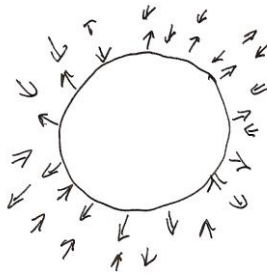
If this if going on in empty space the number of particles going through any concentric surface is constant. If this is going on in empty space then the number of particles would have to be infinite, that is impossible, the number of particles must be finite.

Now consider that all of space outside free electrons, free protons and atoms, including the interstitial space of liquids and solids, is filled with a very small spherical particle that is also a thin shell sphere, just with a very small radius.
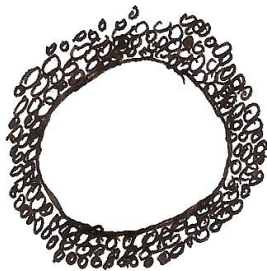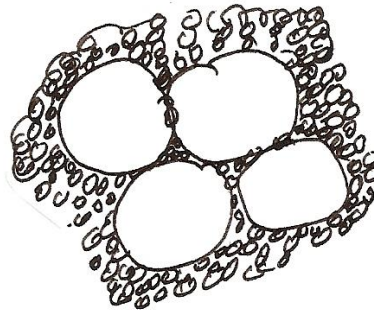
Free electrons, free protons and atoms   Liquids and solids

Now consider that the particles being emitted are reflected back by the small spherical particles that fill just about all of space. Then the result is a field in which the flux decreases with increasing radius and the number of particles in a field is finite. That is exactly what is going on in Nature. I have named the small spherical particles that fill space neutrinos. Neutrinos are small thin shell spherical individual Ö particles. The neutrinos form a space filling foam that makes electric, magnetic and gravity fields finite and capable of reaching the steady state by reflecting the particles making up the field back to the source of the field that can only be free electrons, free protons, atoms and collections of atoms.

Electric fields surround electrons, protons, ions and all atoms due to their dipoles. These sources of electric fields are all made finite by the neutrino foam. Neutrinos cannot get inside atoms or inside free electrons and free protons. But everywhere outside free electrons, free protons and atoms where there are neutrinos Gauss's Law for the electric field applies. Inside atoms Gauss's Law has to be modified to reflect that in the absence of the neutrino foam the flux through any surface at any radius inside the atom is constant.

When an electron, quark or proton spins it generates a magnetic field in the surrounding space. The magnetic field is everywhere parallel to the spin axis, the RH spin axis for negative surfaces and the LH axis for positive surfaces. The Ö particles making up the magnetic field are emitted normal to the surface and at c as always. A spinning electron, quark or proton generates both a N and S pole, hence magnetic monopoles are not physically realizable. Angular momentum is not conserved for an isolated spinning electron, quark or proton. The angular velocity decreases as Ö particles making up a magnetic field carry away the energy of rotation. For an electron, quark or proton to maintain angular velocity its spin must be coupled through the magnetic field to the spin of another electron, quark or proton. This is of enormous importance to the quantum mechanics.
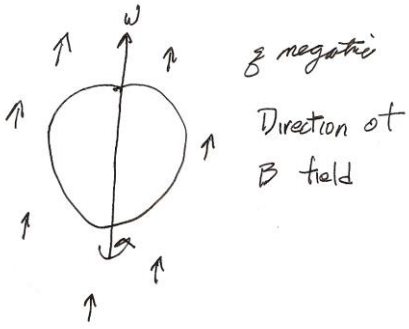
The $\mathbf{qv \times B}$ force provides the centripetal force necessary to keep the electron, quark or proton at constant radius instead of bulging at the equator due to centrifugal forces.
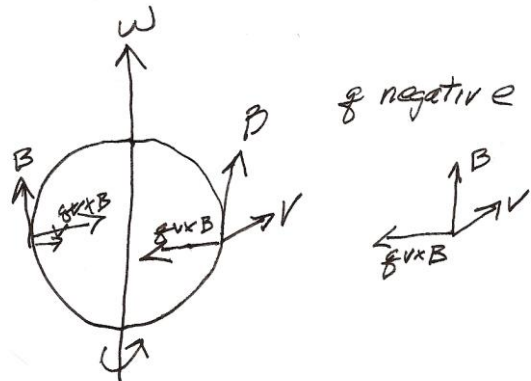
Free electrons and protons have a radius of 2.645×10^{-11} m, ½ the Bohr radius.

Hydrogen in the $n = 1$ quantum state has a proton at 2.645×10^{-11} m and an electron, turned inside out from a free electron so the field is directed inwards towards the proton, at 5.29×10^{-11} m, the Bohr radius. Polonium, the largest atom, has a positive nucleus at 2.645×10^{-11} m and in the $n = 1$ quantum state for all six valence electrons and has six electrons in a stack at 2.734×10^{-10} m.

68
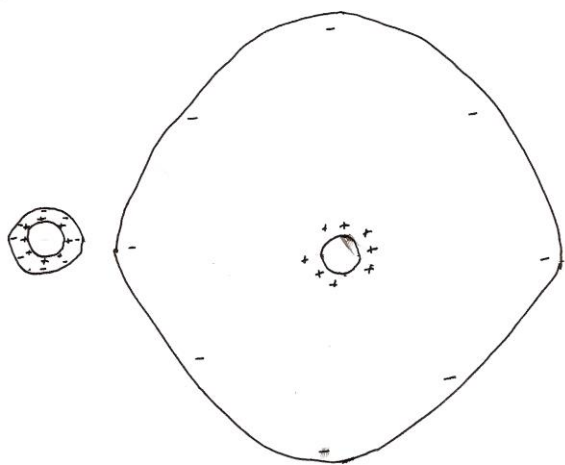
The 10.2 eV line of the Lyman spectra is generated when a hydrogen goes from the $n=1$ quantum state to the $n=2$, $l=1$ quantum state. The electron does this by first dividing into two quarks and then the inner quark shrinks down to the proton radius. In the process a photon is emitted. In the process the electron has angular velocity and momentum. The time period of the process is $\frac{1}{\nu}$ where ν is the frequency. A photon is a linear stream of particles generated by the $q\mathbf{v}\times\dfrac{\mathbf{E}}{c}$ force that flows over the time period of emission from the right hand end, on the axis, of the spinning and shrinking radius quark.
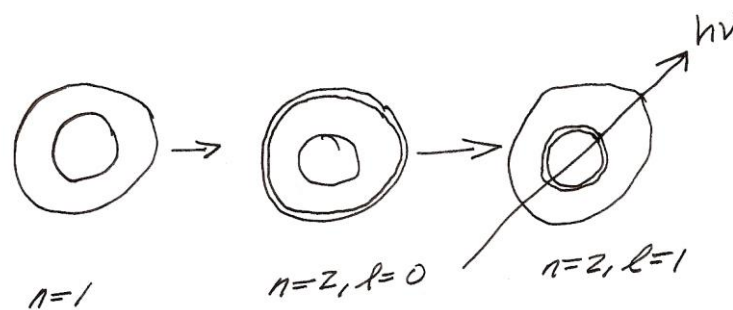
The rest of the Lyman spectra are generated by allowing $3,4,5,...,n$ quarks. The Balmer series is where the starting quantum state of hydrogen is $n=2$, $l=1$ and the final state $n>2$, $l=n-1$.

The $q\mathbf{v}\times\dfrac{\mathbf{E}}{c}$ force is the most important and interesting in Nature. Since the force is distributed over the surface of a spinning electron, quark or proton the force is the flux of a pressure vector field defined on those surfaces: $\text{pressure}=\dfrac{dF}{dA}=\rho_E \mathbf{v}\times\dfrac{\mathbf{E}}{c}$ where the surface charge density $\rho_E=\dfrac{q}{4\pi r^2}$. So with the electric field normal to the surface and the vector field for angular velocity simply described this pressure vector field starts at one axis and grows along arcs parallel to the axis of revolution, like the slices in an orange.
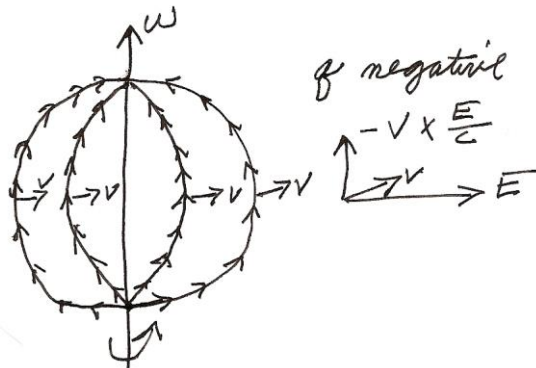
The effect associated with the cause of this force is emission of the Ö particle as a point particle at one end of the axis, normal to the surface and at c. Repeated emission in a period of time results in photons. So a photon is a linear collection of Ö particles translating on a line.

Photons, gravity, mechanical forces, covalent bonds, electricity and circuit generated EM radiation all use the $q\mathbf{v}\times\dfrac{\mathbf{E}}{c}$ force. All involve emission and reception of Ö particles on one end of the spin axis of an electron, quark or proton.

Mechanical forces flow through solids elastically. Ever atom in a solid is affected and these forces fill mechanical conductors at c and transmit at c. They use the $q\mathbf{v} \times \dfrac{\mathbf{E}}{c}$ force. I have not studied them in much detail.

 In the simplest covalent bond, the hydrogen atom, both atoms are in the $n = 2$, $l = 1$ quantum state. Both quarks are spinning with their spins opposed, head to head. Each is emitting a stream of Ö particles aimed right at the axis of the opposing quark. There is a steady state of spin and Ö particle emission and reception. The net result of this, via the $q\mathbf{v} \times \dfrac{\mathbf{E}}{c}$ force, is an attraction between the spinning quarks that pulls the atoms close together so their surfaces are deformed as they press together. The protons are spinning too, in the opposite direction, so that in each atom the sum of angular momentum is zero.
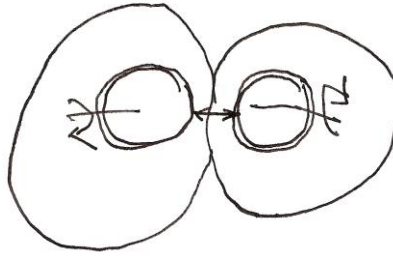
Each quark is emitting and receiving a linear stream of Ö particles and the Ö particle is so small that even in this configuration they do not collide, or at least I don't think they do. Real mathematical points would never collide because the cross-sectional area is zero.
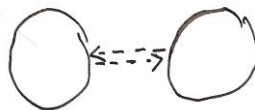
A metal is a regular lattice. In a wire conductor there are atoms within the metal that carry a positive charge. On the surface of the wire are electrons, coating the surface as thin membranes, so a wire is like a cylindrical capacitor. Consider the positive ions in the interior as nodes.
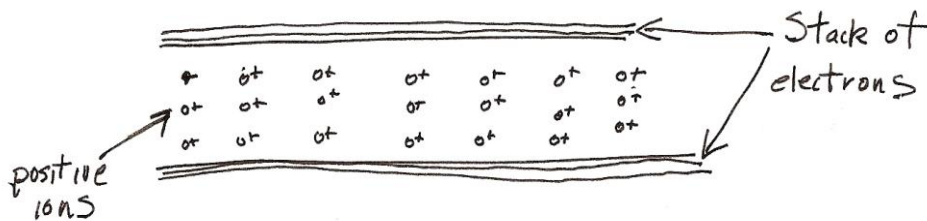
Electricity is a flow of Ö particles on a line like in photons and covalent bonds. They flow from positive node to positive node at c. The number of lines piercing any cross section is proportional to the current. The linear density of Ö particles in any line is proportional to the voltage. Two simple properties immediately emerge. The power is equal to the current times the voltage, $P = iV$. Power is proportional to the flow of energy that is proportional to $e_{\ddot{o}} \dfrac{dN}{dt}$.

And the resistance is proportional to the current, not the voltage.
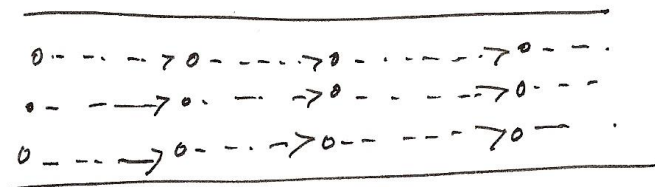
An antenna is a conductor with resistance such that the electricity flowing in flows out of the antenna as EM radiation from very small frequencies up to microwaves, the highest resonance frequency possible in electronic

circuits. When a single linear stream of electricity hits an antenna positive node that node spins with its spin axis normal to the length of the antenna and emits a stream of Ö particles out into space normal to the antenna. The wavelength and frequency reflect the linear density variation of the input stream of Ö particles. These are not photons in that they do not have a simple wavelength or frequency, are not simple represented by $E = h\nu$ and are continuous, within graininess of the size of the Ö particle that is very small, as if kind of like photons appended end to end.
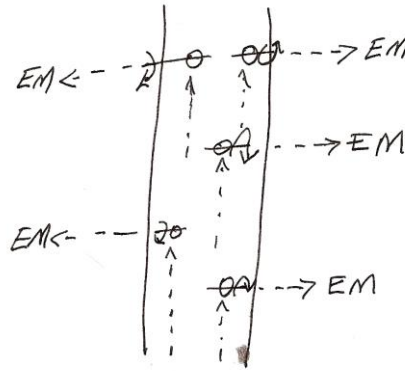
When the reader gets to the orientation of the Ö particle the elegant underlying symmetries will be compelling.

Introduction to the Ö particle

The Ö particle is a classical particle. The Ö particle is neither created nor destroyed. This is the basis of the conservation law of mass and energy. How God made them is beyond me but when is not too much of a mystery.[3] The Ö particle has a definite location in space at an instant in time. The Ö particle has a precise trajectory over time. The Ö particle has a precise size and shape, although dynamic, so it can be visualized. The Ö particle is orientable in space and in some orientations has a non-superimposable mirror image. The Ö particle is very small in volume although two spatial dimensions can be large – it can have a large area but an extremely small thickness. The volume of the Ö particle is unknown to me and it would be a very interesting fundamental constant to know. In my physics I treat the Ö particle as having zero volume and I believe that is an excellent approximation although I have not studied the fine structure of the hydrogen spectrum where the volume of the Ö particle may come into play. The Ö particle has a constant mass that is $m_{\ddot{O}} = 2.98349 \times 10^{-71}$ kg . The Ö particle properties of mass, momentum and energy I will label with a subscript Ö. The mass of the Ö particle is calculated from the electron mass, the speed of light, the Bohr radius and the fine structure constant so is known with high precision. The mass of the Ö particle can also be calculated from the electron mass, the speed of light and Planck's constant. The most remarkable property of the Ö particle is that it is in perpetual motion and always possesses a quantum of momentum and a quantum of kinetic energy. Mass, momentum and energy are simultaneous properties of the Ö particle. This is why $E = mc^2$.

The Ö particle can exist in one of three configurations or states:

1. As a very, very small solid state point like particle in electric, magnetic, photon and gravity fields, mechanical forces, covalent bonds, electricity and EM radiation produced by electronic circuits.
2. As a dynamic thin shell liquid state membrane in electrons, quarks and protons.
3. As a very small thin shell sphere, much smaller than free electrons, free protons and atoms that fills the space between free electrons, free protons and atoms – an "ether".

As a point like particle making up electric, magnetic, photon and gravity fields, mechanical forces, covalent bonds and electricity the Ö particle translates through space at the speed of light and has a quantum of momentum of

$p_{\ddot{O}} = m_{\ddot{O}}c = 8.94419 \times 10^{-63} \dfrac{\text{kg m}}{\text{s}}$ and a quantum of kinetic energy of $e_{\ddot{O}} = m_{\ddot{O}}c^2 = 2.68138 \times 10^{-54}$ J . These point-

like Ö particles translate in a straight line in empty space.

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[3] We travel through time at a constant, finite rate. Therefore we can never get to infinity in the future or have started from minus infinity in the past. That means there was a creation by God. It appears from the Big Bang cosmology that this creation occurred in a small region of space about 12-15 billion years ago. The creation was not the beginning of time. It is impossible for man to define a beginning or end to time.

As a dynamic membrane like liquid state particle in electrons, quarks and protons the Ö particles have an average velocity of $\frac{\pi c}{2}$ but still have a quantum of kinetic energy of $e_{\ddot{O}}$. A black-box model of electrons, quarks and protons needs to be introduced first before this mechanism can be explained.

The space between heavenly bodies and the interstitial space between the atoms heavenly bodies are made of are filled with a close packed foam of the very small thin shell spherical Ö particles. In the foam the thin shell spherical Ö particles are spinning on an axis and have a quantum of kinetic energy of $e_{\ddot{O}}$. The radius of Ö particles in this foam is much smaller than free electrons, free protons and atoms. I call the Ö particles that make up this space filling foam neutrinos. If these particles are not neutrinos then they are a new particle and need a new name, but for now I will assume they are neutrinos and refer to them as neutrinos. Neutrinos cannot get inside free electrons, free protons or atoms. But they are everywhere outside of free electrons, free protons and atoms and go right up to the surfaces of free electrons, free protons and atoms. The space filling neutrino foam is the missing "dark matter" in the universe. The radius of neutrinos can be calculated from the mass density of the dark matter and the mass of the Ö particle. If the mass density of the dark matter is one proton per cubic meter and the Ö particle mass is correct then the radius of the neutrinos in a close packed foam with a packing efficiency of 74.05% would be $1.52 \times 10^{-15}\,\text{m}$.

The neutrino foam makes electric, magnetic and gravity fields finite in terms of the number of Ö particles or the total mass/energy of Ö particles in the field. It does that by reflecting back to the source the point like Ö particles that make up electric, magnetic and gravity fields. This gives rise to the $\frac{1}{r^2}$ electric, magnetic and gravity field magnitude fall off with radius as the radius goes to infinity. In a spherical electric field where the magnitude of the electric field falls off as $\frac{1}{r^2}$ the energy density in the field is given by $\frac{1}{2}\varepsilon_0 E^2$ so the energy in the field between an inner radius, R_i, and an outer radius, R_o, is $U = \frac{q^2}{8\pi\varepsilon_0}\left(\frac{1}{R_i} - \frac{1}{R_o}\right)$. The energy falls off as $\frac{1}{r}$ and the quantity of energy in the field is finite as $R_o \to \infty$. Without the neutrino foam electrons and protons would not be stable and would decay fast and gravity fields would not be possible.

The point like particles that make up the gravity field, that are emitted and received by atoms, and transmit through the neutrino foam are the missing "dark energy". I will call these particles gravitons.

The neutrino foam gives rise to gravitational lensing where photons follow overall curved paths through three-dimensional space due to varying gravity fields. Gravitational lensing is due to dark matter and its interaction with dark energy.

Suns produce neutrinos, adding volume to the close packed neutrino foam. This gives rise to an "expanding" universe.

The end point of the universe is a universe with no electrons, protons or atoms and only neutrinos with the photons and gravitons escaping and expanding at the speed of light into an ever larger volume of empty space.[4]

A theory of everything in a single sentence

Electrons, quarks and protons emit Ö particles to the field, a process I call emission, and receive Ö particles from the field, a process I call reception. Emission is always normal to the surface and at the speed of light in the reference frame of the electron or proton. For an electron or proton mass to remain constant and be stable over time requires that the emission flux is equal in magnitude to the reception flux. Electrons, quarks and protons exchange Ö particles through the four Ö particle fields, mechanical forces, covalent bonds, electricity and circuit generated electromagnetic radiation. The TOE in ten words is: **Electrons, quarks and protons inventory and exchange the Ö particle.**

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[4] For this to go on forever requires that space extends to infinity in all directions. It is impossible for man to define an edge to empty space.

The Ö particle is orientable in space

The Ö particle has two vectors that I associate with it that I label $\hat{\mathbf{E}}$ and $\hat{\mathbf{B}}$. I use the normal vector hat on them because their length does not have meaning so these vectors can be thought of as having length the dimensionless number 1. These two vectors are at a right angle to each other in the Ö particle. Electric and magnetic fields coat the entire surface or surfaces of electrons, quarks and protons. Photons, gravitons, mechanical forces, covalent bonds, electricity and circuit generated EM are one-dimensional linear streams of Ö particles emitted at one end of spinning electrons, quarks and protons. All emission of Ö particles is normal to the surface with $\mathbf{v} \| \hat{\mathbf{n}}$ where $\hat{\mathbf{n}}$ is the surface normal vector.

Life is greatly simplified because there are only three orientations possible in electric, magnetic, photon and gravity fields, mechanical forces, covalent bonds, electricity and circuit generated electromagnetic radiation.

1. $\pm\hat{\mathbf{E}} \| \mathbf{v}$ in electric fields where the symbol $\|$ means parallel and $\mathbf{v}$ is the velocity vector of an Ö particle in an electric field.
2. $\pm\hat{\mathbf{B}} \| \mathbf{v}$ in a parallel macroscopic magnetic field such as between N and S poles. Spinning electrons and protons generate magnetic fields over their surfaces and $\hat{\mathbf{B}} \| \vec{\omega}$ for spinning electrons and $\hat{\mathbf{B}} \| -\vec{\omega}$ for spinning protons.
3. $\hat{\mathbf{E}} \times \hat{\mathbf{B}} \| \mathbf{v}$ for photons, gravitons, mechanical forces, covalent bonds, electricity and circuit generated electromagnetic radiation. In this orientation the Ö particle has a non-superimposable mirror image.

Electric and magnetic can be curved in space and these curves are due to superposition of different sources. In gravity fields the curvature is due to the structure of the neutrino foam and its interaction with the point gravitons that propagate through the neutrino foam.

At every point in an electrostatic field, a field that is not changing with respect to time, one-half the particles are going in one direction with $\hat{\mathbf{E}} \| \mathbf{v}$ and one-half are going in the opposite direction with $-\hat{\mathbf{E}} \| \mathbf{v}$. The $\hat{\mathbf{B}}$ vectors of those particles making up the electric field point in random directions in a plane $\perp \mathbf{v}$, where $\perp$ means perpendicular.

At every point in a parallel macroscopic magnetic field such as between N and S poles, a field that is not changing with respect to time, one-half the particles are going in one direction with $\hat{\mathbf{B}} \| \mathbf{v}$ and one-half are going in the opposite direction with $-\hat{\mathbf{B}} \| \mathbf{v}$. The $\hat{\mathbf{E}}$ vectors of those particles making up the magnetic field point in random directions in a plane $\perp \mathbf{v}$.

A spinning electron, quark or proton generates a magnetic field through emission of Ö particles on their surfaces. Angular momentum is not conserved by electrons and protons. The energy of motion is dissipated through emission of magnetic fields. For spinning negative surfaces the magnetic field direction is $\hat{\mathbf{B}} \| \vec{\omega}$ and $\mathbf{v} \| \hat{\mathbf{n}}$. For spinning positive surfaces the magnetic field direction is $\hat{\mathbf{B}} \| -\vec{\omega}$ and $\mathbf{v} \| \hat{\mathbf{n}}$. The $\hat{\mathbf{E}}$ vectors of those particles making up microscopic magnetic fields point in random directions in a plane $\perp \mathbf{v}$.

A photon is a collection of Ö particles with $\hat{\mathbf{E}} \times \hat{\mathbf{B}} \| \mathbf{v}$. In a photon the $\hat{\mathbf{E}}$ and $\hat{\mathbf{B}}$ vectors are aligned to give the standard Thomas Young wave description[5] of light and give rise to polarizable property of light. This is the standard sinusoidal configuration with the E field and B fields normal to each other and transverse to the direction of propagation and the front half and the back half rotated by π with respect to each other.

A gravity field is made of gravitons – single, discrete Ö particles with $\hat{\mathbf{E}} \times \hat{\mathbf{B}} \| \mathbf{v}$. In a gravity field one-half the particles are going in one direction with $\hat{\mathbf{E}} \times \hat{\mathbf{B}} \| \mathbf{v}$ and one-half are going in the opposite direction with $\hat{\mathbf{E}} \times \hat{\mathbf{B}} \| \mathbf{v}$.

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[5] Thomas Young's electric and magnetic wave theory of light where the electric and magnetic fields are transverse to the direction of propagation was a hypothesis put forward on theoretical grounds to account for interference.

In a gravity field the $\hat{\mathbf{E}}$ and $\hat{\mathbf{B}}$ vectors of different gravitons in the field are not aligned, all pointing in random directions, and not correlated.

A mechanical force is a flow of Ö particles between objects with $\hat{\mathbf{E}} \times \hat{\mathbf{B}} \parallel \mathbf{v}$.

In a covalent bond there is emission of Ö particles on one end of the spinning axis with $\hat{\mathbf{E}} \times \hat{\mathbf{B}} \parallel \mathbf{v}$. Two quarks involved in the covalent bond are spinning opposed to each other, each emitting a stream of $\hat{\mathbf{E}} \times \hat{\mathbf{B}} \parallel \mathbf{v}$ and receiving a stream from the opposed quark that is $\hat{\mathbf{E}} \times \hat{\mathbf{B}} \parallel \mathbf{v}$.

Electricity is the flow of energy as Ö particles oriented with $\hat{\mathbf{E}} \times \hat{\mathbf{B}} \parallel \mathbf{v}$ in addition to a flow of electrons. The voltage is a measure of the linear density of Ö particles in that stream and the current is a measure of the number of streams piercing a wire cross section. The simple power relationship for electricity $P = iV$ follows directly.

I speculate the handiness of $\hat{\mathbf{E}} \times \hat{\mathbf{B}} \parallel \mathbf{v}$ is what leads to a matter universe as opposed to an anti-matter universe. Ö particles oriented with $\hat{\mathbf{B}} \times \hat{\mathbf{E}} \parallel \mathbf{v}$ are not physically possible for reasons a theoretician will have to determine although I make one exception.

What a force is

A force is a flow of the Ö particle. For a flow to occur requires a source and a sink. The dynamic Ö particle interpretation of Newton's Second Law is simple:

$$F = \frac{dP}{dt} = p_ö \frac{dN}{dt}$$

where $\dfrac{dN}{dt}$ is the flux, the flow rate, of Ö particles, in number of particles per second, between source and sink.

At the microscopic level all forces are on electrons, quarks and protons. At the microscopic level the sources and sinks can be electrons, quarks, protons interacting through the eight exchange mechanisms. There are only two kinds of forces:

1. Those that arise by contact between electrons, quarks and protons. In the macroscopic world we live in the outer electron and quark surfaces of atoms is what we make contact with and touch. For macroscopic objects that exert forces on each other through contact the object applying the accelerating force, the source, is a collection of atoms and the object undergoing acceleration, the sink, is a collection of atoms.

2. Those that arise on electrons, quarks and protons through Ö particle exchange. Fields being created from their surfaces or impinging out of the surrounding space on their surfaces.

Since the Ö particle is the quantum of momentum, mass and energy a force is a flow of momentum, mass and energy:

$$F = \frac{dP}{dt} = c\frac{dm}{dt} = \frac{1}{c}\frac{dE}{dt}$$

where $\dfrac{dm}{dt}$ is a flow of mass and $\dfrac{dE}{dt}$ is a flow of energy.

Newton must have known his second law means a force is a flow of momentum. But he failed to realize that this is because a force is due to the flow of an elementary particle that cannot be seen that possesses a quantum of momentum and flows between macroscopic objects.

Einstein's increase of mass and energy with velocity

Once one realizes the particle being transferred in a force is also the quantum of mass and energy Einstein's increase in mass and energy with velocity follows immediately and also leads to a limiting velocity for electrons, quarks, protons, atoms and any collection of atoms being accelerated.

The momentum of an object measures the number of Ö particles that have been transferred to an object over some time interval t (please excuse my habit of using the same variable as the limit of integration and the variable of integration):

$$P = \int_0^t F \, dt = \int_0^t p_{\ddot{o}} \frac{dN_t}{dt} \, dt = \int_0^{N_t} p_{\ddot{o}} dN_t = p_{\ddot{o}} N_t$$

where N_t is the number Ö particles transferred.

The rest mass of an object is $m_0 = m_{\ddot{o}} N_0$ and the rest energy $E_0 = e_{\ddot{o}} N_0$ where N_0 is the number of Ö particles in an object at rest. The translating mass of an object is m and the translating energy E. Calculating the mass and energy of a moving object simply requires taking the integral of force over distance:

$$E_{kinetic} = E - E_0 = \int_{E_0}^E dE = \int_0^R F \, dR \int_0^R p_{\ddot{o}} \frac{dN_t}{dt} \, dR$$

$$v = \frac{P}{m} = \frac{c^2 P}{E} \quad \text{so} \quad \frac{dR}{dt} = \frac{c^2 p_{\ddot{o}} N_t}{E}$$

Substituting and solving the integral yields:

$$E = e_{\ddot{o}} \sqrt{N_0^2 + N_t^2}$$

The similar result for mass is:

$$m = m_{\ddot{o}} \sqrt{N_0^2 + N_t^2}$$

The gamma, defined as $m = \gamma m_0$ and $E = \gamma E_0$, implicit in these results is:

$$\gamma = \sqrt{1 + \frac{N_t^2}{N_0^2}}$$

The velocity definition is:

$$v = \frac{c N_t}{\sqrt{N_0^2 + N_t^2}}$$

The limiting velocity since N_0 is greater than zero but finite is:

$$\lim_{N_t \to \infty} \frac{c N_t}{\sqrt{N_0^2 + N_t^2}} = c$$

Using the Ö particle definition of velocity the Ö particle gamma reduces to Einstein's gamma as it must:

75

$$\sqrt{1 + \frac{N_t^2}{N_0^2}} = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$$

A similar relationship applies to spinning electrons and protons:

$$\sqrt{1 + \frac{N_t^2}{N_0^2}} = \frac{1}{\sqrt{1 - \frac{\omega^2}{\omega_{max}^2}}}$$

where $\omega_{max} = \dfrac{c}{R}$.

Microscopic forces

I will now consider forces on electrons, quarks and protons due to electric and magnetic fields. Photons, gravitons, mechanical forces, covalent bonds, electricity and circuit generated EM impinge on just a point on the surface of an electron, quarks or proton in reception and are emitted by just a point on the surface, the spin axis, in emission, they are one-dimensional phenomena. Electric fields always impinge on the entirety of one or both surfaces of electrons, quarks and protons. When electrons, quarks and protons spin they generate magnetic fields that emanate from the entirety of one or both surfaces of electrons and protons.

The one-dimensional processes exert their force just on a point on the surface of electrons, quarks and protons so they are like classical forces. A classical force is a vector with zero thickness that applies to a point. Electric and magnetic field forces are distributed over the surface of electrons, quarks and protons as pressure fields. Since these pressure fields have magnitude and direction they are pressure vector fields. An electric field or magnetic field force is not a vector but rather the flux of a pressure vector field:

$$F = \int_S \mathbf{p} \cdot d\mathbf{A}$$

where $\mathbf{p}$ is a pressure vector field defined on surface S, $\cdot$ is the dot product and $d\mathbf{A}$ the infinitesimal area vector that is normal to the surface.

The fundamental forces

There are only and precisely nine fundamental forces that arise on electrons, quarks and protons due to interaction with electric and magnetic vectors of the Ö particles they emit or receive:

1. **emission**
2. **reception**
3. $\mathbf{F} = q\mathbf{E}$
4. $\mathbf{F} = q\mathbf{v} \times \mathbf{B}$ where $\times$ is the cross product
5. $\mathbf{F} = q\mathbf{v} \times \dfrac{\mathbf{E}}{c}$
6. $\mathbf{F} = qc\mathbf{B}$
7. $\mathbf{F} = -\nabla U_{Electric}$
8. $\mathbf{F} = -\nabla U_{Gravity}$
9. **frustrated**

The e**mission** force and the **reception** force are associated with every emission and reception event of every point Ö particle by electrons, quarks and protons and these forces are applied to the surface of electrons, quarks and protons at the point of emission and reception. The magnitude of force associated with a single emission or reception event

is the quantum of momentum of the Ö particle. These are always repulsive forces, into the surface of the electron, quarks or proton. They are due to the conservation of momentum and Newton's Third Law.

Later in this paper I introduce a treatment of the $q\mathbf{E}$ force from first principles. In capacitors the $q\mathbf{E}$ force is always attractive and is always equal in magnitude and opposite in direction to **emission** plus **reception** so the total force due to $q\mathbf{E}$, **emission** and **reception** is zero::

$$q\mathbf{E} = -(\mathbf{emission} + \mathbf{reception})$$

note these are vectors ergo the minus sign

$\mathbf{F} = q\mathbf{v} \times \mathbf{B}$ arises in spinning electrons, quarks and protons. This force provides the centripetal force necessary to maintain spherical symmetry in a spinning electron, quark or proton. A spinning electron, quark or proton emits Ö particles as a magnetic field in all directions equally with the $\hat{\mathbf{B}}$ vectors parallel to the spin axis for electrons and anti-parallel to the spin axis for protons. A spinning electron, quark or proton has a centrifugal force on it given by $m\dfrac{v^2}{r}$. By setting $q\mathbf{v} \times \mathbf{B}$ equal to $m\dfrac{v^2}{r}$ the relationship between the magnitude of the magnetic field at the electron, quark or proton surface and the angular velocity is derived:

$$\mathbf{B} = \pm\sqrt{\frac{m\mu_0 c\vec{\omega}}{4\pi R^2}}$$

$\mathbf{B}$ is in the direction $\vec{\omega}$ for electrons and in the direction of $-\vec{\omega}$ for protons.

$\mathbf{F} = q\mathbf{v} \times \dfrac{\mathbf{E}}{c}$ also arises in spinning electrons, quarks and protons and gives rise to emission of $\hat{\mathbf{E}} \times \hat{\mathbf{B}} \parallel \mathbf{v}$ Ö particles on the right hand end of the axis of a spinning electron or quark. $\hat{\mathbf{E}} \times \hat{\mathbf{B}} \parallel \mathbf{v}$ arises in covalent chemical bonds, mechanical forces, electricity and circuit generated electromagnetic radiation in addition to photons and gravitons.

$\mathbf{F} = qc\mathbf{B}$ is an attractive force analogous to $q\mathbf{E}$ except with respect to the exchange of Ö particles as magnetic fields. Like $q\mathbf{E}$ this force is equal in magnitude and opposite in direction to **emission** plus **reception** so the total force due to $qc\mathbf{B}$, **emission** and **reception** is zero.

$$qc\mathbf{B} = -(\mathbf{emission} + \mathbf{reception})$$

$\mathbf{F} = -\nabla U_{\text{Electric}}$ arises on the electron and proton due to electric fields defined on its surfaces. To calculate this force we determine U as a function of the size, shape and charge and take the gradient of the field energy. This is always an attractive force.

$\mathbf{F} = -\nabla U_{\text{Gravity}}$ arises on atoms in gravity fields. I do not know how to calculate the U of gravity fields but have not worked on it and it looks like it should be possible to determine the energy density of gravity fields. This is always an attractive force.

frustrated arises on electrons and protons that have a mass defect. The mass defect is discussed later in this paper. **frustrated** is always a repulsive force. The radii of all electrons, quarks and protons is determined and maintained by the interaction of **frustrated** and $\mathbf{F} = -\nabla U_{\text{Electric}}$ that point in opposite directions:

$$-\nabla U_{\text{Electric}} = -\mathbf{frustrated}$$

When electrons, quarks and protons are distorted from simple spherical symmetry the balance of **frustrated** and $-\nabla U_{\text{Electric}}$ provide the restoring forces.

Electrons, quarks and protons remain in motion or change their state of motion as a result of the sum of these nine forces. The balance of these nine forces is the **Arrow of Time**.

The Ö particle definition of E, B and e

Using the energy density relationship in an electric field, $\mu_E = \frac{1}{2}\varepsilon_0 E^2$, the Ö particle definition of the electric field and of the elementary charge can be derived. μ_E in Ö particle dynamics is: $\mu_E = e_{\ddot{o}}\frac{dN}{dV} = e_{\ddot{o}}\frac{A\,dn}{Ac\,dt} = \frac{1}{2}\varepsilon_0 E^2$, where V is volume, and rearrangement leads to the expression for E:

$$\mathbf{E} = \sqrt{\frac{2p_{\ddot{o}}}{\varepsilon_0}\frac{d\mathbf{n}}{dt}}$$

where $\frac{d\mathbf{n}}{dt}$ is the total Ö particle flux density vector field and points in the direction of the electric field. On the surface of an electron the total flux or flux density is the sum of emission flux or flux density plus reception flux or flux density. The total flux density at any point in an electrostatic field has an equal number of Ö particles going in two opposed directions and the total flux density is the sum of the two flux densities going in opposite directions added together. The Ö particle flux is related to the Ö particle flux density by $\frac{dN}{dt} = \int_S \frac{d\mathbf{n}}{dt}\cdot d\mathbf{A}$.

Using Gauss's Law with e the quantum of elementary charge substituted for q, $EA = \frac{e}{\varepsilon_0}$, and the definition of the E field in Ö particle dynamics the elementary charge is:

$$e = \sqrt{2\pi\varepsilon_0 A^2 p_{\ddot{o}}\frac{dn}{dt}}$$

What area, A, and what magnitude of flux density, $\frac{dn}{dt}$ are to be used in the expression for elementary charge that must be a constant? The correct area is the area of an electron in a hydrogen atom, $A = 4\pi r_{Bohr}^2$. Then the Ö particle definition of the elementary charge is:

$$e = \sqrt{8\pi\varepsilon_0 r_B^2 p_{\ddot{o}}\frac{dN}{dt}\bigg|_{r_B}}$$

where $\frac{dN}{dt}\big|_{r_B}$ is the Ö particle flux as an electric field on the surface of an electron at the Bohr radius r_B. $\frac{dN}{dt}\big|_{r_B}$ is the sum of emission flux and reception flux on the electron surface.

Using the energy density relationship in an magnetic field, $\mu_E = \frac{1}{2\mu_0}B^2$, the Ö particle definition of the magnetic field can be derived. In Ö particle dynamics is: $\mu_B = e_{\ddot{o}}\frac{dN}{dV} = e_{\ddot{o}}\frac{A\,dn}{Ac\,dt} = \frac{1}{2\mu_0}B^2$, where V is volume, and rearrangement leads to the expression for B:

$$\mathbf{B} = \sqrt{2\mu_0 p_{\ddot{o}}\frac{d\mathbf{n}}{dt}}$$

78

where $\dfrac{d\mathbf{n}}{dt}$ is the total Ö particle flux density vector field and points in the direction of the magnetic field. Similar to the electric field on the surface of an electron the total flux or flux density is the sum of emission flux or flux density plus reception flux or flux density. The total flux density at any point in a stationary magnetic field has an equal number of Ö particles going in two opposed directions and the total flux density is the sum of the two flux densities going in opposite directions added together.

Free electrons, free protons and atoms

Introduction

Electrons and protons are liquid state thin shell spheres surrounded by electric fields. Electrons and protons are single plate spherical capacitors. The energy stored in the electric field of a capacitor is fully defined by the charge on the plate or plates and the configuration of the plate or plates. The thickness of the thin shell spherical electrons and protons is so small it can be assumed for most purposes to be zero, but that, of course, would be impossible. The radius of free electrons and free protons is $2.645 \times 10^{-11} \text{m}$, one-half the Bohr radius. The electrons and protons are at that radius because there is a balance of forces on their surfaces at that radius and there are restoring forces to that radius that arise when a convex or concave deformation develops in the surface of an electron or proton. The electric field surrounding free electrons and free protons are identical except for the direction of the electric field. The energy in the fields is given by Gauss's Law for the electric field and contains 27.2 eV. The mass of free electrons and free protons is 27.2 eV less than the rest masses, what I call a mass defect from rest mass, so the total energy in both systems is the rest mass. In free electrons and free protons the electric field is only on one side of the thin shell sphere, the outside surface. The inside surface is a surface without an electric field adjacent to it, a surface without charge.

All capacitors

Hydrogen, neutrons and atoms are simple spherical capacitors with an electron or stack of electrons as the outer, negative plate and a proton or stack of protons as the inner, positive plate. A stack is simply several thin shell spherical electrons or protons very close together, actually touching, at approximately the same radius. A hydrogen atom in the $\text{n} = 1$ quantum state is an electron on the outside at a radius of $5.29 \times 10^{-11} \text{m}$ and a proton on the inside at a radius of $2.645 \times 10^{-11} \text{m}$. I call the annular space between plates the electronic space of an atom. The electronic space is where the electric field is in atoms. A neutron is a proton on the outside at a radius of $\dfrac{5.29 \times 10^{-11} \text{m}}{1836.15}$ and an electron on the inside at a radius of $\dfrac{2.645 \times 10^{-11} \text{m}}{1836.15}$.

Only four phenomena

Electrons and protons in atoms can only undergo four transformations or exhibit four phenomena:

1. Be turned inside out.
2. Divide into integer fractional pieces or recombine back into one piece from fractional pieces.
3. Change radius.
4. Spin.

Electrons and protons can be turned inside out. I call a free electron or proton facing out because that is the direction in which the electric field is in. In hydrogen the electron has been turned inside out and I call that configuration facing in because that is the direction the electric field is in. In hydrogen the proton is facing out. In a neutron the proton has been turned inside out and I also call that configuration facing in because that is the direction the electric field is in. In a neutron the electron is facing out.

Inside atoms valence electrons can divide into an integer number of equal sized parts that are concentric thin shell spheres. I have named these fractional parts quarks. Each quark is an integer fraction of an electron. Quarks have integer fraction charge and integer fraction mass. Quarks can recombine to go back to an electron. The number of quarks a valence electron in an atom divides into is the principal quantum number in my quantum mechanics. I label this quantum number n where $n = 1, 2, 3, \ldots$. In neutrons the proton can also divide into quarks and recombine back into a proton

Electrons, protons and quarks can change radius. There are two radii possible: up and down. Up means at the outer radius of the atom that I label R_o. H is the smallest atom with $R_o = 0.529 \text{Å}$ and Po is the largest at $R_o = 2.734 \text{Å}$. A valence number of electrons are at the up radius in $n = 1$ quantum state atoms. The valence electrons divide into quarks at R_o. Down means at the inner radius that I label R_i. In all atoms $R_i = 2.645^{-11} \text{m}$. In all atoms there is an atomic number of protons in a stack at R_i. On top those protons are electrons where the number of electrons is the atomic number minus the number of valence electrons. And on top of the electrons are the down quarks. I call this stack of protons, electrons and quarks that is positively charged on its surface, the nucleus. The mass of electrons and quarks at R_o is the rest mass. The mass of electrons, protons and quarks in the nucleus at $R_i = 2.645^{-11} \text{m}$ is less than the rest mass and I call this the mass defect.

Electrons, protons and quarks can spin on an axis. When they do this they maintain spherical symmetry due to the magnetic field force. They are just thin shell spheres spinning.

Electrons and quarks can only be up or down. In a stack there is a top and bottom. There is a stack at 2.645^{-11}m, the nucleus, the down stack and a stack at R_o, the up stack. The top in the stack is the electron or quark adjacent to the annular space. The bottom in the stack is the electron or quark at the other end, the one most removed from the annular space.

The quantum numbers

There are two quantum numbers and two quantum vectors associated with each valence electron: n, l, $\mathbf{m}_l$ and $\mathbf{m}_s$.

1. $n = 1, 2, 3, \ldots$, the principal quantum number, is simply the number of quarks an electron divides into. In all of biological chemistry almost all atoms are in the $n = 2$ quantum state.
2. $l = 1, 2, 3, \ldots, n - 1$ is the number of down quarks.
3. $\mathbf{m}_l$ is a vector that represents the quantum of angular momentum of a spinning down quark at $R_i = 2.645^{-11} \text{m}$.
4. $\mathbf{m}_s$ is a vector that represents the quantum of angular momentum of a spinning up quark at R_o.

For non-bonded atoms that have perfect spherical symmetry these four quantum numbers fully define electrons and quarks.

The periodic table

Higher atoms in the $n = 1$ quantum state are spherical capacitors with an atomic number of protons at 2.645^{-11}m in a stack, an atomic number of electrons minus the number of valence electrons are on top those protons and the valence number of electrons are in a stack at R_o. The net positive charge on the nucleus in an $n = 1$ atom is simply the sum of the charge of protons and down electrons that is the number of valence electrons.

All valence electrons in atoms at room temperature are in the $n = 2$ quantum state. This makes life very easy.

I explain the structure of the periodic table in a separate paper focusing on quantum chemistry.

The stack and charge

With the down stack at $2.645 \times 10^{-11} \text{m}$ and up stack at R_o defined this way then the bottom proton and the up bottom electron or quark have charge only on one side, that facing the annular space. All the rest of the electrons,

quarks and protons have charge on both sides and the charge on the two sides differs by one quantum of charge for electrons and protons and by $\frac{1}{n}$ quantum of charge for quarks. The net charge at any interface in the down stack or the up stack is just the simple algebraic sum of the individual positive and negative charges. So in oxygen with six valence electrons with all valence electrons in the $n = 1$ state there is a charge of -1e (e is the elementary quantum of charge) on the inside surface of the bottom electron, a charge of -1e on the outside surface of the second from bottom electron, a charge of -2e on the inside surface of that electron, a charge of -2e on the outside surface of the third from bottom electron, and so forth. On the bottom proton is a charge of +1e, and +1e on the inside surface of the second from bottom proton, a charge of +2e on the outside surface of the second from bottom proton, and so forth. The charge in the annular space of oxygen in the $n = 1$ quantum state is 3. Charges add in a simple algebraic fashion.

Amplification and reduction

Consider a stack of two protons such as the nucleus of helium. The charge on the outer surface of the top proton is $q = 2$. The energy in the field is a function of q^2 not q. The flux of the Ö particle on the second proton outer surface is 4 times the flux on a single proton. The bottom proton emits a flux of one unit into the outer top proton. That flux is transmitted through the top proton and the top proton adds 3 units of flux to that one resulting in 4 units of flux on the second proton outer surface. The number of units of flux is simply the sum of the odd numbers:

$$q^2 = \sum_1^q 2n - 1$$

I call this phenomenon amplification.

Consider a nucleus stack with eight protons and two down electrons such as the nucleus of oxygen. The highest positive charge, the highest flux, is on the outer surface of the top of the six proton stack, $q = 8$ and there are 64 units of flux emitted by the outer surface. On the outer surface of the bottom down electron the charge is decreased by one, $q = 7$ and there are 49 units of flux emitted by the outer surface of the down electron. It is the opposite of amplification. At the surface of the top down electron in the oxygen nucleus the charge is $q = 6$ and there are 36 units of flux emitted by this surface. I call this phenomenon reduction.

Consider oxygen with all six valence electrons in the $n = 2$ and $l = 1$ quantum state. Then there are six down quarks on the nucleus stack on top of the two down electrons. The net positive charge on the nucleus is $q = 3$. The net negative charge on the stack of six quarks at $R_o = 1.555 \times 10^{-10}$ m is $q = -3$.

With these rules for building atoms we can see the highest charge in the electronic space is the number of valence electrons. The number of valence electrons can be multiple for some atoms. Nitrogen can have a valence of three or five.

Neutrons and atomic mass

Neutrons, either free, bonded to each other or as higher structures are trapped inside the nucleus. They make up the difference in mass between the atomic number of protons and electrons and the atomic mass. I have not studied neutron structure because I am interested in the chemistry of biology but imagine there is some kind of quantum mechanics for neutrons like for atoms. The neutrons give rise to gamma rays and are important in NMR.

The radii of atoms

There are only three energies, sources and sinks of energy, in atoms:

1. The mass defect of electrons, protons and quarks.
2. The electric field energy in the electronic space.
3. The energy of rotation electrons, protons and quarks.

In free atoms the electrons, quarks and protons are not spinning, all $\mathbf{m}_l$ and $\mathbf{m}_s$ quantum vectors are zero. Then the energy of free atoms only involves the mass defect and the electronic space electric field energy. Free atoms are perfect spheres. The radii of non-metal atoms, except for hydrogen and helium, can be calculated from the first ionization energy. The positive ion that results from emission of an electron by the neutral atom is the same size as the neutral atom. The following equation describes the relationship between ionization energy, valence number and radius:

$$\text{Ionization Energy} = \frac{(q \times 1.6 \times 10^{-19})^2 \left(R_o - \frac{r_B}{2} \right)}{8\pi\varepsilon_0 R_o^2} \left[\frac{\left(q + \frac{1}{2} \right)^2}{q^2} - 1 + \frac{3}{4} \frac{2q^2}{q^2} \frac{1^2}{\sum\limits_{x=1}^{x=v} x^2} \right]$$

where v is the number of valence electrons, q is the charge in the electronic space of the atom between down quarks and up quarks and in neutral atoms $q = \frac{v}{2}$, R_o is the outer radius of an atom, and r_B is the Bohr radius. Everything is known except R_o so there is one equation with one unknown, a quadratic equation in R_o. Solving for R_o and choosing the larger root gives the radii. Carbon has a radius of 1.365Å. Nitrogen is 1.190Å. Oxygen is 1.555Å. Phosphorous is 1.809Å. Sulfur is 2.160Å. Chlorine is 1.918Å. Hydrogen is the smallest atom at 0.529Å and Polonium is the largest atom at 2.734Å.

I will break this equation into two parts:

$$U_c = \frac{(q \times 1.6 \times 10^{-19})^2 \left(R_o - \frac{r_B}{2} \right)}{8\pi\varepsilon_0 R_o^2} \quad \text{and} \quad PsiD = \frac{\left(q + \frac{1}{2} \right)^2}{q^2} - 1 + \frac{3}{4} \frac{2q^2}{q^2} \frac{1^2}{\sum\limits_{x=1}^{x=v} x^2}$$

Atoms are spherical capacitors with the inner positive plate at r_B and the outer negative plate at R_o. In the annular space between r_B and R_o, the electronic space, the electric field strength at radius R between r_B and R_o is given by Degner's Law for the electric field inside atoms, not Gauss's Law for the electric field.

$$E = \frac{q \times 1.6 \times 10^{-19}}{4\pi\varepsilon_0 R_o R}$$

There is no neutrino foam inside atoms so the flux of the Ö particle is constant at all radii. For free electrons, free protons, ions and dipoles there is the neutrino foam in the surrounding space that reflects the Ö particles back to the source giving rise to Gauss's Law.

U_c is the electric field energy stored in a spherical capacitor using Degner's Law to describe the electric field in the electronic space where the charge on the plates is q units of elementary charge. U_c is also the energy stored in a parallel plate capacitor with a plate area of $4\pi R_o^2$, a plate separation of $R_o - r_B$, and a charge of q quantum's of elementary charge on each plate. Note that Degner's Law approaches Gauss's Law for the electric field asymptotically as R approaches R_o and when $R = R_o$ Degner's Law and Gauss's Law are identical. Outside of atoms and in macroscopic capacitors Gauss's Law always applies. Inside atoms in the electronic space Degner's Law always applies.

PsiD describes a transition in a spherical capacitor where the electric field is defined by Degner's law from a charge q to a charge $q + \frac{1}{2}$. $U_c \left(\frac{\left(q + \frac{1}{2} \right)^2}{q^2} - 1 \right)$ represents that charge transition. The $\frac{3}{4} \frac{2q^2}{q^2} \frac{1^2}{\sum\limits_{x=1}^{x=v} x^2}$ part of PsiD describes the additional energy that must go into an atom to get it to oxidize due to the mass defect of the down quarks.

82

Consider v electrons in the $n=2$, $l=1$ quantum state. $U_c \times \dfrac{3}{4}\dfrac{2q^2}{q^2}$ is the total mass defect in v $n=2$, $l=1$ quarks when an atom goes from charge v to charge $\dfrac{v}{2}$. The sequence $1^2, 2^2, 3^2, \ldots, v^2$ reflects the relative magnitude of the mass defects in the v down quarks. The $1^2 \dfrac{1^2}{\sum\limits_1^v x^2}$ mass defect is associated with the top down quark, the $\dfrac{2^2}{\sum\limits_1^v x^2}$ mass defect with the second from top down quark, the $\dfrac{3^2}{\sum\limits_1^v x^2}$ mass defect with the third down and the $\dfrac{v^2}{\sum\limits_1^v x^2}$ mass defect with the bottom down quark. The mass defect in a single quark, the top quark in the nucleus, that is lifted from down to up radius, from the $n=2$, $l=1$ to the $n=2$, $l=0$ quantum state, is

$$U_c \times \dfrac{1^2}{\sum\limits_{x=1}^{x=v} x^2} \times \dfrac{3}{4}\dfrac{2q^2}{q^2}.$$

The radii of metals

The radii of metal atoms are calculated from the unit cell dimensions or density, atomic mass and lattice packing efficiency and based on the assumption the metal atoms are perfect spheres that do not interpenetrate and deform in metallic bonds. Metal atoms in metal crystals are perfect non-interpenetrating spheres. Introductory chemistry students make this calculation but its simple meaning has not been understood.

The radii of bonded atoms

Since electrons, protons and quarks are liquid state they deform from perfect spherical symmetry in covalent, electrostatic, covalent/electrostatic, and dipole/dipole interactions such as hydrogen bonds. Bond lengths are known for a great many molecules. The deformation, interpenetration, means the bond length is less than the sum of the free radii in bonded configurations.

The higher the charge in the electronic space the "harder" the atom is. The larger the radius the "softer" the atom is. In a covalent and/or electrostatic bond the interface between bonded atoms is described physically and mathematically by the following relationship:

$$\frac{R_A}{R_B} = \frac{q_A^2/R_A^2}{q_B^2/R_B^2}$$

where R_A is the distance along the bond axis to the interface of atoms A and B in atom A and R_B is the distance to the interface in atom B, q_A is the charge in the electronic space of atom A and q_B is the charge in the electronic space of atom B. The relationship allocating the bond length into R_A and R_B holds for covalent, electrostatic, covalent/electrostatic and dipole/dipole bonds.

The bond length is:

$$\text{Bond length} = R_A + R_B$$

We have two equations with two unknowns. The solution is:

$$R_A = \frac{\text{Bond length}}{(q_B^2/q_A^2)^{1/3} + 1} \text{ and } R_B = \frac{\text{Bond length}}{(q_A^2/q_B^2)^{1/3} + 1}$$

Atoms deform in bonds. In a covalent bond where the two bonded atoms are the same element the interface surface is flat. In a covalent bond between different kinds of atoms the interface surface is convex in one and concave in the other. Determining R_A and R_B allows one to know which atom has a convex deformation and which atom has a concave deformation. Opposite from a convex bond interface in an atom is a positive dipole. Opposite a concave bond interface in an atom is a negative dipole. In electrostatic bonds such as those in salts significant deformation of spherical symmetry occurs and in NaCl the atoms are somewhat cubic.

Photons

The highest energy state of an atom is the $n = 1$ state. In quantum transitions from higher energy states to lower energy states a photon is emitted. In quantum transitions from lower energy states to higher energy states a photon is absorbed. The energy of an emitted photon is derived ½ from the change in energy in the field of the electronic space and ½ from the mass defect of a quark going from up to down. Similarly, in photon absorption, ½ the photon energy goes into the field in the electronic space and ½ goes into the mass defect to lift a quark from down to up and restore it to rest mass.

Photons are emitted by spinning quarks that are changing radius from R_o to 2.645^{-11}m. Photons are emitted at the RH end of the spinning quark axis. The force that gives rise to photon formation is $q\mathbf{v} \times \dfrac{\mathbf{E}}{c}$. Photons are of length λ and are emitted in the time interval $T = \dfrac{1}{\nu}$. Quarks that emit photons are both changing radius and spinning. A photon is emitted in precisely one revolution of a quark. When the quark begins to change radius it starts to spin. It accelerates rapidly to the maximum frequency ν_{max}, then decelerates back to $\nu = 0$, then accelerates again to ν_{max}, and then decelerates back down to $\nu = 0$. Since the energy in a photon follows $E_{max} \sin^2 \theta$ where $0 \leq \theta \leq 2\pi$ for a single photon the ν is given by $\nu = \nu_{max} \sin^2 \theta$. The ν in $E = h\nu$ is therefore an average frequency of an electron or quark and the relationship is really $E = h\bar{\nu}$ where $\bar{\nu}$ is the average frequency of an electron or quark over the one revolution it takes to produce a photon. A simple integral shows the relationship between $E = h\bar{\nu}$ and ν_{max}:

$$\bar{\nu} = \frac{1}{2\pi} \int\limits_0^{2\pi} \nu_{max} \sin^2 \theta d\theta = \frac{1}{2} \nu_{max}$$

I do not have a set of differential equations to describe at a fully analytical level the photon emission or absorption process although I believe that is possible. Photon emission is asymmetric. The atom starts out with an up quark and in the process of shrinking while spinning to become a down quark a symmetric photon is emitted although the initial and final quantum stets are different, asymmetrical.

Photons can be multi-quark processes in higher atoms.

The electromagnetic spectrum

Infrared photons associated with thermal motion are emitted and received by the up quark stack. These can be viewed as "breathing" modes. IR photons extend from the smallest possible all the way up to the ionization energy that is in the ultraviolet. When all valence quarks are in the $m_s = 0$ quantum state the temperature is absolute zero, 0 degrees Kelvin. Rotational and vibrational spectra of molecules are really thermal breathing of IR photons. At constant temperature a molecule is emitting and receiving numerous IR photons, defined by the geometry of the up quarks, rotating and vibrating in space as these events occur. This is very important phenomena because the repulsive force in water and in proteins is this breathing of thermal photons, like a repulsive radiation pressure. These spectra are continuous over various different ranges of the spectrum.

IR, visible and UV are emitted by atoms in transitions of quarks going from up to down. IR, visible and UV are absorbed by atoms in transitions of quarks going from down to up. These are line spectra for single atoms but more complicated and contain continuous spectra for molecules.

When an X-ray is absorbed some of the down electrons in the nucleus are picked up and raised to the Bohr radius. The largest X-ray is to pick the pile up at the penultimate to the bottom down electron, raising $Z-1$ down electrons, where Z is the atomic number, to a radius of 5.29×10^{-11} m. Then those electrons emit an X-ray from that excited state in the process of shrinking back down to 2.645×10^{-11} m. Moseley's Law for the energy of the K-alpha line is $E = 10.2 \text{ eV} \times Z-1^2$. The above transition mechanism accounts for this law in a simple way. The 10.2 eV photon is the $n=1$ to $n=2$, $l=1$ transition in hydrogen and is the smallest X-ray.

Continuous EM radiation generated by electronic circuits extends from next to 0Hz up to the microwave range, the maximum frequency that can be produced by electronic circuits.

Gamma rays are emitted by some kind of neutron structure.

The moment of inertia of electrons, quarks and protons

The moment of inertia is an important property of electrons, quarks and protons. Naively we might assume it is $\frac{2}{3} mr^2$, the moment of inertia for a thin shell sphere. The actual moment of inertia is mr^2, like for a ball on a string. But for electrons, quarks and protons it is for a zero thickness line, a circle, on the equator with mass m. If this was not true Bohr's model of hydrogen would never have worked so well. Bohr's famous second equation, the quantization equation, $mvr = n\hbar$ should really have been written as $mr^2\omega = n\hbar$. Since $\omega = \frac{v}{r}$ these are equivalent. The same assumption about the moment of inertia is made when Bohr set the Coulomb force as the centripetal force, $qE = \frac{mv^2}{r}$. To see the reason the moment of inertia is like a zero thickness circle with mass m will require a fully mechanical model of the electron. The non-relativistic energy of rotation is given by $E = \frac{1}{2} mr^2\omega^2$ and this is an excellent approximation for angular velocities small compared with $\omega_{max} = \frac{c}{r}$. The relativistic equation for spinning electrons, quarks and protons at constant radius is $E = \frac{1}{2} m(\gamma) r^2\omega^2$ where $m(\gamma) = \dfrac{m}{\sqrt{1 - \dfrac{\omega^2}{\omega_{max}^2}}}$ and the increase of mass with ω is clear.

The size of the Ö particle

The energy of an electron at the Bohr radius spinning with the angular velocity of $\frac{2\pi}{137} \frac{\text{rad}}{\text{s}}$ has the energy of one Ö particle:

$$\frac{1}{2} m_e r_{Bohr}^2 \left(\frac{2\pi}{137}\right)^2 = 2.68138 \times 10^{-54} \text{J}$$

To prove this result we need to go into the symmetries of photons. The largest photon that can be emitted by an electron has the full energy of the electron:

$$5.11 \times 10^5 \text{ eV} = h \times 1.23^{20} \text{Hz}$$

Note $1.23\times10^{20} = \dfrac{137c}{2\pi r_{Bohr}}$.

The smallest photon possible is one with two Ö particles:

$$2\times2.68\times10^{-54}\,J = h\times8.09\times10^{-21}\,Hz$$

Note $8.09\times10^{-21} = \dfrac{1}{1.23\times10^{20}} = \dfrac{2\pi r_{Bohr}}{137c}$.

Dividing the largest photon by the smallest gives the number of Ö particles in an electron divided by two:

$$\frac{N_e}{2} = \frac{1.23\times10^{20}}{8.09\times10^{-21}} = 1.52\times10^{40}$$

We want to know if this is true, if it can be proven. There are no assumptions that went into this equation. It is known the largest photon an electron is capable of is its own energy and by the definition of photons the smallest photon has precisely two Ö particles so it would seem to be no more than an identity. But is the size of the Ö particle correct?

Consider an electron spinning at the Bohr radius. The angular velocity associated with one quantum of energy of the Ö particle is $\dfrac{2\pi}{137}$ and the maximum angular velocity is $\dfrac{c}{r_{Bohr}}$. The correct expression, but not the relativistic equation, for the angular energy of an electron at the Bohr radius spinning at $\dfrac{c}{r_{Bohr}}$ is:

$$m_e r_{Bohr}^2 \left(\frac{c}{r_{Bohr}}\right)^2 = 5.12\times10^5\,eV$$

Dividing the maximum angular energy by the minimum angular energy gives the number of Ö particles in an electron:

$$N_e = \frac{m_e r_{Bohr}^2 \omega_{max}^2}{\dfrac{1}{2} m_e r_{Bohr}^2 \omega_{min}^2} = \frac{\left(\dfrac{c}{r_{Bohr}}\right)^2}{\left(\dfrac{2\pi}{137}\right)^2} = 3.04\times10^{40}$$

The assumptions that went into this are that the angular velocity of an electron at the Bohr radius with energy of the Ö particle is $\dfrac{2\pi}{137}$, the maximum angular velocity is $\dfrac{c}{r_{Bohr}}$ and the energy of revolution is given by $\dfrac{1}{2}mr^2\omega^2$. We want to know if all those assumptions are true. To prove everything we set two expressions for $\dfrac{N_e}{2}$ equal to each other:

$$\frac{\omega_{max}^2}{\omega_{min}^2} = \frac{\nu_{max}}{\nu_{min}}$$

$$\frac{\left(\dfrac{c}{r_{Bohr}}\right)^2}{\left(\dfrac{2\pi}{137}\right)^2} = \frac{\dfrac{137c}{2\pi r_{Bohr}}}{\dfrac{2\pi r_{Bohr}}{137c}}$$

This can be seen to be true since this expression reduces to $1 = 1$. So that means the maximum photon frequency by an electron is $1.23 \times 10^{20}\,\text{Hz}$, the minimum frequency is $8.09 \times 10^{-21}\,\text{Hz}$, the non-relativistic energy of rotation is given by $\frac{1}{2}mr^2\omega^2$, the angular velocity of an electron at the Bohr radius with the energy of one Ö particle is $\frac{2\pi}{137}$ and the maximum angular velocity is $\frac{c}{r_{Bohr}}$.

The Ö particle cycle in electrons

Introduction

When an Ö particle as a point particle in an electric field strikes the surface of an electron at c it comes to a stop for an instant of time and exerts one quanta of momentum, p_N, as a repulsive force on the electron surface at the point of collision. This is the **reception** force. Then the Ö particle expands from a small solid point-like particle to a growing membrane that accelerates at a constant rate until it coats the entire surface of the electron and is a sphere. When the leading edge reaches the point on the electron spherical surface opposite the collision point it has a velocity of πc. The average velocity on this expansion from point to sphere is $\frac{\pi c}{2}$. When the leading edge collides with itself at that point on the electron opposite the collision point it comes to stop for an instant of time and two quanta of momentum are imparted to the surface of the electron at that point and in the direction of the electric field so this is an attractive force. This is the attractive $q\mathbf{E}$ force. Then the spherical Ö particle reverses direction and accelerates at a constant rate back to the point of collision, un-coating the electron, going from sphere back to point. When the receding edge reaches the collision point on the electron surface it has a velocity of πc and becomes a point particle again. The average velocity on this recession from sphere to point is $\frac{\pi c}{2}$. Then the point Ö particle is emitted from the initial point of collision in the electric field orientation at c and one quanta of repulsive force is applied to the electron surface at the point of emission. This is the **emission** force. The net force on the electron from this cycle is zero:

$$q\mathbf{E} = -(\mathbf{reception} + \mathbf{emission})$$
note these are vectors ergo the minus sign

Since the radii of all electrons are known and the average velocity is known we know how much time the Ö particle spends coating and un-coating electrons in this cycle. Now I said the Ö particle came to a stop for an instant in time when it collided with the electron and came to a stop again for an instant in time when it un-coated the electron and again became a point particle. Actually it spends a small interval of time as a point particle, not an instant.

Now this is the damnedest thing in all of physics. In an electron with a radius of $5.29 \times 10^{-11}\,\text{m}$ the Ö particle spends $\frac{1}{137.0359997^2}$ of that cycle time as a point and $1 - \frac{1}{137.0359997^2}$ of that cycle time as a growing and shrinking dynamic membrane!

This is the reason the energy stored in the electric field of a free electron is $\frac{1}{137.0359997^2} \times E_e$ where E_e is the rest energy of a free electron:

$$\frac{1}{137.0359997^2} \times E_e = 27.2 \text{ eV}$$

Deriving the Ö particle flux from first principles

Observing this time meaning of the fine structure constant means we can calculate the flux of Ö particles by electrons from first principles. The flux can be expressed in Ö particle flux, $\frac{dN}{dt}$, or Watts, $e_{\ddot{o}}\frac{dN}{dt}$ where $e_{\ddot{o}} = 2.68138 \times 10^{-54} \text{J}$. The time period of an Ö particle cycle in an electron with a radius $5.29 \times 10^{-11} \text{m}$ is:

$$\triangle t = \frac{2\pi \times 5.29 \times 10^{-11} \text{m}}{\frac{\pi c}{2}} = 7.058 \times 10^{-19} \text{s}$$

There are 3.053×10^{40} Ö particles in an electron. Then in one second there are $\frac{3.053 \times 10^{40}}{\triangle t}$ Ö particle cycles in an electron. The Ö particles are points for $\frac{1}{137.036^2}$ of the time and associated with each cycle is one reception and one emission event.

Therefore the flux of emission or reception is:

$$\frac{dN}{dt} = \frac{3.053 \times 10^{40}}{137.036^2 \triangle t} = 2.303 \times 10^{54} \frac{N}{s} \text{ and } \frac{dE}{dt} = e_{\ddot{o}}\frac{dN}{dt} = 6.176 \text{W}$$

The total power of emission plus reception by an electron at $5.29 \times 10^{-11} \text{m}$ is 12.34W.

In atoms with a single outer electron at different radii AND in macroscopic spherical capacitors[6] with a single electron on the negative plate the following applies:

$$\frac{dN}{dt} = \frac{3.053 \times 10^{40}}{\frac{R}{r_B} 137.036^2 \triangle t}$$

where $\triangle t = \frac{2\pi R}{\frac{\pi c}{2}}$, R is the electron radius in both atoms and macroscopic spherical capacitors and r_B is the Bohr radius.

This treatment can be extended to systems with more than one electron in a simple way.

Free electrons require a small modification of this formula. This is the only time we see a definite volume for the Ö particle. In an electron at $5.29 \times 10^{-11} \text{m}$ the leading or receding edge of an Ö particle accelerates to πc. In a free electron at $2.645 \times 10^{-11} \text{m}$ the surface area is one-forth that of an electron at $5.29 \times 10^{-11} \text{m}$. The Ö particle membrane thickness in a free electron is 4 times that in an electron at $5.29 \times 10^{-11} \text{m}$. Then the acceleration in a free electron at $2.645 \times 10^{-11} \text{m}$ is one-fourth the acceleration in an electron at $5.29 \times 10^{-11} \text{m}$. It is as if the volume of the Ö particle is made into membrane at a constant rate but the membrane is 4 times thicker so fills at one-forth the rate. The equation for the time interval of an Ö particle cycle in a free electron then is:

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[6] On all macroscopic capacitor plates the electrons have the area of the plate and are in a stack like in atoms on the negative plate. This means electrons can have macroscopic sized areas.

$$\triangle t = \frac{2\pi \times 2.645 \times 10^{-11}\,\text{m}}{\frac{1}{4} \times \frac{\pi c}{2}}$$

Using $\dfrac{dN}{dt} = \dfrac{3.053 \times 10^{40}}{\dfrac{R}{r_B} 137.036^2 \triangle t}$ we see a free electron has the same emission or reception flux as an electron in

hydrogen of $2.303 \times 10^{54}\,\dfrac{N}{s}$.

Deriving the power from energy and time

Since we can easily calculate the power of emission plus reception in atoms and parallel plate capacitors it is easy to verify these results. The energy in the electronic space of atoms is given by:

$$U = \frac{(q \times 1.602 \times 10^{-19})^2 (R_o - \frac{r_B}{2})}{8\pi\varepsilon_0 R_o^2}$$

The time period in which the entire energy in that field is turned over once is:

$$\triangle t = \frac{R_o - \frac{r_B}{2}}{c}$$

Then the power of emission plus reception is:

$$\frac{dE}{dt} = \frac{U}{\triangle t}$$

For hydrogen in the $n = 1$ quantum state $U = 6.799$ eV and $\triangle t = 8.817 \times 10^{-20}$ s so:

$$\frac{dE}{dt} = 12.34\,\text{W}$$

In macroscopic spherical capacitors the flux on the inner plate is higher than the flux on the outer plate so we can not determine the power of the plate by dividing energy stored in the spherical capacitor by the replacement interval. The same is true for free electrons where the flux of the "outer" plate, at infinity, is 0. The power of any capacitor plate, microscopic or macroscopic, including free electrons and protons, can be determined from the force on the plate simply by multiplying the force by c:

$$\frac{dE}{dt} = cF = cp_N \frac{dN}{dt}$$

This calculation for free electrons and macroscopic capacitors, using $F = -\nabla U = \dfrac{qE}{2}$ where U is defined using

Gauss's Law, agrees perfectly with that predicted from first principles using the fine structure constant.

Proof of the Ö particle model

The perfect quantitative agreement between calculating the Ö particle flux by using the fine structure constant and calculating the power using the energy in the field and the replacement time interval is physical proof of the validity of this model of the electron. This is mathematically proven by setting equal the total power of emission plus reception calculated these two separate ways and seeing this reduces to the fine structure constant identity. Here I

use the power expression for atoms but the power expression for macroscopic capacitors could equally well be used and give the same result:

$$\frac{\dfrac{2\times e_N \times 3.053\times10^{40}}{2\pi R_o}}{\dfrac{\dfrac{\pi c}{2}}{\dfrac{R_o}{r_B}\times137.036^2}} = \frac{\dfrac{(1.602\times10^{-19})^2\left(R_o - \dfrac{r_B}{2}\right)}{8\pi\varepsilon_0 R_o^2}}{\dfrac{R_o - \dfrac{r_B}{2}}{c}}$$

Cancel terms and viola:

$$\frac{1}{137.0359997} = \frac{e}{2c\sqrt{\pi\varepsilon_0 m_e r_B}}$$

And since $r_B = \dfrac{4\pi\varepsilon_0\hbar^2}{m_e e^2}$ this reduces to the standard definition of the fine structure constant:

$$\frac{1}{137.0359997} = \frac{e^2}{4\pi\varepsilon_0\hbar c}$$

The elementary quantum of charge

In the Ö particle model the elementary quantum of charge is $e = \sqrt{8\pi r_B^2 p_Ö \dfrac{dN}{dt}_{r_B}}$. I have derived the power of the electron in hydrogen at the Bohr radius, $\dfrac{dE}{dt} = 12.34W$. Since $p_Ö \dfrac{dN}{dt} = \dfrac{1}{c}\dfrac{dE}{dt}$ we see it is possible to calculate the elementary quantum of charge from first principles, a here to for measured quantity, first measured by Milliken in 1907.

The mechanism of reflection of point Ö particles by the neutrino foam

Sometimes when a point Ö particle strikes a neutrino the point particle comes to an instantaneous stop, I hypothesize the neutrino almost instantly turns into an anti-neutrino, with spin parallel to $\mathbf{B}\times\mathbf{E}$, then the anti-neutrino almost instantaneously turns back into a neutrino, and the point Ö particle instantaneously reverses direction and zooms off at c, precisely tracing its incoming trajectory. If a neutrino/anti-neutrino flip produces one quantum of momentum in the radial in direction and the anti-neutrino/neutrino flip back also produces one quantum of momentum in the radial in direction then the conservation of momentum is observed for the field reflection process since the change in direction of the reflected point Ö particle is $2p_Ö$. About the "Sometimes when a point Ö particle strikes a neutrino the point particle comes to a stop" it seems geometric factors of the collision must determine the probability of reflection versus transmission. The interesting collision geometry is when the point Ö particle collides at one end of the axis of spin of the neutrino or close to one end of the axis of spin. Electric, magnetic fields and gravity fields may have different fundamental phenomenology but must have the common element of conserving momentum in reflection. Neutrino field organization by alignment of spin axis seems important, especially to gravity fields. The interaction of gravitons, dark energy, with the neutrino foam, dark matter, is most interesting, and as always, the simplest mechanism will probably be the right one.

Is a "black hole" Schwarzschild radius the point in space where 100% alignment of neutrino spins is achieved? Does a photon striking the Schwarzschild radius get trapped no matter what the impact geometry? Is that why they are "black"?

Universal numbers and a universal physics

There are some numbers, that always must be pure numbers, dimensionless, that are the same throughout the universe. Any number that has any combination of m, k and s associated with it has different magnitude in all other physics systems invented by intelligent beings throughout the universe. 137 is the same number throughout the universe. From its meanings we can see why this is the case. The ratio of the time an Ö spends as a point and a membrane in electrons must clearly be the same throughout the universe. The ratio of the energy in the field of an electron to the energy in the electron must clearly be the same throughout the universe.

Now look at $\dfrac{N_e}{2} = \dfrac{\nu_{max}}{\nu_{min}}$. When we divide a frequency by a frequency we are left with the ratio of the number of cycles. The number of cycles an electron makes when it spins is the same number throughout the universe. But the length of seconds is different everywhere in the universe. So it would appear that the number of cycles in ν_{max} and ν_{min} is the same throughout the universe. Clearly their ratio is. Now look at $\dfrac{N_e}{2} = \dfrac{\omega_{max}^2}{\omega_{min}^2}$. The angular velocity $\dfrac{2\pi}{137}$ must be the same number of radians throughout the universe since 2, π and 137 are the same pure numbers. That means $\omega_{max} = \dfrac{c}{r_{Bohr}}$ must be the same number of radians throughout the universe. So $\dfrac{3\times10^8\,m}{5.29\times10^{-11}\,m}$ is the same pure number wherever physics is invented. $3\times10^8\,m$ is arbitrary and $5.29\times10^{-11}\,m$ is arbitrary but the ratio is the same throughout the universe.

There really is just one physics for the entire universe. That seems like Einstein's second postulate of his special relativity theory. But what he meant is that the phenomena of physics are all the same. Is mankind's physics on planet Earth the universal physics? It is. Only the arbitrarily assigned magnitudes of m, k and s differ. All the equations are the same. All the mathematics is the same.

Once we quantize the electric field and know how many Ö particles are in the field of a free electron and how many are in the electron and we realize those numbers are the same numbers throughout the universe then determining the size of the Ö particle connects us to those universal numbers.

These universal pure numbers are quite interesting and I believe a productive area for metaphysical speculation on the elegance of God's design, albeit only as an absentee landlord. The Laws of Physics determine the evolution and fate of our universe. And then what is determinism and what is free will?

9 You are the Bold Ruler

It was 10:44 AM and Heidi had spent almost 3 hours examining my paper. She entered the bar and sat down next to me.

"You've got the Grand Unified Theory and the Theory of Everything everyone has been looking for."

"Thanks."

"The fundamental forces, the fundamental constants, the fundamental particles, dark matter, dark energy, curved space, gravitational lensing, the expanding universe, a complete and USEFULL definition of atoms and bonds, it's astonishingly simple with only four particles, electrons, protons, quarks and neutrinos, only three orientations of the Ö particle, and precisely nine forces, yet capable of supporting the complexity we find in the physical universe. It is simple, symmetric, elegant, beautiful, complete and of the highest utility to mankind."

"It's really just charge, mass and velocity. Both charge and mass are associated with the surfaces of electrons, quarks and protons so it's just surface and velocity. That's the whole shooting match right there. See why everyone on the planet can appreciate it? All you have to do is be able to make four short lists, four long for the particles, three long for the Ö particle orientations, eight long for exchange phenomena and nine long for the fundamental forces and see how they fit together and you see physical reality in its entirety one to one."

"What about the experimental proof of time dilation using atomic clocks?"

"I think it's because motion through the neutrino foam can affect the vibrational frequencies of crystals. Vibrations in liquids and solids are between atoms and molecules, not within atoms and molecules as is thought. In an object moving through the neutrino foam the neutrinos move through the interstitial space between atoms and therefore perturb the vibrational modes."

"Obviously since time and space are made of nothing they can have no properties like time dilation or curved space. Time dilation and curved space are physically and philosophically absurd. Einstein is the number one bullshit artist of all time."

"Everyone's either bought into time dilation and curved space or they are pretending they have bought into time dilation and curved space making the two groups indistinguishable."

"I can only imagine what else you have come up with that you have not told me about."

"What's the bartender's name?"

"John."

"Hey John could I get a Bloody Mary?"

"Coming up."

"Salt on the rim?"

"Please."

"Of course a single particle that accounts for all physical phenomena is Occam's finest shave."

"Simple is better, but not too simple. The greatest architecture of complexity is the Tree of Life built on the combinatorics of combining a few atoms and in the Tree of Life the human brain is the greatest design with the ability to stack and sort, use memory and learn."

"What else have you worked out?"

"Once I got interested in the problem of solar collection it took me five weeks to solve the energy problem. I have a solution that will allow everyone to live at the American energy consumption level, that is a steady state solar solution, and that will generate no pollution. It'll come in at somewhere between 15 and 25 dollars a barrel in crude oil equivalent."

"Let me go to the truck and get a two-page paper describing my solar energy solution."

The bartender was returning with Heidi's drink.

"Here is the simplest and most inexpensive energy solution possible."

Heidi picked up the paper.

A Simple, Old-fashioned, Steady State, Engineering Solution to the Energy Problem for all Mankind

There are only three possible energy sources; fossil fuels, nuclear and solar. The only viable long term solution is solar. There are only three solar collection schemes possible; thermal, photovoltaic and photosynthesis. In photosynthesis only approximately 2% of the incident photon flux is converted to energy in the form of biomass. Due to the arable land intensity required at 2% energy conversion biomass is not a candidate for an energy solution although the efficient conversion of waste biomass to energy and fertilizer will be important economically, just not the major piece of the energy solution. Photovoltaics are not efficient enough, expensive, not proven over a meaningful 30 year lifetime and at present use highly toxic elements such as iridium that would be a potential chemical waste problem of staggering proportions. That leaves thermal collection of incident solar flux.

In almost every scientific or engineering problem the size scales are important. When either designing or interpreting a design the proportions are a key element that needs to be understood well. So also it is with the energy problem.

A parabolic dish collector reflects and focuses the parallel incoming light out through a focal point, where the receiver is located. I propose the solar collector be a ¼ meter^2 parabolic dish, 11.2 inches in radius. I propose the receiver should be able to handle 335 Watts.

At normal incidence the photon flux from the Sun is 1340 Watts per meter squared. Converting the high quality source of visible and infrared flow of photons to heat in a fluid is easy and efficient. When the light rays are focused to a point very high energy flux is achieved. The part of a solar energy conversion device that heats a carrier fluid with focused photon flow is called the receiver. The receiver is the "boiler". The ideal receiver would be a black box – a black, absorbing coated metal enclosure with a pinhole on one side. In a solar collector/receiver configuration you want to put the focal point of the collector inside the black box, the light entering through the pinhole. The receiver plumbing has an inlet pipe for low temperature fluid and an exit pipe for high temperature fluid. The size of the collector and receiver turns out to be the most important part of the engineering solution to the energy problem, the question of proportion.

High reflectance is readily available, 96% to 98% no problem. Receiver efficiencies can be as high as 96%. Converting the heat collected to steam and employing a steam engine with an efficiency of 18% and an electric generator efficiency of 96% the overall efficiency for solar flux to electricity is 16%. Employing a steam turbine with an efficiency of 35% the overall efficiency for solar flux to electricity is 32%.

Prime solar collector locations have the equivalent of 2200 hours per year of maximum solar flux.

A parabolic collector must be aimed at the Sun, so must track the Suns arc over the course of a day. The aiming device, on which the collector is mounted, can be built cheaply and reliably due to the light weight of the collector/receiver and the small forces on the aiming device. Those are the three components of the design—parabolic dish collector, receiver, and aiming/mounting device.

We need to produce about 300 kilowatt hours per day per person for each person on the planet to have an average per capita level of total energy consumption, including transportation and the power grid, like that of the developed world. At an overall conversion efficiency from incident light flux to electricity of 16% that works out to about one thousand ¼ meter^2 collectors for each person on the planet. Packed in a two-dimensional array that will require about 850,000 square miles, a square 926 miles on edge, 1 to 1.1 per cent of the Earths surface area.

The collector/receiver is lightweight and small so the wind and mechanical forces on it are small. Wind resistance goes up as the velocity cubed, and a collector is like a lever, the smaller the length of the lever, the smaller forces at the fulcrum. The wind forces can be minimized by keeping the size of the collector small. The design of a rubber band model airplane in contrast with a Boeing 747 represents well the concepts of scale, proportions and economic cost of this simple design. Since we will need to build about 6 trillion of these solar collection devices, there will be the largest possible economies of scale, resulting in lowest cost per unit. I estimate the maximum cost will be around $30.00 per unit installed. With a useful life of 30 years at 5% interest the energy cost is 1.4 cents per KWH. At the low estimate overall efficiency of 16% the monthly cost to an individual to have 300 KWH per day would be $130 a month, if the land to put collector farms on is free. If the cost is $22.00 per unit installed, an estimate of 25% in overall efficiency to electricity and a 5% interest rate the energy cost is 0.7 cents per KWH. If the interest rate was 3% the costs would be 0.84 cents and 0.42 cents respectively. After 30 years the field would be paid for and the energy of the field just about free unless the collectors need replacement every 30 years. Neither of these calculations takes into account the cost of the turbines and generators in the power plants embedded in the collector fields. They only reflect the cost of the collector fields. Prime non-arable high solar flux land is largely uninhabited and in the government domain. Of course many people will want their roofs covered with these things. The efficiency of the collector is the same on the equator as on the North Pole. They both would collect virtually the same amount of energy. But you can not close pack the dishes on

the North Pole. There they have to be spaced apart so they do not hide each others view of the Sun.

The collection manifolds, turbines, generators, and electrolysis of water technologies are all mature, well designed, on the efficient thermodynamic and engineering frontiers and are mechanical engineering poetry.

That's all there's to it, amazingly enough. It's a matter of proportions.

One is hesitant to make such a remark, but in my analysis this appears to be the best, the cheapest, the most efficient, the only way, the singular path we should follow for the large scale energy problem.

Photovoltaics are more expensive, less reliable, and use highly toxic elements. Biomass is only about 2% efficient in converting solar radiation to biomolecules so would require far more land, and at present would require arable land. Designed biological collectors for non-arable land, maybe 20 years in the future, that could produce carbon based fuels may be important for providing airplane fuels, but would be inadequate for the large piece of the energy solution. Since the biosphere fixes 2% of solar flux into biological chemicals, and we use in energy magnitude, at present, the equivalent about 10-15% of solar biologically fixed energy, primarily as fossil fuels, it would be impossible to harness technologically. So the 17th Century Isaac Newton's parabolic reflector (I do not know if he invented the first parabolic reflector or just the reflector based telescope, it seems the latter) and the early 19th Century isothermal/adiabatic ideal cycles of Sadi Carnot, win this war.

A Fresnel lens design with similar proportions is an interesting alternative design.

"Is that all there is to the energy problem?"

"Amazingly that's it."

"What about wind, wave and tidal energy sources?"

"You could actually provide all the energy mankind needs through those but it would cost three to four times as much or more. Harvesting wind and wave energy is far more difficult technologically than my solution. But it is greatly to the credit of modern design engineers that they can already harvest both wind and wave energy economically."

"Now let me show you my provisional patent application for an analog solar tracking mechanism. If it hasn't already been patented it will be the simplest and most valuable patent ever."

Provisional Degner Analog Virtual Eclipse Solar Tracker Patent Application

What is the title of your invention?

The name of my invention is the Degner Analog Virtual Eclipse Solar Tracker (DAVEST).

What are the objectives of your invention?

In a parabolic dish solar collector with the receiver located at the focal point we need a way to aim at the Sun and track it throughout the day. The trajectory of the Sun is an analog phenomenon. The DAVEST is an invention to track the Sun.

Provide a brief summary of how your invention works.

The receiver casts a shadow on the dish. An opening in the base of the parabolic dish is made approximately the same shape and size as the receiver cross-section that casts the shadow. Behind the opening is located an array of photoelectric cells. When the dish is aimed at the Sun the shadow from the receiver covers the opening. From behind the dish the Sun will be eclipsed by the receiver and no light will come through the opening in the dish and strike the photoelectric cell array. When the dish is not aimed directly at the Sun there will be light striking some of the photoelectric cell array. The electrical signals generated by the array of photoelectric cells can be used to aim at the Sun and track it throughout the day. The level of precision required determines any specific design.

How is the invention used?

It is included in the design of parabolic dish solar collectors.

"Simple, elegant and of high utility. Are you going to build a working model?"

"The parabolic dish and receiver out of cardboard, four photoelectric cells, four light bulbs, a 7th grade science project. I'll just put a handle on it and a human can aim it just by getting all the lights to go out. It'll be all analog, from generating a current to aiming in the hand of a human."

"Will it actually be able to aim at the Sun?"

"Not only aim at the Sun but the center of the Sun. It'll be easier than placing shots on a one-inch target at 100 yards with a .340 Weatherby."

"What is so important to have an analog feedback system to track the Sun is that it allows construction standards to be significantly relaxed and also can accommodate Earth motion over time in the mounting structure. It is a simple solution to what otherwise is a difficult and expensive problem. The 6 trillion or so photovoltaic cells required will be the largest use of photovoltaics ever and the chips required will be a large order."

"An important feature of the small parabolic dish design is it can cover almost any surface topology efficiently and inexpensively, so out in the desert, in the foothills, on roofs and fence lines the installation is easy. The DAVEST makes the small dish collector scheme a very robust solution."

"The aiming device is just a two-axis aiming device, east-west, north-south, requiring two axis and two small electric motors that can easily be designed for a 30 year duty cycle and probably a lot longer."

"Could your energy solution have been implemented in the 50's?"

"It really requires the photoelectric cell, the computer and the silicon chip because of the computations required to track the Sun. So it could have been done in the 70's. It could have

been implemented with vacuum tubes but would not have been economically viable. With the integrated circuit and DAVEST its implementation will be quite easy. It's really astonishing how much energy we have available to us and how cheap it can be. In future generation's people will look back on our Fueilletonistic Age and wonder what we were using for brains.'

"What will happen to the price of oil after you publish?"

"At first there will be skepticism. Then the General Electric's and Dean Kaman's of the world will get focused on the best, the cheapest implementation. In short order the price of oil will collapse to between 15 and 25 dollars a barrel. We'll pick a target city to convert their electric grid entirely over to solar in 3 or 4 years. Phoenix would be an excellent choice because of the prime amount of solar flux it receives and their dependence on fossil fuel. We would also implement hydrogen generation and piping to get a handle on that too. Eventually there will be hydrogen pipelines from the southwest US to the rest of North America. China and North Africa have abundant solar energy flux land too. This solution to energy will increase the carrying capacity of the planet for humans by a factor of ten before we run out of land for collector fields, maybe even larger than that."

"If we had a good superconductor and a good battery we would not even have to utilize hydrogen."

"I haven't worked on either or on fuel cells, although all are interesting. I don't think there ever will be a room temperature superconductor so I think we are stuck with hydrogen for transmission and storage. I think we will have a good battery that will give an acceptable range of maybe 200 miles and that will be a design that could take out the entire automotive business. I think if you had an efficient enough fuel cell you could just use pressurized hydrogen, maybe get a hundred mile range, instead of requiring cryogenic."

"Now Honey let me tell you about another important project, a pure information technology project. I call it the efficient Market and asset manager, eMaam for short."

I handed the one-page paper to her.

The efficient Market and asset manager

What we want to do is minimize the human labor time, and therefore economic cost, required to carry on all our affairs and we want to carry on our affairs in an envelope of security.

All markets, all assets, all inventory, all asset transfers, all ownership, all taxes, all financial transactions implemented by one computer program, that I have named the efficient Market and asset manager, for everyone on the planet. This program will catalyze the transition to electronic money and a single currency. Eliminate all tax lawyers, all non-academic accountants, the IRS, SS, one-half or more of the banking industry, all the exchanges, the market specialists, one-half or more of the brokers, realtors, the GAO, statistics gathering people, government by one-half or more. One computer program for all people for all transactions – all businesses, all inventory control, all pricing, all sales, to keep track of all assets, to make efficient markets, to implement taxes all done free of charge by a straightforward program, the efficient Market and asset manager. I have a simple algorithm

to implement a bid/ask market. It shaves bid ask spread to zero cents per share on average and implements the singularities in time that correspond to transactions.

By implementing this transition to all electronic financial transactions, performed by the modern computer-communications network with minimum cost, I estimate we will be able to reduce the workweek from 40 hours to 30 hours while increasing the standard of living.

Also the total health data base, all medical, dental, and optical records, for everyone on the planet implemented by one computer program. This would give the individual the best care and the public health, medical and scientific community the necessary data base to fight disease and pollution. Maintaining privacy will be a challenge but could be implemented much better than the current level of privacy.

All voting can be done electronically, implemented by this computer program.

And we will have a dossier on every person alive and a record of every purchase made by anyone.

Heidi read it in a minute or two.

"Do you realize what else it is?"

"A total solution to the terrorism and security problem for all people and all countries for the rest of time, wow!"

"You got it"

"Bring me another Bloody John, SALT on the rim."

"It solves those problems to the highest degree possible. All business inventories are known. All purchases are known. If someone is buying acetone, propane, nitrate fertilizer, kerosene, box matches and timers at Walmart or Home Depot there will be a record of it. Bombs are easy to make but so many possible bomb making purchases are innocuous it will be a considerable searching problem to find potential bomb makers. All backgrounds in chemistry, microbiology, computer science, all military training, all talents and abilities will be known. We will know who can fly airplanes, can culture bio-toxins, who can disable computers and interfere in infrastructure. With this program we can put to an end most if not all economic crimes, stealing, forgery, embezzlement, fraud, etc. We will know where everyone is to some degree all the time and for people on probation will know where they are at all times. We will have complete access to lifetime medical records and sibling's and parent's medical records. When this program is fully implemented the work week for the average Joe can be lowered to 30 hours per week from the current 40 while obtaining a higher standard of living."

"Will it solve everyday problems like people getting into football games, buses and restaurants?"

"It can do all of those things. If biometric recognition is possible no ID cards will be required. But ID cards along with a PIN and biometric recognition will be easier and simpler to use than the current menagerie of ID cards, passports, driver's licenses, credit cards, debit cards, etc, etc. It will be necessary to enter stores, public facilities, transportation, in short everywhere a person is exposed to other people outside of the home."

"How exactly will eMaam reduce the work week?"

"eMaam will reduce, not increase, the cost of doing business. The full implementation will be far smaller than currently used for computer resources. We have so much redundancy and duplication it is almost absurd. It eliminates about 20% of the workforce, very many in government, and they must go out and find a new job, probably doing real work for the first time in their lives. When they are all employed again the other 80% will have their work week cut by about 20% because there are more hands for the same task. Add to that no defense expenditures and there can be a further reduction in work week."

"Can eMaam implement fair taxation?"

"Easily. There should only be two taxations possible, income and wealth. There should be no deductions. There should be no sales tax. Sales taxes are both regressive, hurting those with the least income and wealth and also inhibit the economy at the worst level possible, that of retail sales. All governments at all levels must have a balanced budget. The rates of taxation on income and wealth are determined by the magnitude of governmental expenditures. There is a range of economies, from those just developing where there is only income and no wealth yet to the highly developed countries where there is very substantial wealth. Determining the fraction of taxes allocated to income and wealth is a little difficult. It depends on the amount of income, the amount of wealth and the return on investment. I could derive a simple formula based on those three data inputs but have not had a chance to work on such an applied problem as yet. Both income and wealth taxes must be flat taxes applied at the same rate to all income and all wealth. In a primitive economy this is not possible since there is so little wealth they would have to derive the majority of their tax income through taxing income. Eventually all economies will raise their taxes entirely through wealth alone since there will be so much wealth. Those workers without wealth will have an opportunity to rapidly accumulate wealth since the income taxes will be so low."

"Should there be a minimum income and wealth below which there is no tax?"

"Yes. In America I would start out with the first $15,000 of income and the first $150,000 of wealth to not be taxed."

"What about taxation of businesses, from the sole proprietorship to the largest multi-national?"

"There should be no corporate tax, it is double taxation."

"How would you determine profit?"

"Simple cash flow. The profit for any business is assigned to the owners of that business, be they a sole proprietorship or a publicly held company. The income tax on business profits is then paid by the individual who owns those profits. It enables expansion and growth into new markets. It does that by allowing a growing company to have no taxes to assign to the shareholders while it is growing and incurring the cost of physical assets. The assets of all businesses would be assigned to the owners and they would also have to pay wealth taxes on those assets. Then all income and wealth is assigned to individuals. When the market is mature, there is no room for expansion left, and the physical assets are paid for, the profit will be significant. This is precisely

how we want the economy to respond to the challenges of mankind's needs. It directs investment into emergent new and important technologies in a free and unfettered marketplace."

"Of course income and wealth are easy to determine in eMaam so all this is implemented with no cost. Assign wealth as income at the 30 year risk free rate and tax that amount as income."

"How will you ignite it?"

"All I have to do is show it to Bill Gates once."

"To make a marketplace you have to bring the bidder and the seller to the same price. Right now on the NYSE there is what is called a specialist who has two lists, one of bids and one of asks. He pockets the bid/ask spread when a trade is executed. My simple algorithm will reduce the bid ask spread to zero cents. Here's a copy of the provisional patent application. This patent is the simplest in history with the possible exception of the Post-It note by 3M."

I handed Heidi the one-page document.

Provisional Strike an Arc Patent Application

What is the title of your invention?

The name of my invention is Strike an Arc, SAA.

What are the objectives of your invention?

The SAA is a simple algorithm by which a trade event can be executed at the minimum bid/ask spread, a bid/ask spread of zero cents on average.

Provide a brief summary of how your invention works.

The buyer or seller of a security picks a price to an accuracy of one cent. Then the algorithm is to add ½ cent to the chosen price for a buyer and subtract ½ cent from the seller. Whenever two securities, one from a buyer and one from a seller, have the same price after that algorithm is executed a trade occurs almost instantaneously at that intermediate price.

Explain how your invention may be used differently.

Different buyer/seller units can be used and a different increment to bring them into equality can be used.

How is the invention used?

In a computer based strategy the algorithm is implemented in the software that determines a trade event.

"Do you think you will be able to get a patent?"

"It won't cost much to find out."

"What else have you been up to too keep busy?"

"With my quantum mechanics I can solve the protein folding problem and the general problem of interactions in liquid, solid and gas states such as occur in biology. This will revolutionize drug design and protein building and will underlie the future of biotechnology, the area of design, what DNA sequence? There will be a huge advance in our ability to build the simplest biological organisms, viruses and prokaryotes and eventually man."

"You know what else I am going to do someday?"

"I can't even guess but am sure I'll be surprised."

"I call it Einstein's brain in a box. You have a human brain that has input and output in a box on the table next to your computer. It will have emotions and a soul."

"Would you use your own DNA or neurons to build such a device?"

"I would."

"Would they be immortal's"

"I think that would be possible."

"Should you have the right to do that?"

"I'll do whatever I want with my DNA and neurons and if anyone doesn't like it they can kiss my ass."

"Also with my quantum mechanics I am interested in quantum computers whose capacitors, inductors, resistors, transistors and switches are molecular entities. This is a very exciting prospect."

"You'll love this – I think I might be able to design a machine to harvest electric field energy from the Earth's electric field that is about 150 V/m with the surface negative. Based on the same principle I might be able to design a machine that extracts energy from the charge transfer when two dissimilar metals touch. This is my only quack like thinking. It looks almost like free energy. It asks profound questions about the electric field and how you go about extracting energy from one. Tesla wanted to extract energy from the Earth's magnetic field that has a much higher magnitude of energy density than the electric field."

"And I want to establish a huge genetic data bank of sperm and egg for use in producing humans with desirable biological attributes. I want to provide this service so that all people who carry genetically undesirable traits can give rise to highly desirable children. Imagine a catalog of attributes that man and woman can use so their progeny don't further head into the dead end box canyon called NO offspring, Darwin's cruel selective force in action. The basic legal principle underlying this technology is the right of the individual to buy or sell in a fair, orderly and ethical marketplace sperm, eggs, embryos and surrogacy."

"I am going to discover a way to combine chromosomes to develop really superior humans. It's a really exciting prospect. What you do is select the top say 100 chromosomes for each individual chromosome for each distinct genetic pool of mankind or any group you want to use. When you put all top chromosomes for each individual chromosome and combine them in one individual's set of chromosomes he or she could have a very nice set of chromosomes. It's still a little way down the road coming up in 10 to 20 years but will revolutionize human genetics. Conventional conception combines the 23 chromosomes that come in a set. By combining chromosomes individually to build new sets of 23 you perform evolution at a rate not possible through conventional biology. Every individual would be genetically unique net of whose Y gets used."

"How are you going to get started?"

"I am going to patent my set of atomic surfaces and their distortions in bonds, both covalent and electrostatic. Would you like to read my provisional patent application? It's only four pages and simple although not as simple as the DAVEST and SAA."

"Let's have a look."

I handed Heidi a copy.

Provisional Degner Atomic and Molecular Model Patent Application

What is the title of your invention?

The name of my invention is Degner Atomic and Molecular Models. These models are a set of closed spherical surfaces in three-dimensional space that represent atom and molecule surfaces in both physical models and computer models, the computer representation of atoms. Atom centers, bond lengths and bond angles that define the chemical backbone are known for many molecules from x-ray crystallography. My Degner Atomic and Molecular Models is a method to manufacture surfaces to associate with those chemical backbones. These physical and computer models will allow a solution to the protein folding and function problem and revolutionize drug and protein engineering and design as well as pave the way in quantum computers.

What are the objectives of your invention?

Size is the most important property of a physical system. In liquids and solids atoms touch and this determines the size of all liquids and solids. If we don't understand atoms have definite size, touch and have empty space in the interstices between atoms we cannot understand anything. Because atoms and molecules touch in liquids and solids the importance of size in modeling is self-evident and manifest.

There are two kinds of models possible – real plastic, metal, wood, rubber or some other solid medium models and computer models that involve objects manipulated by computers in cyberspace. My invention is a method of manufacture of atomic and molecular surfaces as discrete objects in three-dimensional space both physically and in cyberspace. For the objects in the computer representation I coin the word cyberatoms. This set of mathematical surfaces will allow cyberatoms to be represented in computer graphics and molecular design simulation software. This set of mathematical surfaces will allow physical

models to be represented by a configuration of plastic, metal, wood, rubber or some other solid medium. Under the current quantum mechanics paradigm atoms do not have surfaces. The wave function for all the quantum states of all the atoms is continuous from the center of the atom to infinity in all directions.

Provide a brief summary of how your invention works.

By providing a set of radii for atoms I enable physical models and cyberatoms to be described by discrete, relatively rigid objects in three-dimensional space. I describe surfaces where atoms touch and do very little inter-penetration. In single, double and triple covalent bonds, ionic bonds due to electrostatic attraction, covalent/ionic bonds and dipole/dipole electrostatic interactions such as hydrogen bonds these spheres interpenetrate according to a relationship I call the Bond Fraction Index (BFI). The BFI allocates the bond length into the two respective radii in each of the bonded atoms. The combination of a set of radii for atoms and the BFI allows a complete representation of atomic and molecular surfaces in physical models and computer models to be associated with chemical backbones.

Explain how your invention may be used differently.

Although atomic and molecular surfaces are interesting for humans to look at in three-dimensional physical models and computer graphics the power of the approach of representing atoms and molecules as discrete objects with definite radii is in calculating the interaction parameters and energy wells of interactions between discrete atomic and molecular entities, such as a drug molecule with a protein. The interaction parameters and energy wells between molecules will have to be calculated by computers because of the complexity of the problem. All those computer software applications will need to use my cyberatom set of radii and the BFI.

Provide a brief summary of how your invention works.

The Degner set of atomic radii

Free atoms are perfect spheres. The set of Degner radii of non-metal atoms, except for hydrogen and helium, can be calculated from the first ionization energy and the number of valence electrons. The positive ion that results from emission of an electron by a neutral atom is the same size as the neutral atom. The following equation describes the relationship:

$$IE = \frac{(qe)^2 \left(R_o - \frac{r_B}{2} \right)}{8 \pi \varepsilon_0 R_o^2} \left[\frac{\left(q + \frac{1}{2} \right)^2}{q^2} - 1 + \frac{\frac{3}{4} \frac{2q^2}{q^2}}{\sum_{x=1}^{x=v} x^2} \right]$$

where v = number of valence electrons (the valence for C is 4, for N is 5, for O is 6, for S is 6, and for P is 5), $q = \frac{v}{2}$ where q is the charge in the neutral atom, R_o is the outer radius of the atom, e is the quantum of elementary charge and r_B is the Bohr radius. Everything is known except R_o so there is one equation with one unknown, a quadratic equation in R_o. Solving for R_o and using the larger root gives the radii. Carbon has a radius of 1.365Å. Nitrogen is 1.190Å. Oxygen is 1.555Å. Phosphorous is 1.809Å. Sulfur is 2.160Å. Chlorine is 1.918Å. Polonium is the largest atom at 2.734 Å.

I will break this equation into two parts:

$$U_c = \frac{(qe)^2 \left(R_o - \frac{r_B}{2}\right)}{8\pi\varepsilon_0 R_o^2}$$

$$PsiD = \frac{\left(q + \frac{1}{2}\right)^2}{q^2} - 1 + \frac{\frac{3}{4}\frac{2q^2}{q^2}}{\sum_{x=1}^{x=v} x^2}$$

Atoms may be thought of as spherical capacitors with the inner positive plate at r_B and the outer negative plate at R_o. In the annular space between r_B and R_o the electric field strength at radius R between r_B and R_o is given by Degner's Law for the electric field inside atoms, not Gauss's Law for the electric field. Degner's Law is:

$$E = \frac{qe}{4\pi\varepsilon_0 R_o R}$$

U_c is the electric field energy stored in a spherical capacitor using Degner's Law to describe the electric field in the spherical capacitor annulus where the charge on the plates is q units of elementary charge. U_c is also the energy stored in a parallel plate capacitor with a plate area of $4\pi R_o^2$, a plate separation of $R_o - r_B$, and a charge of q quantum's of elementary charge on each plate. Note that Degner's Law approaches Gauss's Law for the electric field asymptotically as R approaches R_o and when $R = R_o$ Degner's Law and Gauss's Law are identical. Outside of atoms and in macroscopic spherical capacitors Gauss's Law always applies.

PsiD describes a transition from a charge q to a charge $q + \frac{1}{2}$ in a spherical capacitor where the electric field is defined by Degner's Law. Multiplying U_c by the $\frac{\left(q + \frac{1}{2}\right)^2}{q^2} - 1$ part of PsiD represents that charge transition. The $\frac{\frac{3}{4}\frac{2q^2}{q^2}}{\sum_{x=1}^{x=v} x^2}$ part of PsiD describes the additional energy that must go into an atom to get it to oxidize due to the low energy well atoms are in, an energy defect in the sum of the parts of an atom below the ground state energy of the parts. $U_c \times \frac{3}{4}\frac{2q^2}{q^2}$ is the total energy defect when an atom goes from charge v to charge q. The total energy defect is divided into v pieces of magnitude $1^2, 2^2, 3^2, ..., v^2$ each. The denominator of this correction factor, $\sum_{x=1}^{x=v} x^2$, a sum of squares, is the sum of those v pieces. In a single oxidation of a neutral atom the 1^2 piece must be added in addition to the

change in charge energy in the q to $q + \dfrac{1}{2}$ transition. So the energy defect in an atom that must be replaced in the first oxidation is $U_c \times \dfrac{1^2}{\sum\limits_{x=1}^{x=v} x^2} \times \dfrac{3}{4} \dfrac{2q}{q^2}^{2}$.

The Bond Fraction Index

Atoms surfaces are liquid state and deform from perfect spherical symmetry in covalent and/or electrostatic bonds including dipole/dipole interactions such as hydrogen bonds. The deformation, interpenetration, means the bond length is less than the sum of the two bonded atoms free radii. The Bond Fraction Index determines the amount of interpenetration and whether the interface between the two atoms is convex, concave or flat. The BFI allocates the known bond lengths from X-ray crystallography into two parts R_A and R_B. R_A is the distance along the bond axis to the interface between atoms A and B in atom A and R_B is the distance to the interface between atoms A and B in atom B. In covalent and/or electrostatic bonds the ratio of R_A and R_B is given by the following relationship:

$$\frac{R_A}{R_B} = \frac{q_A^2 / R_A^2}{q_B^2 / R_B^2}$$

where q_A is the charge in the annular space of atom A and q_B is the charge in the annular space of atom B. The bond length is:

$$\text{Bond length} = R_A + R_B$$

We have two equations with two unknowns. The solution is:

$$R_A = \frac{\text{Bond length}}{(q_B^2 / q_A^2)^{1/3} + 1} \qquad R_B = \frac{\text{Bond length}}{(q_A^2 / q_B^2)^{1/3} + 1}$$

How is the invention used?

Specifying R_o, R_A and R_B allows discrete atomic and molecular surfaces to be manufactured for physical models and computer models based on the chemical backbone specification of atom centers, bond lengths and bond angles.

"That's step one. When are you planning to file?"

"July 4th, 2008."

"Do you smoke pot?"

"Since age fifteen and have been raising my own since age twenty-one. I am now raising White Widow, three-time Cannabis Cup Winner, got the seeds from my Amsterdam friends. Do you smoke?"

"Just in the evenings, enjoy it."

"The people that do not enjoy marijuana are deficient in neurochemistry. It's purely due to genetics."

"Could that be possible?"

"Amazingly, astonishingly, I think it is. The human mind is only a neurochemistry machine. Perceiving universal peace, justice, freedom, and liberty is also a neurochemical machine perturbation. I estimate almost half of the human population would smoke marijuana if it was legalized. It looks to me like one gene is involved, a gene that codes for a cannabis receptor in the brain, that about half the population has, half have the I enjoy marijuana gene variant and the other half don't have that gene variant. The genetics could be quite a bit more complicated but the fact about one-half the population enjoys pot makes it look like a simple mechanism. The connection of pot to universal peace, justice, freedom, and liberty is that when an individual is high he or she thinks more about that kind of stuff. Exactly why that is I don't know."

"Were you a fan of Muhammad Ali?"

"Float like a butterfly, sting like a bee, I was raised on Muhammad Ali. Love Ali. From knocking out the big, bad bear Sonny Liston all the way through to Zaire and knocking out the big, bad George Foreman, Ali was pure poetry in motion. Ali is the greatest athlete in the history of man. And he is very handsome and smart. We are the same size and have the same optimum weight but I am more upper body strength whereas Ali's footwork is his strongest suit. And Ali refused to step forward and be inducted into the military during the Vietnam conflict, the morally right and courageous move. He paid for it by being convicted of draft evasion and not being able to fight for four of the prime years of his boxing career. I hate America for doing that to him. I will not forgive America until they repent. You know what one of my goals has been since I was about fifteen or sixteen? To meet Ali and shake his hand, champion to champion."

"His pugilism induced Parkinson's disease is a real tragedy. No longer will an athlete of Ali's stature go into boxing. I was so happy when his wife said he is happy and well inside, just lost some motor functions."

"How about Malcolm X?"

"Read the Autobiography of Malcolm X as a freshman, one of the first college level books I read. Loved Malcolm X. As I recall he was early in life very street smart and a numbers runner, good at numbers. Never thought much of the Black Muslim connections but loved the fight, the resistance, the brashness, the street smarts, the spirit and the intelligence of both Ali and Malcolm X. Read Eldridge Cleaver's Soul on Ice and wrote a five-page paper on it titled In Search of White Cunt. I'd love to have a copy of that one."

"I agree with you on Ali and Malcolm X but being a generation younger I missed the incredible experience you had of growing up with them in your most impressionable years. How much older than you is Ali?"

"Almost eleven years."

"What about Martin Luther King?"

"I never really paid much attention to King but at about thirty read his I've got a dream speech and saw a tape of the speech. Now that old boy could write and deliver a sermon. I've got a dream is the greatest oratorical performance in modern history."

"Let freedom ring from Stone Mountain of Georgia. Let freedom ring from Lookout Mountain of Tennessee. Let freedom ring from every hill and molehill of Mississippi. From every mountainside, let freedom ring. And when this happens, when we allow freedom to ring, when we let it ring from every village and every hamlet, from every state and every city, we will be able to speed up that day when all of God's children, black men and white men, Jews and Gentiles, Protestants and Catholics, will be able to join hands and sing in the words of the old Negro spiritual, free at last, free at last. Thank God Almighty, we are free at last."

"You memorized the closing?"

"What else do you carry around in there?"

"The Lord is my shepherd; I shall not want. He maketh me to lie down in green pastures: he leadeth me beside the still waters. He restoreth my soul: he leadeth me in the paths of righteousness for his name's sake. Yea, though I walk through the valley of the shadow of death, I will fear no evil: for thou art with me; thy rod and thy staff they comfort me. Thou preparest a table before me in the presence of mine enemies: thou anointest my head with oil; my cup runneth over. Surely goodness and mercy shall follow me all the days of my life: and I will dwell in the house of the Lord forever."

"Can't go anywhere without those two. It's an astonishingly bad result that the two leading Black leaders, King and Malcolm X, were both assassinated early in life. The loss is difficult to fathom. Not to sound harsh but the loss of JFK and Bobby was of minor consequence in comparison. King and Malcolm X were revolutionaries and the best of the Black community. JFK and Bobby were spoiled rich kids with inferior intelligence polishing their egos in public life. The Cuban Missile Crisis and getting into to Vietnam were reflections of their astonishingly shallow leadership and their animal ability to murder people."

"How good is your memory?"

"I have a good memory, one of the best in some regards, but it seems to me mathematicians carry around more memorized data than I do. I know this one individual whose memory exceeds mine by quite a bit although he is a moron incapable of learning calculus. Lawyers have good memory ability. Lots of people have good memory ability. I really suck at Jeopardy and Trivial Pursuit. The interaction of memory with thinking and creativity is interesting. It seems to me that if you don't have the essential building blocks of mathematics in your head, be it as a biologist, an economist or an English major, you perceive so little of physical reality that you are disconnected from reality. But I approach life as a reductionist, always trying to find a few simple principles to account for complexity."

"Can you list the basic building blocks of mathematics?"

"Points, lines, surfaces, volumes, integers, real numbers, coordinate systems in zero, one, two and three dimensions and vectors that are a line of finite length with a head and a tail.'

"What about dimensional systems higher than three?"

"Mathematically interesting but of no value to physics."

"You left out for a reason algebra, geometry, trigonometry and calculus. Why is that?"

"Those four essentials of mathematical literacy follow logically from my set of basic building blocks."

"What do you think of the Jesse Jackson's and Al Sharpton's?"

"I had to think about Jesse's knocking up that young woman and fathering a child. My Dad would not have done that. But it really isn't fair. Any attractive 30 year old woman who comes on to a 60 year old man is biologically irresistible. But I like Jackson and wonder what Jesse will think of my work? Sharpton's involvement in the Tawana Brawley situation indicates he is stupid and a racist."

"Do you think many Blacks are racist?"

"I do. I think Blacks are the most racist in America, followed by Native Americans, Hispanics and in a separate category the Christian right. I think whites are the least racist of any groups but do contain the most vile racists. Everyone blames whitey for their problems and white males at that. In looking at the last century and still even now I can see their bitch. But in modern America they are wrong. In America there are no legal barriers to anyone anymore and everybody can realize their full potential. Universal peace, justice, freedom, and liberty will extend that status to everyone on the planet."

"What do you think of that pedant George Will?"

"His pedantry is enough to make you puke but he's a smart bastard. When I think of George Will I also think of William F. Buckley. They are the leading intellectuals in the conservative arena and if they are not the two smartest people in the business, albeit in the somewhat trivial business of commentary, I would be surprised. Of course they are both somewhat innumerates. My theory of physics will help them along on their journey."

"George will find this interesting. I consider myself the quintessential conservative. And I'm not a prude about defining conservatism. If conservatism cannot accommodate gays and marijuana it is completely hopeless. The principles involved are privacy, freedom and liberty. To not allow diversity in lifestyles is a violation of those fundamental principles. First and foremost in a conservatives mind must be a few principles and I think I lay them out fully in The Sands of Time and its succinct definition."

"Have you ever been in a fight?"

"Six between fourteen and seventeen and one the fall following graduation from Cornell. I was six and one. Talked my way out of at least three or four."

"That's a pretty good win percentage. Who did you lose to?"

"An outstanding jock a year younger than me, in fact he turned out to be the best running back in Ithaca High's history. I was an inch or two taller but he was the same weight and stockier. I stopped the fight in about 10 seconds after I figured out he would have kicked my ass."

"When was your first fight?"

"We were waiting for the school bus at Milwaukee Lutheran High School at about 3 PM. I was in ninth grade and fourteen at the time. This moron I got into a minor verbal argument with lunged at me. I didn't have any books in my hands. I dropped him with an overhand right. He was a real asshole and instigated the whole event and I was proud to have inflicted so much damage with one punch. It was the first punch I ever threw. But I knew he was a trivial opponent, just emotionally uncharged, and felt dropping him with one punch was not very impressive."

"I've got an overhand right even Ali would be envious of. I can deliver it with precision at the moment in time the opponent is in perfect range. Knocking someone out with one punch to the chin is like hitting a golf ball. When you connect perfectly you swing right through the target, the maximum force is generated and the maximum transfer of momentum occurs. If it is properly applied to the face the person can be knocked unconscious by the mechanical brain trauma."

"If a strange man approached me and grabbed me?"

"He would be dead meat inside one second."

"It all comes in one package doesn't it?"

"Did you become friends with everyone you got in a fight with?"

"Yup. After you defeat a man he sees your point. If he defeats you, you see his. Either way you reconcile differences."

"Like sorting in a wolf pack."

"In the human wolf pack the top wolves have an average IQ of 150."

"Were you ever wrong in instigating a fight?"

"Just once. I made fun of a disabled student for reasons I don't remember. The leader of the auto mechanics type students called me out on it and a fight was set up for after school just off school grounds. That was before first class. By 3PM there were over 100 students gathered, surrounding us and cheering on me or him. He took one swing, I ducked, moved inside and put him in a headlock. A headlock is the deadliest inside move there is. You use it to subdue a superior opponent. You can kill a person by putting him in a headlock if you are strong enough. The vice principal showed up and asked who won. The police pulled up and took us in the back of the squad car to the school parking lot, gave us a little lecture on proper ways to resolve conflicts and released us. We had a lot of respect for each other after that."

"In all the fights it was with common class individuals, never an intelligent person except for the fight after college. I had stolen the girlfriend of this spoiled rich kid, a fraternity brat, his Dad

and brothers all went to Cornell and we were both at a happy hour on Friday afternoon. I don't remember if I threw one punch or just put him in a head lock. We were having beers together at the bar ten minutes after the fight was over."

"You consider yourself a common man albeit with uncommon intelligence don't you?

"When your mother was raised on a dairy farm and your father a minister you are proud to be a common man."

"Did you know that most Blacks have been in a few fights, both the men and the women, and hardly any Jews ever get in fights? Why do you think that is?"

"Genetics?"

"Must be."

"I think people who have never been in a fight have missed out on an important biological experience and might even be sissies."

"Most people have not been in fights, or have they?"

"The average Joe, schooled in the school of hard knocks, can take care of himself and his family and deliver a punch if required. It's really just the intellectuals who are sissies."

"Sometimes I can't tell if you're serious."

"You've heard, probably live, both Witten and Schwarz. If they had any less charisma they would not have any at all. Their delivery and style is effeminate."

"What's the singular most pusillanimous thing you've seen a physicist do?"

"Writing books with the help of a real writer. Leon Lederman and Sheldon Glashow are so low I won't ever even acknowledge they exist. I paid for both of their books, and although I read them both, a rare act for me, they were so completely devoid of intellectual content I wondered if they were both cretins and felt ripped off. Murray Gell-Mann wrote the best book I have read by a physicist for popular consumption, The Quark and the Jaguar. It's easy to distinguish between them."

"Is the problem with the Y chromosome?"

"I think that is the problem. Jews especially have bad Y chromosomes. In the Jews the big load of intelligence is on the X chromosome. That's why Jewish men think like women, because their Y adds little additional intelligence. Their bad Y chromosome apparently makes them ugly and that's why so many Jewish men are ugly."

"Now you can't be serious."

"Somewhat serious, I really have not studied human population genetics, but I have observed humans and human behavior in detail. At Cornell you could easily tell who the Jews were with

one glance. They were the ugly Caucasians with black hair. Not in all cases to be sure. The fact that the Jewish men are physically unattractive is definitely true, I couldn't be wrong on that observation. The Jews back then were only welcome at some of the fraternities. The Jewish fraternity brothers would only get dates with and be able to bring back to their frat house ugly women. My best friends were smart Jews and I was at their frat house many times and observed all of that. I also had friends at the most desirable fraternities so knew both sides of the issue. Of course the Jewish fraternity brothers were among the smartest people at Cornell and the desirable fraternities had a lot of jocks and dummies. Both of their egos were inflated but for different reasons."

"It's all changing now due to the fact of extensive hybridization, Jews marrying Gentiles and other non-Jews for the first time in their history."

"In Germany for 1000 or more years there was almost no cross breeding between the Jews and the host population. That's been verified by DNA sequence analysis. There are only 12.5 million Jews on this planet and that tells you something important about their religion, culture and genetic pool. There only being 12.5 million would indicate a lack of biological success in the world at large but that is in marked contrast to their incredible success in America."

"Apparently in Y chromosomes Genghis Khan was rather extraordinary. After killing all the males he would impregnate many of the women and his Y chromosome is now in more men than any other Y."

"I am really curious how many different Y chromosomes there are in man. We'll know before too much longer."

"The Arabs also have bad Y chromosomes."

"You must have a pretty good Y chromosome."

"I am proud to be extracted from two generations of Lutheran ministers. Did you know just about all highly intelligent people are assholes? Of the highly intelligent only the ministers and their wives and kids are not assholes."

"Why would highly intelligent people usually be assholes?"

"The reasons are very complicated but the root cause is many smart people take advantage of dumb ones. It's the oldest game there is and from what I can see it is apparently irresistible for humans to do this. Their response to the guilt of having so much material wealth in a zero-sum game of asset allocation is what gets them in trouble and where they lose their honor. They always think they worked for it as if the average Joe isn't. And they always think they have the moral high ground."

"The smart people are also responsible for all innovation and the ascent of man in politics, technology and science, even our survival over the evolutionary path we traversed."

"No doubt, but the common man has carried the load."

"The X Y chromosome dance is the most important in the human genetic system and the genetic system of all higher organisms. The big load of quantitative and mechanical skills the Y chromosome is loaded with is the most interesting aspect to me. I wonder if men have additional proteins in their brains to account for that or if it's due to hormones or some developmental switches. I know it has nothing to do with the environment."

"Modern biology will work out all those mechanisms in the coming years?"

"It will."

"Right now in America 50% of Black women are obese, 40% of Hispanic women and 30% of white women. It's a serious public health problem and very sad for those who are obese in terms of the myriad health consequences, and maybe sex linked. I think the reason for the high incidence of obesity in women is the hybridization of the X chromosome. The average Black in America is something like 20% white. Hispanics are a mixture of Spanish and Native gene pools so also have extensive hybridization. Many whites today are hybrids of mixed Caucasian extraction. The only solution at present is to provide donor eggs to obese women who want to have children but don't want their children to be obese."

"Are more men obese than ever before?"

"As far as I know they are too."

"What do you think about Rush Limbaugh, ever listen?"

"Occasionally for ten or twenty minutes. I like Rush but have difficulty with his overbearing intellectual pomposity. But at least he is certainly no intellectual pussy and is not scared to speak his mind even on controversial subjects. He's not quite of my intellectual stature but I would hate to have to debate him. He thinks and can express himself so fast I think he could defeat me in most debates. But if we were discussing substance I could slow him down and make him think a little slower. I'll be interested to see what he thinks of my work?"

"My favorite talk radio host is Art Bell. Ever listen to Art?"

"Have not even heard of him."

"First radio is a very special medium. You are not distracted by video and can think about what is being said. Art is a real treasure in so many ways. The truckers love Art. He did late night talk radio six days a week for five hours each night for 14 years and an additional three hours on Sunday evenings and built up the largest late night radio syndication with over 500 affiliates, so you can see he's got a lot of energy. He is intelligent and his talking skills are the best. He transmits alone from his home in Pahrump, Nevada. He is highly knowledgeable of radio technology and is an avid ham although pretty weak in theory. He answers the phone himself when viewers call in with no screening. He can conceal himself well and never gets excited or loses the slightest amount of control so you don't always know what he really thinks. He's just a really nice person, fair and balanced, an extremely good interviewer, in fact one of the best ever, even better than Larry King. Art can interview scientists and engineers; guests Larry King can't do. We'll drive at night on the way to Anchorage and you'll get a chance to listen to him. The number one in his Harvard physics class, theoretical physicist, and founder of string field theory,

Michio Cock-and-bull of CUNY is on quite often and maybe we'll be lucky enough to catch him. Now Art is only on Saturday and Sunday nights for four hours. I look forward to doing Art's show and explaining physics and chemistry to the world and taking unscreened questions from the audience. Now the featured guests are on for three hours so there is enough time to really get a lot of communication done and you can do repeat shows. I am going to explain physics and chemistry to Art in a way he will be able to understand and a lot of other people will be able to also."

"Ever listen to the G-man?"

"G. Gordon Liddy is an American treasure. Of course he is a complete Neanderthal, and soon an anachronistic figure, a leftover from the age of militarism."

"But vigorous, virile and potent. And wise. I love the G-man. Being a man is a natural act for him. I'll be interested in his take on my science. He once gave a description of how an internal combustion engine works that is the best I have ever heard. Has a Corvette and a Harley. He acknowledges his wife has the math brains in the family. He's got a law degree, actually a JD, the equivalent of a PhD in law, and if he would have practiced as a lawyer I think he would have been a good lawyer, honest, principled, not just in pursuit of a fee. I'd say less than 10% of lawyers fit that category."

"The OJ trial was illustrative of the complete failure of our legal system. Letting a guilty individual go free is a crime but not nearly as bad as convicting an innocent individual. The DNA technology has revealed how flawed we have been in that regard. The entire legal system needs to be scrapped. Our legal system is not in touch with modern reality. eMaam can eliminate most of the lawyers because all economic transactions, conflicts and resolutions will have simple mechanisms requiring no legal expenses. The rulings on what is permitted as evidence are nonsensical. I always use all evidence in all decisions I make. The courts have to do the same thing. A rational outcome is only possible if all evidence is included in all trials. Courts need to be able to analyze and interpret human behavior. They need to take a look at the long term pattern. Too many violent criminals are repeat offenders. The entire system is clearly in crisis. The lawyers themselves cannot solve the problem because they are all full of shit, lacking in common sense and only motivated by self interest. It's a question of design. We want a system that doesn't waste people's time and money, always convicts a proven guilty individual and never convicts an innocent individual. The lawyers need to be taken out of the problem as they are presently defined. Those shyster bastards are going to squeal like stuck pigs."

"Scientists and mathematicians know a lot more about proving things than lawyers."

"Take one of the simplest cases possible, a he said she said rape case. Since it is not possible to prove guilt in these cases because you don't know who is telling the lie you cannot convict the accused rapist. You should not even be able to charge an individual with a crime in a pure he said she said. This is all completely unequivocal. Yet all the time men in a he said she said go to trial and are convicted. Now if two women successively accuse the same man of rape you might give him life depending on the credibility of the women. Of course the probability of two women lying is not zero. You want to determine the probability someone is telling a lie so of course both individuals character comes into play, character has to come into play. To convict an individual the probability he or she is guilty must be one. In most cases, certainly not all, this is easy to do.

Beyond a reasonable doubt is very poor and imprecise language because it does not reflect that the possibility of guilt must be 100% to convict."

"What do you think the sentence should be for raping a stranger?"

"Life without the possibility of parole. The same for all violent criminals. One violent crime, one crime with a knife or a gun, and you go to jail for life. Violence cannot be tolerated and just about all of them become repeat offenders."

"I would only put violent criminals in jail. For all non-violent crimes the punishment would be fines, economic sanctions only."

"Then the prison population would be cut in more than half."

"Having the highest incarceration rate in the world is a horrible statistic to be in possession of. The disproportionate number of Black victims of our criminal justice system amounts to genocide against the Black male youth. That being said the level of violence committed in the Black community is totally unacceptable. If it turns out to be genetic they will have to have their lives structured through electromagnetic monitoring in case they start to become violent. But we do violence first with our drug laws. Although the level of violence in the Black community certainly has a genetic component I am confident the correct environment could reduce the level to a small percentage of what it is today. Did you know the number one cause of death in young Black males is gunshot wounds? The whole nightmare needs to end and ASAP."

"It's almost 2 already. Are you ready to get started? We'll drive up to Prince George today. It's one of the most beautiful drives in the world and goes through the Fraser River Canyon. It'll be about a ten hour drive. Tomorrow morning we'll pick up the Alcan in Dawson Creek. In Canada I drink Molson Canadian. It is excellent beer. The Canadians are very hospitable."

"Lovely."

10 The Fraser River Canyon

"Have you selected music?"

"Pachelbel canon in D major, Pat Metheny, Diana Krall, Diane Schuur, Roy Hargrove and Stan Getz."

"Are we going to hit rush hour traffic around Seattle?"

"I'm afraid we are."

"How fast do you drive? So far you have gone speed limit plus ten per cent."

"When we get out in the country, on the lonely highway, I open it up. But this truck's computer chip regulator shuts down at 95, so we won't ever hit any real speed. 95 is safe on many highways in good weather and I never go into a corner too fast."

"You really like to drive. How good of a driver are you?"

"When I was young I wanted to win the Indianapolis 500 as a non-professional driver."

"I'm not quite that delusional anymore but can drive to within a quarter of an inch of another vehicle at speed."

"How many accidents have you had?"

"I fell asleep driving when 16 and rolled a VW bug over. I once hit a cow in Guatemala, just a dent, but beside those two incidents have never had an accident. I've driven all over North America, from Homer to Panama City, from Halifax to Key West, in all kinds of weather and traffic conditions with no accidents other than hitting that cow."

"Ever have a sports car?"

"No one on the planet appreciates sports cars more than me. You must be knowledgeable about cars."

"I drive a Mercedes 500 SL. Your comment about a good car goes with a good drive when we first met revealed your knowledge of cars and driving to me, and I also enjoy driving."

"Changing subjects, what do you think about the concept of freedom and the marijuana laws?"

"Anyone who denies me freedom will not walk away standing up."

"Would you kill people who denied you freedom?"

"I am a not embarrassed to say it, not only would I kill people who deny me freedom, I might enjoy doing it to the bastards."

"Would you strike without warning like a Cobra or use the rattler like the Diamondback?"

"The first time around the rattler, if that doesn't work they'll get the Cobra from the next David Martin Degner to come along. He or she will have learned from my experience that rationality does not work and force is the final solution."

"So what's the finest sports car ever designed?"

"1956 Mercedes 300SL Gullwing."

"That's the right answer. Just throwing a softball."

"Ok smart ass. I'll throw you a hard ball. Why do I appreciate sports cars better than anyone, I'll give you a hint, it's physics, but what in physics?"

"Give me a second."

"The geometry of the frame and the configuration of the suspension?"

"Not too far off, a little simpler than that. The moment of inertia and the balance of forces."

"You worked out the moment of inertia and balance of forces on the electron. Is that the most subtle?"

"It is. But it is a simple balance of forces as opposed to a sports car accelerating, braking and going around a corner that is complex mechanical phenomena."

"And the spatial distribution of mass determines the moment of inertia?"

"That's right. And any volume that has mass and is spinning on an axis that pierces that volume has a moment of inertia that can be modeled as a zero thickness ring with mass spinning on the axis of revolution, like an electron, quark or proton. The moment of inertia of electrons, protons and quarks is as if the entire mass is on that zero thickness ring on the equator."

"When a vehicle goes around a corner moment of inertia is involved but the spin axis is outside the volume, at the center of the curve. Is centrifugal force involved?"

"Did you know Feynman didn't believe centrifugal forces exist? He called centrifugal forces pseudo forces that arose only if the observer did not have Newton's coordinate system which is also the simplest coordinate system. Does that sound reasonable to you in view of a potter's wheel, a salad spinner or circus rides that spin?"

"Do centrifugal forces really exist?"

"Take a guess first."

"Feynman couldn't have been wrong. Centrifugal forces must be pseudo forces."

"No area of fundamental physics is more confused than that of forces and their nature. Feynman was actually wrong. Centrifugal forces are quite real. When a vehicle goes around a corner the centripetal force is the friction of the tires on the pavement and the centrifugal force pushes the car to remain in a straight line, an outward force opposing the centripetal force. Any time an object rotates there are two forces on it, a centripetal force inward to the axis of spin and a centrifugal force outward, exactly opposite in direction to the centripetal force. When the centripetal and centrifugal forces are in exact balance the radius of the spinning object remains constant."

"On any object spinning at constant radius there is a net centripetal force that causes the object to go in a circle and remain at constant radius. So in the space shuttle circling the Earth there is a net centripetal force on it causing it to go in a circular orbit. On the space shuttle the centripetal force is gravity. That centripetal force causes it to free fall at a rate relative to its high velocity such that it makes a circular path at constant radius. Like Newton's the Moon falls an inch or two a second towards the Earth. That's why astronauts in stable orbit are weightless, they are in free fall."

"And in a free fall the mass of the falling object is increasing according to Einstein's special relativity."

"But astronauts in stable orbit are at constant mass. The centripetal force is perpendicular to the velocity so the dot product of the force of gravity with the object's displacement is zero so the change in mass and energy is zero. What force do we feel sitting here, gravity?

"We feel the force of the solid matrix beneath us pushing up on our body. We don't feel gravity. We feel the opposition of the centripetal force of gravity exactly balanced with the force pushing us up."

"Consider a railway around the equator. Sitting in a seat on a train at rest we feel the force of the solid matrix pushing us outward, opposing the gravity force. The net force is zero. As the train accelerates the centrifugal force begins to grow and grows larger as the velocity increases and at a certain velocity it exactly replaces the matrix force and we feel weightless, no longer being pushed up by the solid matrix beneath us. If the centrifugal force did not exist that could not happen."

"Do you see the glaring mistake Einstein made with his equivalence principle?"

"I do. He thought what you feel when you are sitting in a chair is gravity, not the upward force of the matrix we are sitting on. You can't feel gravity, if you could weightlessness would be impossible. Gravity is always there."

"And the other glaring mistake?"

"In an accelerating rocket ship the mass of the astronaut is increasing whereas for an astronaut sitting in a chair on the surface of a planet his mass is constant. They are not physically equivalent. On the rocket ship there is a net force. On a person in a chair there is no net force."

"Analyze it from the point of view of a force being a flow of the Ö particle."

"On an electron, quark or proton spinning at constant radius there is a centrifugal force exactly balanced by an opposing centripetal force, like the space shuttle in orbit at constant radius. But when an electron, quark, proton or space shuttle changes radius the centripetal force exceeds the centrifugal force when the radius gets smaller and the centrifugal force exceeds the centripetal when the radius gets larger."

"In the Bohr model there is a centripetal force only, no centrifugal force. Bohr realized the electron under a net force would not be stable and would spiral into the nucleus. He hypothesized stationary states of atoms and that transitions between these stationary states were photon emission and absorption events. He did that by quantizing the angular momentum of electrons in orbit around the proton as a quantum number n times Planck's constant divided by two pi in the famous quantization equation mvR equals n h-bar. There also are no centrifugal forces in quantum mechanics."

"Is that the full range of phenomena?"

"It is.

"What do you think of people that can't perceive quality?"

"I feel sorry for them. They can also not appreciate design, music, literature and art. But everyone optimistic facing the future is capable of perceiving quality and the perception of quality is qualitative, not quantitative."

"What was your first sports car?"

"A 1965 MGB I bought with a blown engine my senior year in high school for $135. I put in an almost new 1970 MGB engine I bought from a junk yard for $350. I had to take the rear plate off the old engine and put it on the new engine to get it to bolt up with the 65 tranny and have a sleeve put on the transmission clutch shaft. The sleeve had to be turned on a lathe and heat shrunk onto the pinion shaft."

"The history of the modern sports car began in Europe in 1948 with the Porsche 356 and the Jaguar XK120 and in the US with the Chevrolet Tiger-Tooth Corvette in 1953. Ferdinand Porsche was a genius of engineering design and the Chevrolet Corvette was also a great design. When Chevrolet put the 265 cubic inch V8 in the Corvette in 1955 a classic design was achieved."

"Why is there a formative time when the elements of design make their historical expression and classic designs emerge?"

"Because of the ascent in technology and the acquisition of knowledge in an episodic evolutionary scheme."

"In punctuated episodes of history the first designs to confront those problems of design are resolved. So the first designs that come along are eventually recognized as the greatest. But my F-250 with a simple leaf spring suspension on all four corners handles better than a 1951 Porsche 356, adjusted for weight. I suspect there will be many more van Gogh's, Beethoven's and Ferdinand Porsche's in future design."

"That makes sense, for every invention there is a time of that invention, along the evolutionary pathway mankind and all of the universe traverses."

"When will design come to an end?"

"Never, although there are various ideal designs we approach asymptotically over time."

"Let me tell you of the selection of sports cars I am planning to own. Remember that in any arrival at a list it is quality that counts and not quantity. So my list of the greatest designs in sports cars is short."

"And sports cars are so important because they represent the spirit of man?"

"You've got it. Here's the list: a 1950 Jaguar XK120, a 1951 Porsche 356, a 1955 Corvette with the 265 cubic inch V-8, a 1956 Mercedes 300 SL Gullwing, a 1959 MGA Twin-Cam coupe, a 1960 Ferrari SWB, a 1964 Porsche 356 C Carrera, a 1964 Pontiac GTO, a 1965 Shelby Mustang GT-350 and a 1970 426 Hemi 'Cuda."

"Are you going to get cherry in all?"

"I am, all original or restored and all in perfect condition."

"Any additional ones you might add?"

"A 1956 Alfa Romeo Giulietta Veloce and a 1967 Porsche 911 S."

"That sounds like a pretty nice dozen. I can't wait to see them, open the hood of each and admire and discuss the design."

"All you have to do is to get in a Porsche and take a look around and you immediately see some key elements of design, the simple VDO instruments, uncluttered dash and simple ergonomically satisfying controls. The car is built around the driver."

"Darling, I'm not into cars quite as much as you are but appreciate your understanding of the elements of formative design."

"Did you know the greatest mechanical design in history is the internal combustion engine? It started with the wheel. They'll be replaced by electric vehicles as soon as there is a good enough battery or fuel cell. My selection of classic sports cars have some incredibly diverse and elegant engine designs."

"The greatest design in mathematics analytical geometry and calculus?"

"I think so. It's the only thing that I have found in life that is like magic, other than love. In terms of being able to describe Nature it's unequivocal. The Internet and the World Wide Web is the greatest design possible, a design enabled through the culmination of computer science and electrical engineering technology. I don't think anyone anticipated its full potential in the early stages of its development. It makes possible universal peace, justice, freedom, and liberty."

"How many children do you want to have?"

"More than one and less than seven."

"I'll go for seven."

"You are welcome to impregnate me, repeatedly."

"If your and my goal of universal peace, justice, freedom, and liberty is not realized in our lifetime I hope our children will be able to succeed in that goal."

"I'm sure we will have everything under control before our kids are out of diapers."

"What do you think about Einstein's game?"

"I feel he gave me the heaviest part of the burden to bear, but I feel that is proper in an evolutionary scenario where your successor is smarter than you genetically."

"Your journey has been difficult but not exactly Jesus dying on the cross."

"I'm not whining."

"Would you like to meet Murray Gell-Mann?"

"Like to have a martini with him and thank him for the name quarks and ask him how he chose that name."

"Is the Y chromosome the reason men have casual relationships, buy hookers, cheat on their wives, father children out of wedlock and don't support their children?"

"I don't know what else that pattern of behavior could correlate to."

"Do you want to have sex with other women and maybe multiple women?"

"I'd like to have sex with every attractive woman on the planet and impregnate them as an act required to improve the human species genetically."

"Oh Christ, you're such a fucking Neanderthal I almost have to vomit. I don't want to ever hear any of that stupid shit out of you again. I am not going to talk to you for two hours, no, for the rest of the trip today. And we will sleep in separate rooms in Prince George."

I was scared to even respond. I realized this was the first time in my life I kept my mouth shut. I was fifty-four years old and knew what that meant. I was the dumbest male on the planet.

11 The next morning

I was up at 5:57 AM and having a smoke and coffee. Yesterday we had driven from Portland to Prince George without a word. When I stopped for gas she used the restroom but still said nothing. We didn't stop to eat. She was not stubborn but resolved to teach me a lesson and disciplined enough to drive eight hours, all the way through the magnificent Fraser Canyon, without a single word. We had stayed in separate rooms.

There was a knock at the door at 6:28 AM. I opened the door and it was Heidi. I was a little embarrassed.

"Good morning Honey, it won't happen again."

Heidi looked me in the eyes, paused for a few seconds and then smiled.

"Let's start the day off right."

She turned, closed and locked the door, pulled the shades and looked me in the eyes again.

Looking at Heidi at that instant in time a poem crystallized in my mind:

Oh joy, of purest white
for dream of beauty that cannot leave
forevermore I bow to hold
and grace my soul upon your heart.

An hour later we entered the restaurant.

"It's a beautiful morning. Can't wait to see the Alcan. It's the most famous lonely highway on the planet and there are a lot of lonely highways. Where are we going to stay tonight?"

"Woodlands Inn in Fort Nelson. The drive from here to Dawson Creek is particularly nice. Are you hungry?"

"Famished."

We sat down at a corner table.

"Over easy, ham, hash browns, tomato juice and grapefruit juice OK?"

"Excellent. Are you serious with your embryological theory of dicks and cunts?"

"I know at first it sounds idiotic but I am serious. Developmental biology is extremely interesting and important to understand. It's important to understand the Tree of Life and finally in terms of DNA mechanics and dynamics. In the biotechnology of human husbandry if we want to develop a better human species we need to understand what it is that needs to be designed, what is most

conserved genetically, what selective forces are greatest on and how everything reduces to sequential transcription, the temporal order of transcription."

"Why isn't your theory out there?"

"Either human embryologist's do know of it and aren't saying anything or they are not smart enough to figure it out."

"Why would they not tell anyone? Spoils the fun of figuring it out and seems like more biology than we need to know?"

"Both."

The waiter brought breakfast. We were quiet while eating.

I opened the truck door for Heidi and she got in.

"Mile's Ok for a few hours?"

"Excellent, so back to your embryological theory."

"One more digression. There is a difference in intelligence in physics and biology. When I was a freshman I had the highest score on the first biology pre-lim of anyone I knew on my dorm floor that was all male and was only a few points off the high score that was posted. In the lab was this tall, attractive girl and we were partners for some of the labs. She beat me by a few points on the test and I was impressed. With the exception of one other girl in high school, she was the first highly intelligent woman I had met. Of course I met several more at Cornell that were outstanding. Those young ladies were the best in biology. They were no match for me in math and physics but got all A's in the calculus sequence although they only took the first two semesters. None took physics with calculus. Including the girl in high school they were all highly attractive, very nice and Jewish. I got an A-, a B+ and a B+ in the three semester calculus sequence. I don't know what happened to the girl from high school but the three young ladies I met at Cornell all got into medical school and I didn't."

"How did you only get a B+ in the third semester of calculus?"

"At Cornell back then the math department had the policy for the calculus sequence that if you got a higher grade on the final than the pre-lims then you would get the grade you got on the final for the course. That policy was to reflect the fact that calculus appreciation and knowledge is cumulative. So when I took the third semester of calculus I did not attend lectures, do homework and attended only the first pre-lim that covered the scalar dot product and the vector cross product. I crammed four hours for that pre-lim and received a D. I didn't open the text again until the day before the final and crammed for 22 hours straight. I took the 3 hour final exhausted and got a B+ on it. Of course if you are a pre-med student a B+ isn't a good enough grade. But I will bet that I learned more vector calculus in a smaller time and learned it reasonably well than almost anyone in history. When you can do things like that you know you have a lot of intellectual power but are too young to know what the outcome of that genetically deterministic DNA human Turing machine behavior is."

"I've never done anything like that. The contact hours in a three credit hour course are like 40 hours and a reasonable amount of homework is two hours of homework for one hour of lecture. To cram for 22 hours and get a B+ is quite a lot to learn in so short a time. I'm impressed."

"Who is the smartest female you have known?"

"One that got married to a friend of mine, divorced a few years later. She was a year ahead of me and a history major. She wrote a paper for me for a course called the history of economic thought, a four credit hour course with that single term paper the sole determinant of your grade. I got an A and paid her $80 in 1973. She got a 775 on the LSAT but turned down law school to get a PhD in history. She was very attractive and German. I wondered why I had not found such a woman and was a little envious."

"Did you know the smartest males both in high school and Cornell?"

"In high school I knew most of them. Two of the top three or four students were in my physics class my junior year. They were both Jewish and it's the first time that I ever met a Jew and knew that he or she was Jewish. I had a lot of respect for both of them and they were accessible and friendly. At Cornell I knew most of the top pre-med students, both chemistry majors and biology majors. There were about 20 and I considered myself high on that list. And I knew some of the smartest mechanical engineers. I didn't know of anyone smart in physics with one exception, a student a year behind me, the first son of my p chem professor. It seemed to me that with Einstein's theories of relativity and quantum mechanics physics and much of chemistry were almost finished."

"Did you ever do homework in high school?"

"Never did any at home. Did not read a single book in high school. Wrote maybe one or two short papers total. Only did homework in algebra, geometry and physics and did it in study hall at school. That only took a couple hours a week. And I read the biology text. Did not do any work outside class in any other course."

"What was your class rank?"

"244 out of 642."

"Einstein loves you David."

"What's the reason?"

"In 6th grade I decided it was all bullshit except for the science and math. I knew I would get into college. And I knew I wanted to be a doctor, the only question left was if I wanted to be a surgeon or a psychiatrist. I already knew I was interested in neurobiology. In high school I thought the game being played by the smart students looked rather stupid, but I was not pejorative about it, just the opposite, I respected all the top students, and they respected me."

"Did you think you were as smart as those top students?"

"They all had around 800 on both parts of the SAT's. I did not know what that meant exactly but thought it probably meant they were smarter."

"How did you do in physics?"

"I took physics my junior year and carried a C average up to the final. The final is the New York State Regents Exam. I got a 96 on the regents and ended up with a B in the course. I got a 752 on the SAT Physics test. Since I had done so little homework and I knew the two top students in the class were always well prepared and acing everything, and I did about as well as them on the regents and SAT achievement tests, I felt I might even be smarter, but was reserved in that opinion. "

"When did you take geometry and what did you think of it?"

"I took geometry my sophomore year, my first at Ithaca High School. I remember to this day what a great instructor I had. His name was Mr. Heffron. He loved mathematics and loved to teach mathematics. It took me about 10 minutes a day in homeroom each morning to do the previous day's homework assignment. I got a 98 on the regents and an A in the course. I still remember the one question I missed on the regents. I reversed the definition of complimentary and supplementary angles. I remember he said he got a C in his first semester of calculus when he was in college. I knew he was generous to make such a statement to the class. I knew the point he was trying to make is, to try again, try harder, stay at it, don't give up and I also felt a little sorry for him. I took computer science from him second semester senior year. That's where I met that smart girl from high school. We learned Fortran and the Gauss-Jordon method of solving a set of linear equations. I made a small program that computed the side lengths and angles in any triangle from any input of sides and angles totaling three. We programmed on K-29 punch card machines late nights in the computer room at Clark Hall, the Cornell physics building. Walking around in those rooms, feeding our simple programs in, rubbing elbows with the college students and graduate students was incredibly stimulating. The smart Jewish girl and I were there together about 3 AM in the morning one time. She was the smartest girl I had ever met, including any female teacher I had ever had. After talking to her for awhile about programming I realized I was smarter than her in math. I gave her a ride home, was interested in her, but in a long term relationship and never pursued her. I later found out why she was so smart. It's really a funny story looking back on it now but I'll tell you later."

"Changing the subject did you have any sex education?"

"It was never discussed once at any point in my life, not by parents or teachers. It's so totally irrational it is hard to believe. But sex has in the past been very private and open sexuality is a phenomenon of modern man. You know the evolutionary history and the important role Hugh Hefner played. Now with the Internet and the World Wide Web everything is out in the open. That's good because it is rational and open. But everyone needs to learn discretion."

"How do you want to raise our children regarding sex?"

"My advice regarding sex is that everyone should have an open, curious, inquisitive mind, no one should ever tell their parents what they have done or are planning to do, no one should ever brag or even discuss any details of their intimate relationships with friends, and everyone should

observe the overwhelmingly strong biological matching phenomenon embodied in monogamy, whether gay or straight."

"The obligation we have as adults is to not spoil the imagination of youth regarding sex, and to never stigmatize or traumatize youth for mistakes made in the individual journey of discovery that is each person's sacred right."

"Sex education, which should be in the curriculum in 3rd or 4th grade, should be limited to mechanics, not dynamics, i.e., anatomy only, not use, which should be left to the imagination. And in thinking a little more about this, it would be ideal if parents taught the anatomy to their children and public classroom education would not be needed. And it seems possible, if not probable, that in the age of the Internet and the World Wide Web, no adult sanctioned sex education would even be required. That being said, it is my intention to explain sex to my sons when they are somewhere between 7 and 11 and let you do the same with our daughters at the appropriate ages. And in closing, probably all three areas of teaching – home, school, and Internet – should be used to constitute the complete learning experience."

"I think on some things you are a little old fashioned. Kids can learn so much about sex over the Internet. There is no anatomy, no act not immediately available with Google. But teaching discretion and wisdom regarding sexuality is vital. That's primarily the parent's responsibility, not the schools, and that distinction should be reinforced in the school curriculum."

"Do you think young adults can not engage in sex, be abstinent, and just masturbate?"

"Some can, some can't. I couldn't."

"Should homosexuality be included in the 3rd and 4th grade sex-ed?"

"Of course it should be. And homosexuality should be put in an accurate biological and historical context. That would include that biologically homosexuality is an inferior lifestyle to heterosexuality."

"What do you mean by that?"

"Gays and lesbians can have good oral sex but for them it's always the same, either a blowjob or eating pussy. In a heterosexual relationship you have both. That's a far richer repertoire. Of course the mainstay of heterosexual sex, vaginal intercourse, is only possible for heterosexuals and that's a pretty important biological interaction you might not want to miss out on to put it mildly. And heterosexuals can engage in good anal sex, gays can too but lesbians can't. Lesbians can use fingers, fists, dildoes and toys but so can heterosexuals. However, if you are a man and want to give head or get it in the ass you have to be gay, so gays have two natural sex acts not available to heterosexuals and lesbians. But when you look at the full repertoire of sexual expression possible heterosexuals have a clearly richer repertoire available. And heterosexuals can have children who are 100% their own genetically. Neither gays or lesbians can do that now but both will be able to do that in the future with advanced fertilization techniques."

"By the way 95% of sexual satisfaction is qualitative, not quantitative. Everyone comfortable with their physical self's realizes this. If a woman really wants a large one there is no penis that large, at least in our species, so they have to choose between toys and fists."

"Have you heard of gerbil stuffing Honey?"

Heidi doubled over in laughter.

"I heard this ER doctor from South Chicago tell about it on NPR. ER doctors see more of everything than anyone else period. It's a gay thing."

"They've got to be live and not de-clawed, although I imagine you might give them a bubble bath first."

"Stop David, I'm about to die laughing."

47 seconds later.

"When you say it like that why does anyone become gay or lesbian?"

"I'll give you the simple reason first and follow up with some scientific speculations. Gays are attracted to males, turned on by males and lesbians are attracted to females, turned on by females. That's all it amounts to."

"I don't know if that's saying anything, or is it saying everything?"

"As far as what a person needs to know about homosexuality that's all anyone needs to know. The historical context that also needs to be taught is that gays mostly, and to a lesser extent lesbians, have been hated, persecuted and tortured by many people in many cultures and by many religions. They have been denied all kinds of legal rights heterosexuals have. I do not understand that at all. Gays and lesbians are the nicest people there are. They are the most harmless and the least violent. They pose no threat of any kind just want full legal rights and the respect afforded to heterosexual unions."

"Will teaching about homosexuality in sex-ed as you have outlined cause straights to become gay or lesbian?"

"Just the opposite. They'll see the biological repertoire and capacity available to them and then they will start thinking about who they are attracted to."

"Is that attraction a biologically determined behavior?"

"I think it's almost all genetic but not XY chromosome phenomenon. I think who one is attracted to depends on emotional factors and that emotional factors are more important than plumbing in all monogamous sexual relationships, be they straight or homosexual. I imagine in one night stands plumbing is more important. I think one's emotional state, or collection of states, are genetically determined. Emotions are our human feelings in response to the environment. So our emotional response to the environment is genetically determined but the actual set of emotions an individual feels will be due to the stimulation of environment on ones genetic machine."

"And love is an emotion, isn't it?"

"And you can fall in love with a man or a woman?"

"Then the most basic emotional state, identities, for people after puberty are female straight, male straight, gay and lesbian and to not recognize the most basic emotional states by many modern societies is almost a violent crime?"

"You got it. I just don't get people who are so narrow minded as to not understand those basic aspects of sexual human biology."

"The reason it doesn't look like XY chromosome involvement is that the Y and the X are designed for the highest utility which in biology means fecundity, having many offspring. Since pure gays and lesbians can't have children they never leave progeny behind and do not contribute to future gene pool, they are exposed to the maximal selective force against. Those are the simple reasons homosexuality will always be a just a small fraction of the population. It will be interesting to see what the true percentages gay and lesbian are when they can marry, adopt children, have their own with donated sperm and have their own through surrogate mothers."

"Would they be good parents?"

"The best. Gays and lesbians are emotional nurturers."

"Will they try to bring up their kids to be homosexual?"

"I don't think so. But they will want the biological and historical scenarios taught accurately in school. For my brother identifying himself as gay and coming out was so difficult it was very depressing and he attempted suicide his sophomore year in college with an overdose of Quaaludes. My Dad could never understand homosexuality. He thought being gay was not natural. I pointed out to him it was a naturally occurring small fraction of the human species."

"I'll put some new music on. How about Diana Krall, Karrin Allyson, Norah Jones, Jacqui Naylor, Patricia Barber and Tierney Sutton?"

"Sounds good. Are the female jazz vocalists your favorite?"

"They are. Yours too?"

"They are. The current group is incredibly talented and multi-talented, composing, singing and playing an instrument and beautiful. Let's change the subject. How do you think our relationship is developing?"

"I composed a short poem for you this morning. Would you like to hear it now?"

"Let the music start first."

I loaded the CD's and put Jacqui Naylor's Live at the Plush Room on first. We listened to three tracks and I turned it down low for the fourth track – Blue Skies.

"Are you ready?"

"I am."

"Oh joy, of purest white
for dream of beauty that cannot leave
forevermore I bow to hold
and grace my soul upon your heart."

"Oh, oh, David, once more please."

"Oh joy, of purest white
for dream of beauty that cannot leave
forevermore I bow to hold
and grace my soul upon your heart."

"That's a really beautiful poem David, just lovely. I am thankful to have met you and fallen in love. I'll think of one for you but I don't think they come to me as fast."

"Is Robert Cray your favorite male vocalist?"

"Soul brother number one."

We listened to music for over an hour without talking.

"We'll be in Dawson Creek in an hour. Would you like to go to Subway for lunch?"

"I love Subway. Like the fresh veggies. I like everything except Jalapenos and love the sliced banana peppers. But they need to put more meat and cheese on their subs."

"I agree."

"Well David, this is our seventh day together. You have illuminated most of physics and chemistry to me. You have what you claim are the best technological solutions to the energy and terrorism/security problems. You are going to patent your method of manufacture of atomic and molecular surfaces for use in physical models and computer simulations and your receiver eclipse Sun tracker. You have a plan that you call The Sands of Time that is to declare universal peace, justice, freedom, and liberty as the goal for all mankind. You want to be the Field Marshal in the final military operation that you call Swords into Plowshares. I would say you have uncommon ambition."

"I always set high goals for myself. As I got older and worked harder and longer my goals would ratchet up to the always growing potential. Since there are only three questions that cannot be answered, an edge to space, a beginning or end to time and the existence of Ö particles, it seems fair to set high goals. But you also have to be realistic. I want to get everyone to simultaneously disarm on some planned date, like July 4th, 2008."

"I think it should take place November the 10th."

"You know I don't know your birthday."

"May 14th."

"Do you like pastries?"

"Oh what a sight, each slice a delight, banana cream, Key Lime with meringue, frozen chocolate jubilee, I'll go on a spree, I'll have all three."

Heidi looked at me, smiled and stuck out her tongue.

"Bavarian cream donuts are the best. And nothings better than hot cherry pie with two scoops of vanilla ice cream. But my favorite is walnut brownies washed down with whole milk, so I have to lick my lips after every taste."

We were both laughing.

"I've already worked out a week long worldwide holiday with July 4th as the third day in that week. Day one will pay tribute to those who have died and been injured in the course of mankind's history in all past wars. The theme for that day is Regret, Remorse and Suffering. The theme for the second day will be Repentance, Forgiveness and Atonement. On the 4th we will celebrate America's leadership in mankind arriving at this promised epoch. Days four, five and six will honor Faith, Hope and Love respectively. The theme for day seven will be Wonderment and for the rest of my life I will give a speech on that day."

"Drinking, drugs, partying allowed?"

"Not on days one and two but for the rest of the week it's the biggest party the world has ever seen."

"Is grandioseness a problem for you or do you see your goals as quite reasonable?"

"They seem quite reasonable. In fact, it seems to not do them would be quite unreasonable."

"A week ago I did not think any of this was possible for at least twenty, thirty maybe a hundred more years."

"When's you period due?"

"Sixteen days plus or minus a day. I'm very regular but get some PMS and cramping."

"Then you might already be pregnant?"

"Likely. It's the peak fertility of my cycle."

"Have you been pregnant before?"

"Twice. Had two abortions at about eight or nine weeks."

"How do you feel about abortion?"

"It's the woman's right, the woman's choice and everyone else can butt out."

"What about late term abortions?"

"Once a fetus is viable outside the womb, a preemie, an abortion is murder, so I am opposed to that."

"What if the mother's life is in jeopardy?'

"Give her a c-section and take care of the baby."

"What if the mother did not want the preemie given care and it would die without care, would she have a right to do that?"

"If it would die without care it's not viable and it's the mother's choice if special medical care should be given."

"What about the father or husband's opinion?"

"It's irrelevant and should be given no regard."

"What if a minor is pregnant and her parents don't want her to have an abortion but she does?"

"Tell her parents to take a flying fuck."

"What if a minor is pregnant and her parents want her to have an abortion but she doesn't?"

"Tell her parents to take a flying fuck."

"I agree with you on everything."

"I thought you would."

"I think abortion is just part of family planning. Have kids when you want them and can support them, not just as a result of sloppy withdrawal or imprecise rhythm."

"Not only is abortion an essential part of family planning, it is the single most important AND only option to a potential mother who doesn't want to go through pregnancy and bring a child into this world."

"What do you think of the Roman Catholic position?"

"I don't even bother to listen to men who don't get laid."

"What do you think about prenuptial agreements?"

"I would not allow them. I would generalize the concept of marriage to be any combination of adults. Then the homosexuals and polygamists would be satisfied. Each participant of a marriage

assumes his or her integer fraction share of assets and liabilities when they get married and gets his or her share of assets and liabilities in a divorce."

"Only men that are fecal scum use prenuptials. Donald Trump can buy his pussy. Mine will be an equal partner."

"The Donald really hosed down Ivana with his iron-clad prenuptial. Yuck. What about young Black basketball stars making millions?"

"If you aren't willing to split your assets with your potentially lifelong mate you will not split a lot of other important ingredients too. Since a marriage starts out only with potential, to subjugate that potential extending to infinity to an inferior role is really something only males are capable of."

"I agree. So if you don't want to split your assets don't get married. That is more honorable than making your woman into one more, but small, piece of your economic machine when a marriage should be a fifty/fifty relationship on interpersonal, economic and all planes. Prenuptials amount to nothing more than prostitution. Billionaires are willing to pay millions for pussy right?"

"The dirty scum even think it is a good deal, a deal."

"Are you going to be the wealthiest person on the planet, wrong, are we going to be the wealthiest couple on the planet?"

"I've observed that excess materialism and decadence are bad ways to live. It's good to enjoy the simple things. But driving a Mercedes 500 SL and living in a comfortable home is not excess materialism or decadence. The sports car collection I want to put together will cost about 15 million by the time I acquire them. They are going to be on display at my company headquarters. The name of my company is going to be the Degner Scientific and Engineering Corporation. I am going to set it up as a non-profit corporation and pay myself and the other top individuals 260K a year. Degner Scientific and Engineering is going to be a lean, mean, efficient economic machine."

"What is the company's goal?"

"To take away the means of production from the decadent, florid, over paid, ruling and wealthy class and to put the means of production in the common man's ownership."

"A modern Robin Hood?"

"Yup."

"How big is the company going to be?

"The world GDP is about 60 trillion dollars. In ten years it will be over 80 trillion dollars. I want to have a 12.5 percent market share of that economy."

"What's the capitalization of that?"

"With a 10% profit of that market share and the long rate 6.67% the present value is about 15 trillion."

"That's really huge, almost the size of the current US economy."

"The size just reflects the size of the problems on a global scale. As a scientist one needs to work with many scales, from the smallest, the point like Ö particle to the largest, the diameter of the universe."

"The energy solution, drug and protein design so the entire future of biotechnology, the efficient Market and asset manager, quantum computers, Einstein's brain in a box, the sperm, egg and embryo bank, that's a lot of potential. But there's a lot of competition."

"Do you know how marketplaces work and how an efficient primary and secondary market for securities allocates capital?"

"I've heard of primary and secondary markets for securities but don't really have much understanding of them?"

"The primary market is the initial public offering or selling additional new shares to the public that dilute the companies stock. The secondary markets are like the NASDAQ and the NYSE where shares bought in a primary market can be resold and repurchased, ergo secondary market. Allocation of capital in primary markets is done through high prices for exciting, promising companies. Allocation of capital in secondary markets is done by running up the price on some stocks and running down the price on other stocks. When the public knows I have the energy solution and that it is cheap the price of oil will drop precipitously. The oil companies will lose most of their market value or maybe even go bankrupt. I can capitalize on that by knowing it ahead of time and buying and selling stocks, options and futures. That way assets flow to me, also part of the marketplaces ability to allocate assets to new technology and new ideas. So when the dollars come out of the oil industries pool they go into mine."

"How much are you and I going to be worth if you set everything up in a non-profit?"

"The largest engineering project in the history of mankind is my solar energy collection scheme. Over the next 20 year I am going to build 6 trillion ¼ meter parabolic dishes and all the plumbing and turbines associated with that energy source. If the average price over those 20 years is $20 per unit that will be a 120 trillion dollar project. Double that cost for the full conversion and hydrogen distribution manifold and the total energy solution comes in at 240 trillion. If the world GDP averages 80 trillion for that 20 year period the total GDP will be 1600 trillion dollars. Then a total energy solution at US levels of consumption for all people will only be 15% of the GDP, a bargain. So in 20 years I am hoping Degner Scientific and Engineering with an internal 15% rate of return will have a market capitalization of tens of trillions of dollars. I was thinking of keeping a billion for us and our kids and putting the whole wad down on the non-profit, maximum growth, non-profit scheme."

"Do I have anything to say about it?"

"I'll never take an action you disagree with me on and we will always resolve any conflict between us."

"I think we should keep everything and set up Degner Scientific and Engineering as a for profit corporation that we own 100%."

"You know that one rule for universal peace, justice, freedom, and liberty of no transfers of wealth? That means no welfare, no food stamps, no social security and no rent subsidies. In about seven years I want to start to provide a dividend to all people on the planet Earth over age 14 each month with the profit from Degner Scientific and Engineering. It will be a security blanket for all people in need. Anyone that needs it only has to ask for it to receive it. All people who don't need it are asked not to take it. It will be administered on an honor basis on those terms with no questions asked. I want to provide that security blanket for the rest of time here on planet Earth. If we set it up as a for profit corporation it will just be another large corporation and will not be able to grow without taxes."

"After you die I'll be in charge. After I die our kids will be."

"Then it will be like a monarchy? That's precisely something I object to most."

"I agree it is the long view that needs to be taken into account. But monarchies are not all bad. Are you planning to be the CEO and Chairman of the Board?

"Not the CEO. I could be the Chairman of the Board with only a few hours a year of work. I am a scientist and planning to devote my time to science. I am a terrible administrator. Would you like to be CEO or Chairman of the Board?"

"I am the same as you. Maybe at your age I would be the Chairman of the Board but I also am a scientist and want to devote my time to science. Administering our household is more than enough administrative duty for me."

"Do you want to finish up your PhD at Cal Tech?"

"No, you're set of problems are more interesting and co-linear with string theories goal. But they don't know how to get there."

"We'll be in Dawson Creek in a few minutes. Want to split a foot long?"

"Ok. What do you want on it?"

"I'll give you three choices; roast beef, salami, or club?"

"What's your favorite?"

"Triple salami, double provolone, everything except jalapenos, extra banana peppers."

"Mayo or mustard?"

"That's like kissing a woman at the opposite ends. Quite different but both delicious."

"Now I can't decide if I want to kiss you or give you a blow job. Mayo."

"Peach tea?"

"Excellent."

12 A salami and provolone with mayo between Dawson Creek and Fort Saint John

"This traffic circle is the beginning of the Alcan. No one who has ever been around it ever forgets it."

"I'm having the time of my life."

"So what's your embryological theory? I suspect it is about a lot more than dicks and cunts."

"Take a look at a human being from the exterior, both male and female. Spread the cheeks, the pussy lips, open the mouth, look into the nostrils, the eyes and the ears. Now I ask: What is the oldest thing you have seen?'

"That's a tough one. You mean evolutionarily of course?"

"Yup."

"I don't have any idea."

"It's the asshole."

Heidi started laughing and I joined in.

"I agree it's really funny."

"You are serious aren't you?"

"Very. Want to know why?"

"Something to do with embryology and developmental biology?"

"Yes but extraordinarily fundamental. Consider the first single cell eukaryotic cell. The next stage of evolution is a two cell eukaryote, with a head and a tail. The head is a mouth and the tail is an ass. Bacteria and the first single cell eukaryotes could transport pretty much any biomolecules across the membrane but obviously have to break down big polymers to transport them. So what the first eukaryotic cell could do is to absorb larger particles in the process of phagocytosis, where a membrane is made around the absorbed material and that little organelle enters the cytoplasm. Back then the only thing to ingest is viruses, bacteria and other primitive eukaryotic cells and their degradation products in the external environment. Of course everything in this stage is in water and in salt water at that. When you go to the first two cellular organisms the first order of business is to have an opening in one cell, the mouth, to take in the larger nutrients and a tail, to eliminate stuff you don't want to build up, the asshole. On the interface of the two cells there is some nice surface recognition and binding and there is vectorial transport possible between cells across that surface. That interface between the two cells of the most primitive eukaryote is analogous to the diaphragm in man. The primitive opening in the head of the two cell organism is analogous to the throat in man, somewhere above the esophagus trachea

junction and below the throat nasal passage junction, and the primitive opening in the tail of the two cell organism is analogous to the asshole in man. So the asshole is the most primitive thing you see inspecting a human from the exterior."

"In a human embryo the fertilized egg divides by a binary fission process for the first 8 or 16 cell divisions or whatever. The cells appear indistinguishable but are of course separated in time with the first two cells the oldest and the same age. So what is the first step in differentiation of cells?"

"It would have to be the first cell division wouldn't it?"

"Very good Mendel. And those two cells are the head and the tail in all multi-cellular eukaryotes. In plants it's the part that will be above ground, the head, and the part that will be below ground, the tail. In animals it's the brain and the penis or the brain and the clit, the head and the tail. So the male/female thing starts right there at the first cell division for all multi-cellular organisms."

"Makes good sense, the head and the tail, sex all defined in the first cell division. Don't people think differentiation occurs at a slightly later stage?"

"I am not sure what they think but it has to be that in multi-cellular eukaryotes the first cell division results in a head and a tail. I do think that it is believed there is an undifferentiated glob of cells but I think the two cells in that glob that become head and tail are the first two cells from that first cell division. A lot can be going on inside a cell that is not easily addressable experimentally. Theoretical biologists are going to have to solve a lot of problems."

"Now let's get to some really funny stuff, the dick and cunt stuff. I'll get back to this in the future but you know what it is really about in our American society, Black dicks and Jewish brains, and it is a comedy. One more digression. I am going to avoid using the word race and instead use the word pod for any identifiable gene pool in humans. The word race must have originally been given its name after a race, reflecting that throughout evolution gene pools have been in a race with each other for scarce resources. Changing the name to pod reflects our emergence on the plateau of aesthetic design, when we can design our children and is the correct word from the perspective of population genetics"

"Let me change the subject before you go into your embryological theory. Darling I am in heaven with you. You must have some defects, you are fifty-four years old and without a wife or children, what are they?"

"Alcoholism, it's strongly correlated with my Y chromosome."

"My Dad had seven siblings and five brothers. My Dad was not an alcoholic but told me he could have been one. All five of my male Uncles on his side were alcoholics despite much blessing and success in life. My Uncle Paul, who was an electrical engineer, drank himself to death early in life after his wife died of cancer. One Uncle, who was a commercial pilot, died in an alcoholism related accident 6 years after retirement at age 66. I have two brothers and my older brother died at 51 pulling probably a 0.40% although no autopsy was done. My younger brother, seven years younger, is alive and an alcoholic. As far as I know, and I'm not sure of this, most of my male cousins on my Dad's side had drinking problems. So maybe 10 or 11 out of 13 individuals with my Y chromosome have been alcoholics."

"That's pretty ominous. But I don't think you are an alcoholic. Maybe you're only like an English or German soccer fan. I think they drank 17 pints a day on average at the 2006 world cup final in Berlin, but I don't want drinking to be a problem for us. Your mind and memory are perfectly sharp, you have no shakes or tremors, you get good sleep, you don't get hangovers, you function at a very high level, just have drunk beer like a frat boy all your life. I feel you are not being fully honest with me. Is there something else going on with you that you haven't been able to tell me about yet?"

"You're right I don't think I am an alcoholic either, although I have drunk twelve beers a day for over twenty-five years and have drunk beer since age fourteen."

"I am diagnosed a paranoid schizophrenic."

"Oh David, I don't know what to say, I am so sorry to hear that, so very sorry. That is very disturbing. I am now wondering how much of your work and goals are wild grandiose delusions? I know your scientific work is correct. That is abundantly self-evident. Are you a genius and a schizophrenic in an attractive physical package?"

"It's a lot more complicated to put it mildly, actually astonishingly complex. The hallmark of the diagnosis of schizophrenia is psychosis. The three hallmark characteristics of psychosis are paranoia, delusions and grandioseness. I have been psychotic, in fact four episodes that totaled 10 or 11 years of my life since age 29. I do take anti-psychotic medication, 5 mg Prolixin daily, a low dose of one of the older generation medications. I will need to be on Prolixin for the rest of my life or perhaps a newer drug if one comes along with higher efficacy. But I am not a paranoid schizophrenic."

"If you have been psychotic and need anti-psychotic medication how can you not be a paranoid schizophrenic?"

"What do you know about schizophrenia?"

"Not much. I know it is about 2% of all populations worldwide. I know it has a strong genetic component. And I know it is one of the scariest things a normal person thinks they will encounter and the most horribly scary mental disease there is. I know schizophrenics and bipolars have amazingly high suicide rates and suffer immensely. That being said I had not the slightest idea it was possible you suffered from mental illness. I thought you really had a couple ex's around and a bunch of kids you didn't want to tell me. When is the last time you were psychotic?"

"Nine months ago I came out of the last psychosis and I have been sane since then."

"Oh that is ominous."

Heidi started crying, then sobbing uncontrollably, feeling how everything seemed to change dramatically in an instant and recognizing how much I must have suffered in life.

"If you are pregnant you can get an abortion, you can leave at any time and just call it meeting a stranger on a train."

Heidi wiped the tears off her face and turned to me.

"When I said yes to you I meant for life and with nothing held back. But I did not consider a pre-existing medical condition like schizophrenia. It didn't even enter my mind. But you don't scare me in the slightest. Your rationality is so utterly manifest I trip over it. You seem to me like the sanest person I have ever met."

"Are we going to have a discussion about sanity Darling?"

"Are we ever!"

"One idea I think you are wrong on is that Einstein started a conspiracy. Although his theories and quantum mechanics look ridiculous to you it looks to me like they really believed that stuff. If you don't have the Ö particle it all seems believable."

"I think Einstein discovered the Ö particle, through mechanics, not the electric field like the face I climbed. I think he figured out Newton's Second Law means a force is a flow of momentum, mass and energy. If he figured that out and figured out $E = mc^2$ he knows quite a bit without knowing how electric and magnetic fields work. If he then figures out a photon is a lump of energy he can formulate the photon hypothesis and derive the law for the photoelectric effect for which he was awarded the Nobel Prize in 1921. That's all the foundation to understand gravity. After he derives the increase of mass with velocity he says to himself: "What do I need to do to make this important discovery, this important epoch for mankind, the initiation event that will bring about an end to warfare and conflict among man?" With his new found gamma he decides to say time also slows by gamma when an object has velocity. Since everyone had thought mass was constant and inviolable he sees an opportunity to also slip in time dilation. Then he worked out the consequences of time dilation that is that the speed of light is constant in all frames of reference even when they are moving relative to each other, the Lorentz transformation as opposed to the Galilean transformation and that there is a length contraction along the velocity vector. He writes up his work and planned conspiracy and sends it to Max Planck in Berlin, the pre-eminent physicist of the time with his seminal invention of the Planck constant and blackbody radiation law. From there on it is history. He knows gravity is minus the gradient of the energy field of gravity so thinks he can figure out the gravity field. He combines his special relativity with his gravity and disguises the gravity theory in four dimensions, three of space and one of time, as if space and time are connected even more so than already asserted in the special theory resulting in curved space, a process that took him ten years."

"That doesn't appear to me to be paranoid, delusional or grandiose. Do you acknowledge you could be wrong?"

"I do. But I think anyone should be able to reject time dilation, length contraction and curved space on philosophical grounds alone, even just by common sense. And since he provides no microscopic mechanism, no reduction to elementary particle mechanics and dynamics, the whole load is completely unpalatable."

"What were you doing when you were twenty-five and twenty-six, Einstein's age when he worked out the special theory?"

"I was in Berkeley auditing courses in bacteriology, biochemistry, biophysics, chemical engineering, chemistry, computer science, genetics, mathematics and molecular biology. My goal was to find the secret of life and patent it."

"Isn't the secret of life just the central dogma, DNA, RNA, proteins?"

"That never in any way seemed to embody the secret of life to me. That's just the simple architecture. It would be like having hardware without software. The central dogma as currently defined is not a rich enough structure to handle the information processing function cells manifestly do. There is no higher Turing machine like mechanism to perform the computations that must go on to determine the temporal pattern of transcription."

"Before getting into what looks like a lot of fundamental molecular biology, tell me, when did you first become mentally ill and what was its cause?"

"I led a normal life, for me, and happy, never depressed, never suicidal, never paranoid, up until March 1975, about nine months after graduation at age twenty-two. I used the bad street drug PCP that we snorted like cocaine. I used it once and had a really spectacular time and felt fine the next day. It was sold as THC and I did not know it was PCP. The second time I used it my girlfriend and I snorted a dime, ten dollars worth, maybe a quarter gram of white powder, had sex and went to sleep. The last memory I have of that period is having an orgasm but not feeling it, as if anesthetized. When I awoke the next morning I felt depressed, paranoid and had some kind of serious thought disorder I couldn't interpret. I went to work that morning and in about forty-five minutes thought to myself that if this doesn't change and is permanent I will have to take my life within five years. All these feelings were completely new. It wasn't hard to associate the effect with the cause. Being a neurobiology major I thought I had done irreversible chemical damage to my brain. I can't even begin to tell you how bad I felt. It took thirty-one years to fully recover with the aid of medication."

"Were you psychotic at that point?"

"No, only mortally injured. After six very difficult years, very stressful years I finally twisted off and became psychotic in August of 1981."

"Is the reason you say you are not a paranoid schizophrenic because the whole problem started with your reaction to PCP?"

"That's it. My mental illness was caused by a chemical injury, a chemical perturbation. In an interaction with the environment the situation turned into psychosis. So there is no genetic component and if we have children they will not be schizophrenics."

"If there was a genetic component to your illness would you want to father children?"

"Not a chance. From what I have seen of paranoid schizophrenics and from my personal experiences of becoming psychotic, being psychotic and recovering from psychosis I would not wish it on anyone and would never use my own sperm for procreation if I thought it was genetic."

"Is there any mental illness in your family history?"

"None on my Dad's side going back as many as six generations and my Mom knew of none in her background although it is not as complete as the Degner side. None in my generation of cousins and none in the younger generation of their children."

"Can you give me a brief overview, a chronology, of the periods of psychosis?"

"As I already told you the first psychosis began in August 1981 in Berkeley where I was a research associate in molecular genetics. It lasted without interruption for twenty-three months until June 1983. I came out of the psychosis in two weeks after being given one shot of Prolixin in the thigh at the Illinois State Psychiatric Institute where I was for five weeks. I was at my parents when I came out of the psychosis, was not placed on medication, was not seeing a psychiatrist, moved up to Anchorage and eventually became psychotic again the following year in February or March of 1984. I ended up in the Alaska Psychiatric Institute and was there for five weeks in July and the beginning of August 1984. They put me on 5 mg Prolixin when I arrived and released me with the diagnosis schizoid affective disorder on two mg Prolixin and 200 mg lithium daily, still completely psychotic. I came out of the psychosis alone, in my apartment eight days later and drew the conclusion I was a paranoid schizophrenic. I realized I didn't need lithium so stopped taking it. I have stayed on medication since then with interruptions of no more than a few weeks. I was stable on small doses of Prolixin for over 12 or 13 years but slipped into psychosis again in 1997 or 1998 when the dose I was taking, two mg, was too small and ended up in API again in December 2003. They placed me on large doses of Zyprexia and I was there for 70 days. They released me when I was still psychotic and I came out of the psychosis alone, in my condo, over the next 5 weeks. On the Zyprexia I slept 18 hours a day, put on 8 pounds a month, going from 247 to 342 over about a year, my blood sugar went from 77 to 151 when it was next tested. I got type 2 diabetes and had to get off the Zyprexia due to that in March 2006. I went onto Geodon and became psychotic again in 3 or 4 weeks. What a mess. The psychosis was so stressful I got back on Zyprexia in September to be able to sleep. In three months on Zyprexia I put on 30 pounds but came out of the psychosis, again at home, alone. December 1st, 2006 I awoke sane. I realized all I needed was 5 mg Prolixin for total sanity and stability and that is what I am on now."

"Is psychosis an all or none phenomena?"

"My first two psychoses were. The third, the lengthy one, was a little different in that I fell in and out of psychosis a few times in an episodic fashion, being due to too low a dose of Prolixin. When I came out of that psychosis on Zyprexa it was slowly over two or three weeks. When I became psychotic the fourth time it was in only a day or two and when I came out last November it was overnight. I went to sleep psychotic and woke up sane. When sane I am quite sane, even the first minutes after psychosis. And when I am psychotic, I am without any insight, really psychotic."

"What is psychosis like?"

"You are the first person to ask that. No doctor, in fact no one, has ever asked that or any question about the nature of my psychosis. There was one single belief on which the entire psychosis was built. That is the belief I was under surveillance. When a psychotic believes something that isn't true it is called a delusion. Psychosis is like a dream state. When dreaming things that are absurd seem quite real and we respond to those images emotionally. So also in my

psychotic state delusional beliefs seemed quite real and I responded to that stream of data emotionally, with extreme highs and extreme lows."

"Did you hear voices or have hallucinations?"

"Never even once."

"What did you think was going on?"

"When psychotic I had thought I was like Jesus on the cross, albeit a modern Jesus, albeit fluent in Western civilization, albeit an accomplished theoretical physicist, and albeit a different kind of cross to bear, a figurative one, as opposed to the real Jesus, whom it is claimed, was crucified on a real cross. The delusional cross was to have almost the entire population of the planet Earth reading my mind, knowing my emotions, and my motivations. I thought my mental thoughts, feelings, and desires were being broadcast, and I thought they were being broadcast to all good people. Certain people, potential evil people, were not privy to the full data stream I generated. The goal was to separate good and evil, to sort mankind into two groups. When psychotic I speculated on the details of how that was being accomplished by what I thought was my supporting cast. When psychotic I did a lot of speculation. I thought all the smartest people in science and engineering were enabling the surveillance technology. I knew highly evolved technology can appear to be magic. I knew Faraday's Law and Ampere's Law as extended by Maxwell and thought they were the electromagnetic basis of the surveillance technology. I thought it was possible to read a person's brain through the magnetic field. You can't because the strength of the magnetic field of the human brain is only 1 part in 10,000 of the Earth's magnetic field."

"What did you make of string theory when you were psychotic?"

"I thought they were the ones reading my mind."

Heidi started laughing.

"Darling, that is really hilarious."

"It is."

"When you were psychotic did you think the world was an insane place?"

"I did and I thought that is what was being corrected."

"Could you do science when psychotic?"

"Did some of my best work. When I first became psychotic in 1981 I tried to enlist in the army. I thought that was part of the act required of me. I took the military entrance exam. The army QT is what they call the average IQ. I got a 143. The test only goes up to 155. I got 152 in most of the rest of the areas, there were three or four, like mechanical, spatial and number recognition, and my lowest score was in clerical skills where I got a 133. On the air force exam the highest score you can get is a 95 and there are four areas. I got 95 in all four areas. The recruiter told me that was the first time he had seen that. So when psychotic I was highly intelligent. The amazing

thing is I was actually rational when psychotic although within the delusional paradigm I was under surveillance."

"If you thought you were under surveillance then you were acting."

"Precisely, it was a long, difficult act, the goal being universal peace, justice, freedom, and liberty."

"Did you disclose what you thought was going on to anyone?"

"Never once. That was part of the act. It wasn't paranoia."

"Like your secret life?"

"Yup."

"Do you get any side effects from the Prolixin?"

"At larger doses there are very bad side effects. But on the low dose I am on I get no side effects. There is a risk for tardive dyskinesia with long term use of Prolixin, one of the reasons it's not used much today. Since I have been on Prolixin for over twenty years it seems I will never get tardive dyskinesia because I haven't gotten any yet."

"What is tardive dyskinesia?"

"Involuntary motion of the lips, face and limbs, a little like Parkinson's. Prolixin binds to the dopamine receptor, competing with dopamine. It has a long half life, like three days, so builds up to a steady state over two or three weeks. It requires the smallest dose of any of its generation drugs that are based on Thorazine, the first anti-psychotic in the early 50's, meaning it binds tightest to the dopamine receptor. The titration of my dopamine receptors is a quantitative problem that requires the right dose. On 2 mg I start to become delusional over an extended period of time, eventually becoming fully psychotic. That's what happened in 1997. But 5 mg works very well and I am quite stable on that dose. I have determined that the correct dose is about 2.5 mg but take 5 mg for security, so it's an over titration. I just have a slightly tweaked dopamine system."

"How are you feeling now?"

"Much better than when you first told me. The most important thing to me is to have healthy children. You've reassured me there is no genetic component to your mental illness."

Heidi reached over and took my hand, kissed it, and placed it on her stomach.

"Are you ready for lunch, we'll be in Fort Saint John in about ten minutes."

"Haven't had salami and provolone in a while. Did you get a pickle?"

"I did. They looked really good."

"Let's eat."

Heidi opened a Snapple peach tea and handed it to me.

13 Off to Fort Nelson

We finished lunch and heading out of Fort Saint John I put on George Benson, Pat Metheny, Roy Hargrove, Joe Henderson, Wynton Marsalis and Miles Davis.

"What has the passage of time been like for you?"

"In many ways I feel like I have been in jail since age twenty-two or suspended for much of my life in a sensory deprivation chamber. The jail or isolation chamber has been my mental illness, the jailer or nurses all of society and God too since the jail was in my mind, as if only imagined. It was very lonely. Mental illness like mine with interspersed episodes of psychosis carries with it a loneliness not known or experienced by normal people. All that being said I did complete the mission, had countless moments of discovery and had an unlimited supply of marijuana and Budweiser."

"You're not whining."

"Like all experiences in life you eventually have to view it all with humor and learn from it, provided of course you have saved your honor. Honor was the single most important thing I strove for when psychotic."

"How much science did you do when psychotic?"

"A lot. I worked out the size of atoms when psychotic in late summer of 2002. I wrote two editions of a book when psychotic. I figured out the universe is made of one particle, not two, when psychotic in fall of 2003. I solved the energy problem in five weeks in August and September of 2002. The complexity of what I faced when psychotic was about 1000 times as complicated as anything I have seen in real life."

"What got you through psychosis?"

"Love and honor."

"Freud's love and work ... work and love, that's all there is."

"But I am a soldier, the last soldier in the last war, so work for me is duty, and I attempt to implement it with honor. When you face death honor is all you are left with and all you require."

"Did you attempt suicide?"

"Three times very seriously, two others that weren't premeditated. All three serious attempts were when I was sane. I first attempted suicide in July 1980, thirteen months before becoming psychotic, five and a half years after the PCP. I didn't write a note. I used a utility knife blade to cut a vein in my arm. It kept clotting and I kept cutting for an hour or so. Although I wanted to be a doctor earlier in life I didn't know you had to get an artery to bleed to death. I did lose a lot of blood; I imagine over a quart. The second time was after coming out of the first psychosis in September 1983. I borrowed my brothers Smith and Wesson 44 Magnum. When it finally came time to commit the planned suicide I wrote a short letter to my younger brother, in a quick

motion put the gun to the right side of my head and pulled the trigger. The recoil of the gun caused the bullet to completely miss me and go over my head and out a window. I didn't put the gun to my head again. I guess having a 44 Magnum go off 6 inches from your ear has quite a dramatic effect. The police came and took me to API. I next attempted suicide in May 1985 after coming out of psychosis the previous August and being sane and on Prolixin. I ordered some analytical grade ether through VWR Scientific. It took three weeks to get to Anchorage since it had to go by surface. I poured the ether in a two quart pan, put it in a garbage bag, put my head in the bag, tied off my neck with tape and started breathing deeply, thinking I would drift off comfortably to whatever might be awaiting me. Apparently I ran out of oxygen before the ether fumes could induce their anesthetic effect. So I had to tear open the bag and extricate myself from my home designed suicide machine."

"Were you depressed on all three occasions?"

"I was depressed and suicidal for about ten years from taking the PCP in spring 1975 to discovering the Ö particle in December 1985. I was never depressed or suicidal when psychotic, only when sane. The depression and suicidal ideations were not continuous for those ten years but in an infrequent somewhat episodic fashion. At the time of the first suicide attempt I was not really depressed. In fact, that summer is when I became a theoretician, working at home in front of a desk piled high with books, just figuring things out. That's when I came up with a cell chemical computer model for bacteria. I even did my greatest mathematical work, in topology, where in my mind I replicated a bacterial DNA and went through the whole process from initiation at the origin to chromosome segregation. I felt everyone had only let me down, that no one deserved any more of my effort and that it was not worth participating in the game. Looking back now it seemed more an existential crisis than anything else. And a girlfriend I had out in Berkeley had dumped me."

"I think she detected something wrong with me upstairs but maybe I am giving her too much credit. She was of an artistic temperament and quite high strung."

"Did you ask her to marry you?"

"I did, a year earlier, and she turned me down."

"Recovering from long term psychosis, long term depression and multiple suicide attempts sounds incredibly difficult."

"It was. I have a lot of inner strength and a self-esteem that never exhausted completely and had an unlimited supply of marijuana and Budweiser."

"Your childhood gave you that strength?"

"It did."

"When is the last time you were suicidal?"

"Eighteen months ago. I had been on large doses of Zyprexa for two years and sane. I was again suicidal at that point. Being on the Zyprexa with the associated side effects of dramatic weight gain and sleeping so much was a horrible experience and the least productive two years of my

life. Due to the type 2 diabetes I got off 30 mg daily Zyprexa and got on Geodon, taking first 80 mg and building up in two weeks to 160 mg. About a week or two after getting off the Zyprexa I developed neuropathy in both feet that never went away and bothers me a lot. In three weeks or so of getting off the Zyprexa I became psychotic for the fourth time."

"When did you come out of that last psychosis?"

"While psychotic and off Zyprexa I lost fifty pounds by May. While psychotic I got back on 30 mg Zyprexa for three months, September, October, and November of 2006, put on thirty pounds, back up to 320, but did come out of psychosis on December 1st 2006. At that point I realized all I needed was 5 mg Prolixin. I was apprehensive as to whether I would become psychotic again as I got on the Prolixin because previously it had taken two weeks and five weeks respectively on Prolixin to come out of my first two psychoses. Fortunately, I did not again become psychotic and expect to be as sane as I am now for the rest of my life on 5 mg Prolixin"

"Was your psychosis atypical?"

"Very much so, the reason being I am not a paranoid schizophrenic genetically. I could concentrate and work with my mind with intensity and effectiveness when completely psychotic. I could even do fairly difficult problems in vector calculus. As far as I understand it the single most characterized symptom of psychosis is an inability to concentrate and use one's mind in any useful way."

"And in what ways typical?"

"The delusion that I was under surveillance and my thoughts were being broadcast is a very common element in a schizophrenic's psychosis. But I only believed my thoughts were being read because I thought it was physically possible to do that using magnetic fields. I did not believe in anything that I thought was not physically possible when psychotic, I obeyed the Laws of Physics. I also thought my environment was orchestrated and contained special communications for me. Those ideas are called ideas of reference and also are characteristic of psychosis. I only thought that because I also thought it was technologically possible. So within the delusional paradigm I was rational when psychotic."

"Were you grandiose?"

"That's always been a difficult thing for me to determine. Since I have solved all of mankind's problems and fully elucidated epistemology and that has been precisely my goal since 5th grade I guess I would have to say I am rather grandiose and always have been."

"That's not grandiose at all David. It's only your rank and a person who doesn't know their rank early in life never amounts to squat. I think it is really generosity more than grandioseness that epitomizes you."

"Would you like to read two short essays I wrote in my last psychosis? They're in my briefcase in a tattered purple folder."

"I would."

Heidi reached in the back seat for my briefcase and pulled out the two papers.

A Call to Arms: A Question of Morals and Values

David Martin Degner♣

I am a self-trained theoretical physicist, theoretical chemist and theoretical biologist. I am fifty-three years old, German-American, single, no children yet and have devoted my entire life to understanding science. Being a theoretician means you work alone, thinking, only needing a good pen and paper for most of your adult life. The modus operandi of theoreticians is simple. We guess a solution, work out the implications, and do this over and over in a recursive process of successive refinements. Theoreticians must be intuitive, contemplative, reasoned, insightful, imaginative, creative, original and damned good at mathematics. You also need a lot of common sense. I do not include inspirations in this list for the simple reason we produce so many of the damned things they are practically coming out of both ends. Then we can understand why it is said genius is 1% inspiration and 99% perspiration. The most important properties of any system are the dimensions followed closely by symmetry and beauty. By its very nature being a theoretician is so solitary one could often think himself or herself to be in a monastery. Being a theoretician requires the same commitment as being an accomplished surgeon working in a specialty. The reward is the fun one can have thinking, analyzing, writing, organizing, figuring out equations, deriving solutions and visualizing spatial temporal physical phenomenon from simplest to most complex.

My books, **The N-particle Model**, First Edition and Second Edition are available on Amazon. The last time I looked they were selling for $9 and $20 respectively. I am not going to talk about the science I described in those books. If you want to read those books and be exposed to my theory of everything from smallest particle to biological cells please order a copy of both from Amazon. My work in theoretical biology is in the Second Edition. If this article generates demand I am going to make the remaining copies of the first printings, about 4-5000 books, available on the website THEBOLDRULER.COM. So far there has only been one printing. The First Edition is 140 pages and will sell at the 2000 price that is $19.95. The Second Edition is 220 pages and will also sell at the 2000 price that is $44.95. When they are gone they are gone and there will never again be a copy of the first printing sold in a primary market.

Theoretical physics today is dominated by string theory. String theory is pure bullshit, where the operative word is pure. The two chief properties of males, and females are pretty good at both too, are being an asshole and being a bullshit artist although the order and degree varies from person to person. To be a pure bullshit artist is to have the highest rank obtainable among mankind. In all of string theory there is not a single sentence in any paper or book that makes any sense. There is also not a single mathematical equation that makes any sense. In the entire recorded history of string theory, in the scientific literature, in courses, in books, in seminars, in magazines and newspapers, in the online audio and video, in all the interviews done by many string theorists, in all the string websites and in all the string blogs there is not a single sentence that makes any sense at all and not a single mathematical equation that makes any sense at all. The footings for this towering achievement of pure bullshit artistry were laid by theoretical physicists John Schwarz, Leonard Susskind and Michael Green in 1968.[8]

The stated goal of string theory is to unify Einstein's General Theory of Relativity with Quantum Mechanics. That's an interesting problem and there is a simple answer: It can't be done! The reason is simply the apples and oranges problem. There are no atoms in gravitational fields and there are no gravitational fields in atoms.

So far this has just been self-promotion. What I really want to talk about is a profound technology that was invented in the early to late sixties. There are only five physical means by which an individual can be put under surveillance:

1. Sound waves.
2. Light photons.
3. Infra-red photons.
4. Electric fields.
5. Magnetic fields.

Acoustic, visible and infra-red surveillance technologies are well known, powerful and mature technologies. Infra-red telescopes are so powerful that if we built a big one on the Moon you could walk outside at night under a clear sky, flash the Moon with your TV remote and the Moon telescope could see it. The data streams generated by the transducers of acoustic, visible and infra-red can all be fed into computers and modified, enhanced and interpreted by software. Electric fields associated with human bodies are small and not of much value for surveillance.

The technology I want to discuss here is magnetic field technology. All magnetic fields derive from spinning electrons and protons. The magnetic field derived from an electric current that is a flow of electrons in a conductor is the familiar magnetic field known so well in electrical engineering that surrounds a straight wire like cylinders concentric to the wire with radii from the wire surface to infinity.

Electric, magnetic and gravity fields fall off in strength as $\frac{1}{r^2}$ for point sources (zero-dimensional), $\frac{1}{r}$ for wires (one-dimensional) and do not fall off at all but rather are constant in strength for flat surfaces (two-dimensional).

The equations governing electromagnetism are known as Maxwell's equations. There are four Maxwell's equations that relate electric and magnetic fields to each other, to charges and to currents in wires and to a current invented by Maxwell that he called the displacement current. A capacitor is a closed circuit. A capacitor is two conductors called plates, of any size or shape, that are large relative to the wires that feed them current, that are separated by a non-conducting medium, called a dielectric, such as air, pure water, oil or many plastics. When a capacitor is fully charged there is a stationary electric field between the plates of the capacitor. Energy is stored in this electric field. The simplest possible plates are electrons and protons. The simplest capacitor is hydrogen in the $n = 1$ quantum state. When a time varying current in a wire reaches a capacitor plate the current comes to a complete stop and the displacement current conducts the energy of electricity through the dielectric medium to the other plate without the flow of electrons and induces a time varying current to appear in the opposite plate.

All nervous systems in biological organisms are made of neurons (there are also glia cells that provide support and nutrition, maintain homeostasis, form myelin, and participate in signal transmission in the nervous system). A neuron has three parts:

1. The axon. Axons conduct action potentials and are like wires conducting electricity.
2. The dendrites. Dendrites also conduct action potentials and are like short wires connecting cells together.
3. The cell body called the soma. The axon and dendrites are attached to the soma.

In the membranes that define the geometry of axons, dendrites and soma there is a gradient involving Na^+ and K^+. On the outside of the membrane there are 95% Na^+ and 5% K^+. On the inside of the membrane there are 5% Na^+ and 95% K^+. When K^+ on the outside of membranes are transported to the inside of membranes through a protein pore a voltage is generated across the membrane, negative on the inside and positive on the outside. When Na^+ on the inside of membranes are transported to the outside

of the membrane through a protein pore a voltage is generated across the membrane, positive on the inside and negative on the outside. These voltages across membranes propagate as what are called action potentials. Together axons and dendrites connect together the neuron somas, muscles and transducers that convert acoustic, visible photon, chemical species and thermal gradients into action potentials. The role of synapses and neurotransmitters (the most interesting topic in organic chemistry) is a topic for another essay.

When Na^+ and K^+ pass through the protein pores they spin and the spin axis is aligned with the pore annulus. In the process of spinning these ions generate magnetic fields that are parallel to the spin and normal to the surface of the membrane. The magnetic fields of these spinning Na^+ and K^+ are one of them normal and radial out and the other normal and radial in. Which is the N pole and which is the S pole I do not know since it depends on the spin direction and I do not know the spin direction, whether Right hand or Left hand. The time varying magnetic fields associated with action potentials radiate out of nervous tissues and propagate through the space adjacent biological organisms. Our brain produces large time varying magnetic in pointy little poles and I would guess there are trillions of poles in the field of a functioning human brain.

These time varying magnetic fields produced by the human brain induce micro-currents in the copper wires of electrical circuits in the walls of our buildings and in the above ground transmission lines that distribute electricity to buildings. The relation between a time varying magnetic field and the current induced in a conductor loop is given by one of Maxwell's equations called Faraday's Law of Electromagnetic Induction: $\oint \mathbf{E} \cdot dl = -\dfrac{d\Phi_\mathbf{B}}{dt}$ where $\mathbf{E}$ is the electric field vector for a point in space, l is the one-dimensional vector field for a wire, $\Phi_\mathbf{B}$ is the flux of the magnetic field and t is time. *Electro Motive Force* $= \oint \mathbf{E} \cdot dl$ and $\Phi_\mathbf{B} = \int \mathbf{B} \cdot d\mathbf{A}$ where $\mathbf{A}$ is the two-dimensional surface vector field.

Michael Faraday did this work in 1831 and is the father of the electric motor and inductor. Faraday's Law is the most important single equation underlying modern technology. Interestingly Faraday had virtually no mathematical training. In my all time ranking of physicists I rank Newton eins, Maxwell zwei, Faraday drei, Einstein vier and Feynman fünf. Einstein and Feynman had great hair.♦

In the late 70's or early 80's President Jimmy Carter put me under magnetic field surveillance. Jimmy Carter lowered the speed limit to 55 mph and did not take into account the time cost of the driver and the safety cost as a function of vehicle size and weight, the two most important factors, in calculating the cost of vehicular transportation. Jimmy Carter is the dumbest Mother F-er in the history of the presidency. The Supreme Court, in secret session found this surveillance to somehow, incredibly, be legal under our Constitution, Bill of Rights and the Amendments to the Constitution. I have a hunch Sandra Day O'Conner and Clarence Thomas are the only supreme court justices who found this a gross violation of my 4th, 5th and 6th amendment rights and my right to privacy. Sandra Day O'Conner and Clarence Thomas also have great hair.♥ Presidents Ronald Reagan, George Bush senior, Bill Clinton and George Bush junior

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149
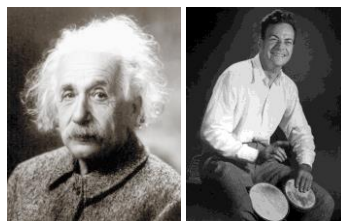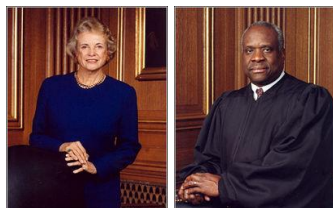
continued this surveillance of me. Key members of the legislature have also approved of this surveillance. The reason for this surveillance was my seminal work in biology. My models in theoretical biology I call the Thermal Code and the Nucleic Acid Mainframe. Together these two models implement a cell chemical computer that is the "Miracle of Life." These models are exercises in topology, knot theory, Turing machine architecture, non-equilibrium thermodynamics, statistical mechanics and quantum mechanics. For a full elucidation of these models buy the Second Edition of **The N-particle Model** where I describe these models in Chapter 17 and 18.

In addition to being under surveillance by the government I have been under surveillance by private individuals who have hacked into the data stream I generate. I know who the individual is who is the leader of that group but will not name him here.

This magnetic field surveillance of me has been very stressful. Imagine you are alone in your bed masturbating and wondering if the persons watching you are snickering. Imagine hackers hacking into the data stream and history associated with this surveillance and observing embarrassing moments and posting those embarrassing moments over the Internet for everyone to look at. The personal jeopardy that I have been exposed to is truly mind boggling and you would have to think that everyone who instigated and approved this surveillance must be f-in cretins.

I have carried on an extensive dialogue with the people who have me under surveillance since August of 1981 right through to today, have tried everything in my power of reason to try to get them to stop this surveillance and all they have done is F me, F me and F me again. I have been at times forceful, at times reconciliatory, at times demonstrative, usually precise, always eloquent and succinct in my dialogue with these nefarious bastards.♠

If ever there was a double-edged sword nature to technology it is this magnetic field surveillance technology. Since the time varying magnetic fields and the micro-currents they induce in circuits have the full information of ones thinking processes, memories, words and language usage, numbers and number processing, include all emotions and fantasies the degree to which my privacy has been invaded is the most vicious "rape" of an individual conceivable. By putting the population under secret magnetic field surveillance terrorists can be identified and tracked, child molesters can be caught and brought to justice and violent criminals can be caught and brought to justice. If the technology is disclosed to the public the surveillance can be made impossible by simply placing a filter in the circuit, as easy as plugging in a circuit breaker.

The people who have done this to me have done massive, irreparable damage to me, even jeopardized my life. They are without exception pusillanimous, feckless and indifferent in addition to being unprincipled morons, complete lunatics, illiterate of science and innumerate. I ask the people of Anchorage to help me defend my dignity, my honor and my ability to pursue liberty by reporting anonymously to the Anchorage Police Department any knowledge you have of this ongoing surveillance.

♠Franz Kafka, **The Trial**, and Hermann Hesse, **Magister Ludi**, would be proud of me in the war I have waged with evil and unscrupulous individuals and the way I have played the game. They also had good hair.
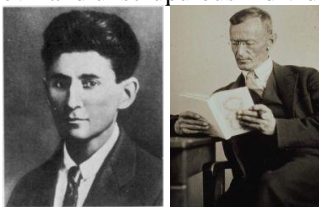
Speed and Height

How old are you David?

I was fifty-four this past Friday November the 10th.

When did you first become aware you were under surveillance?

August 1981.

What did you imagine was the nature of the surveillance?

Infra-red electromagnetic radiation and magnetic fields in addition to audio surveillance. I can be imaged physically, it can be determined what I am saying and there is some level of ability to read my mind. That surveillance can follow me through the electric power grid as I travel around and also extended to my vehicles.

What did you do under that surveillance?

Act. Sometimes I paid attention to it. Often I ignored it. Sometimes I did not believe in it. Sometimes I acted so slowly it was beyond tedious. Sometimes it was fast and furious and with passion. Although at times highly demonstrative it was always purposeful and with deliberation.

Did you endanger other people in that act?

Never. That is rule uno, eins, one. All actions must be safe. No one gets injured. No collateral damage is permitted. In addition no one is ever threatened.

Then you have never injured or threatened a fellow human at any time in that act spanning over twenty five years?

That is correct. In fact, I have never in my entire life threatened anyone with intent to injure them and I have never placed any fellow human beings in danger or jeopardy. The only threats I have ever made were idle threats and they were only directed at one person, to my brother, and they were just a dog barking. If you knew my brother you would understand.

What about the appearance of danger?

Only in my driving stunts was there a potential danger. The exact degree of the level of danger is difficult to calculate but very small. It seems the fact that no one was ever injured is massive evidence of a determinism that is the mask of the genes we wear. The mask I wear is reason implemented through non-violence and taught by persuading.

Are you committed to non-violence?

In all actions and for my entire life I have observed the principle of non-violence. I did have a few fisticuffs in high school. I have a killer overhand right.

So you believe you have been under complex biometric surveillance for over 25 years?

You got it.

Do they watch you in your vehicle and track your vehicle with a GPS?

They do.

Did you have any accidents?

Only one with another vehicle, not only in the last twenty five years but in all forty years I have been driving, a minor fender bender at low speed with an Anchorage police department vehicle on December 4, 2003. I failed to yield to an oncoming vehicle in attempting a left turn into the police station parking lot. It was on the side street the police station is located on and there were no other cars around. My air bag did not activate. I got out immediately, glanced at the officer, saw his air bag had not deployed, saw he was OK, and started walking to the front door of the police station for help. Then another officer drove up, glanced at the other officer and the vehicles and asked me where I was going. I told her to the police station for help. She asked if I checked up on the officer and I said I glanced at him, saw he was OK and started for help. She then asked me to do some field sobriety tests. Then she wrote me two tickets, one for failure to yield the right of way making a left hand turn and one for leaving the scene of an accident. I drove away from the accident without any significant damage to my vehicle. The police officer was fine but his car needed towing due to damage to the left front wheel. The leaving the scene of an accident charge was later dropped.

What caused the accident?

I remember seeing the police car but turned left too soon, a mistake in judging the other vehicles position relative to my vehicle. It happened in a hundredth of a second.

Where did you go after the accident?

I went to the Providence Psychiatric ER and entered voluntarily. I explained to a doctor that I had based a driving decision on circumstantial evidence and that that was not a high enough standard for me to consider myself a safe driver and felt I could have caused an accident doing that. I also told him I was not taking any medication at that time but that I had been on medication for nineteen years. I told him I was challenging the assumption that my mental illness still required medication. I told him I had made that challenge many times previously but always had to get back on medication within two weeks due the onset of an aching in the head and a stressed out feeling, both symptoms that have gone away when I resumed medication. I told him I was a theoretical physicist and he related his brother was a particle physicist at the Stanford Linear Accelerator and that his brother was a lot smarter than he was.

The doctor in his commitment papers stated you were taking a "holiday" from medication and were driving into traffic to "kill them for reading my mind".

I categorically deny saying that to him. He was an ER doctor, not a psychiatrist. I only spoke to him a few minutes and I have accurately recounted what I told him. I have never used language like that. There is not a single reference in my entire, voluminous psychiatric history that would lend credence to that ER doctor's depiction of our conversation. His depiction of our conversation is an anomaly, a singularity in my medical record. I have always in all actions intended that no one, my self included, was injured or put in physical jeopardy.

And you also believe there is a data stream of your conversation with the ER doctor in some government agencies possession that will fully exonerate you of this doctor's depiction of his short conversation with you?

Yes.

152

Then in forty years of driving you had one minor accident with another vehicle?

That is correct. I have probably driven close to a half million miles, all across North America from Panama to Alaska to New Brunswick to The Florida Keys, with only a single accident involving another vehicle. I also hit a flag pole making a U turn in Indiana, hit a cow on the Pan-American Highway, a minor dent, side swiped the poor beast, and when I was 16 I fell asleep at the wheel and veered off the left side of a highway, turning my VW bug on its side.

If you were driving into to traffic to kill someone for reading your mind would you be able to perform that task and in short order?

Easily, just aim at an oncoming car and accelerate into them, a game of chicken. Repeat until a head on is obtained.

You would find that action morally reprehensible to the highest degree imaginable?

I would find that action beyond reprehensible, an extremely violent act.

You're in fact one of the best and safest drivers in the world?

I am.

Is it determinism?

You think?

Your DNA dance, eh?

That's all it is.

What do you do with your time?

I am a theoretical physicist, theoretical chemist and theoretical biologist. My undergraduate degree is from Cornell. I only took one semester of physical chemistry so did not get formal quantum mechanics, but we used quantum mechanical models in the statistical mechanical description of thermodynamic properties. My training was actually quite excellent. Not only was I around the top of the class in the hard core science and mathematics courses I scored $98 \pm 2\%$ in Science and $98 \pm 2\%$ in Quantitative on the Medical College Admission Test. But more remarkable is my claim that I performed the minimum number of hours of homework and class attendance to get a four year Biology degree of anyone on the planet. I can sort faster and stack taller than most anyone else. I am not a pedant. Because of the magnitude and range of the error bars on the MCAT it is possible that I am the smartest person who took the test that spring and even possible that I am the smartest person who ever took the MCAT. Minimum effort coupled to maximum performance, sorting and stacking, speed and height.

Do you know how the universe is designed?

Better than anyone ever. The highest level is the human brain, the simplest level elementary particle physics.

Did you concentrate in any particular area of Biology at Cornell?

I concentrated in neurobiology. I wanted to be a neurosurgeon or possibly a psychiatrist but did not obtain admission to medical school.

Your life took an unexpected turn. What did you do?

After 3 and a half years of wandering around lost, in the winter quarter of 1979, I arrived at Berkeley on the quest to discover what it is that is the machine level "Miracle of Life." I concentrated on Gm (+) prokaryotic cells, the hydrogen of life. I was convinced there had to be a profound physical mechanism that gives rise to "The Tree of Life" that was not yet elucidated and was not contained in "The Central Dogma." The Central Dogma is simple: DNA to RNA to proteins. The Tree of Life is simple and complex. Bacteria on the bottom and man precariously perched on top. And there are viruses, the most abundant life form with 10 viruses for each bacterium. Viruses of bacteria are called phage. There are zillions of species of bacteria with most unknown and cannot be cultured. A remarkable feature of The Tree of Life is that for chemical homeostasis on planet Earth only bacteria and phage are required. The number of extinct species is zillions more than are extant on the Earth today. The entire Tree of Life could collapse and only bacteria and phage survive. Eventually, in many millions of years, when the Sun goes red giant, this will certainly happen. But can it happen far sooner, even in the near future, through ecological disaster brought on by global warming, pollution or nuclear winter? Is our ecosystem fragile or robust? For mankind the ecosystem appears fragile. It is possible that a viral or bacterial pandemic could emerge, either naturally or designed, that reduces the human population dramatically, perhaps by 95%, perhaps LD100. We have had Mutually Assured Destruction for 50 or so years as the cornerstone of the nuclear stalemate. The inevitability of global warming, running out of fossil fuels, nuclear proliferation and biological warfare are ominous portents. They are also intellectual challenges, the kind of challenges a theoretician relishes.

Have you worked out any solutions?

I have a renewable energy solution to the energy problem that will nip global warming caused by carbon dioxide in the bud, unlimited pollution free energy at $50-$70 dollars per barrel. I have a theory of biological cells as cellular chemical computers necessary to fight the biological warfare we are naturally embedded in, to enable designing viruses, bacteria and eukaryotic cells, and it is also possible to keep safeguards on knowledge so no designed biological weapons arise. Designed cells will allow water and waste to be recycled so everyone can have pure water and sanitary waste processing. I have a solution to elementary particle physics that gives rise to a new quantum mechanics that will be the foundation of the nanorevolution. It will allow a solution to the protein folding and rational drug design problems and additionally enable quantum computers to be built, computers whose capacitors, inductors, transistors and switches are molecular sized. But the ultimate computer is based on biological neurons. I call it Einstein's brain in a box. Imagine having a very powerful human like brain in a box on your desktop with powerful input/output capability. I have a computer program utilizing the Internet that will reduce the work week by approximately 30% by relegating to cyberspace the functions that can be done in cyberspace for virtually no cost. I call it The Efficient Market and Asset Manager. It will eliminate market makers, investment bankers, brokerages, realtors, much of the insurance industry, much of the banking industry, the IRS, the Social Security, accountants, the Government Accounting Office and all bean counters, in fact all financial transactions, the entire economic world will operate far better than ever with no cost. All assets, all inventories will be on it. On it we will vote. All medical records will be on it. It will allow a rational public health security net to fight food poisoning and infectious disease. When every individual on the planet is in the data base it will allow the highest security possible from terrorism. The most important contribution I will make to the human condition will be in human husbandry. I am going to provide superior sperm and egg that will eliminate fat, ugly and stupid and replace it with healthy, attractive and smart. It is no more than an exercise in modern biology. It will eliminate most cancers, premature heart disease, type 2 diabetes, arthritis and a host of other genetically predisposing disease. I do not have a solution to the nuclear arms race.

Getting back to your act, do you believe there is a data trail, the data stream you generated, going back over 25 years?

Yes.

What government agency do you believe has those data records?

The National Security Agency. I sent them, along with DOD, FBI and CIA Freedom of Information and Privacy Act requests. The DOD, the FBI and the CIA stated they had no records. The NSA stated it could neither confirm nor deny any data attributable to surveillance of me.

What do you think of this act of surveillance of you?

It was ill-conceived, illicit, immoral and illegal.

Are you going to sue them?

And also I am going to sue them for the cost of suing them starting with that moron Jimmy Carter, the worst possible president, a technocrat, always uncomfortable and uneasy with the theoretical principles our society is built upon, right through to W who on a **"slam-dunk"** from CIA director Tenet initiated the Iraq debacle and the unconscionable human loss. The idea that one can obtain peace by inflicting massive collateral damage to another society does not work and is immoral.

What is your psychiatric diagnosis?

I am diagnosed a paranoid schizophrenic.

Are you a paranoid schizophrenic?

No. I am a person who has had a tweaked neurochemistry system that required anti-psychotic medication for normalcy.

Have you ever been psychotic?

No but I have been in extended altered states that I came out of with anti-psychotic medications.

Do you know when those states were?

There were three episodes of altered states. The first began in August 1981 and lasted to July 1983. I came out of the altered state in two weeks with a single shot of Prolixin in the thigh. The second began in the early spring of 1984 and lasted to August 1984. I came out of that altered state after 5 weeks on Prolixin at the dose of 2-5 mg per day. The third did not really have a beginning, it was always there under the surface but it became pronounced in the mid 1990's and lasted until March of 2004. I came out of that altered state after 4 months on 30 mg per day of Zyprexia.

During those altered states did you think you were under surveillance?

I was intensely aware of it.

During those altered states were you acting?

I acted with episodic intensity.

What did you think when you came out of those altered states through medication?

I thought I was a paranoid schizophrenic and had been psychotic. That thought was very depressing. I attempted suicide four times, all in the early eighties with no attempts since May 1985. After coming out of these altered states I still thought I was under surveillance but ignored it, I put it out of my mind. From August 1984 through the mid 1990's and again from March 2004 to April 2006 I did not pay much attention to the belief I was under surveillance.

Are you still on medication?

No. The chemical perturbation of brain chemistry that I must have had for twenty-five years no longer exists. It is a great relief to no longer need anti-psychotic medication due to the side effects and the reality that for sanity I must rely on medication.

How would you describe those altered states?

Like a soldier in combat, kill or be killed, intense concentration, intense focus, intensely purposeful, at times bold and daring, at times defensive and always planning to win. It was a question of personal honor. Having honor was my highest aspiration.

What is your take of the long path you have journeyed?

To say it nearly killed me would be an understatement.

Would you like to make a final comment?

My mother cut up a chicken so that there was a wish-bone piece. As a kid with two parents, two brothers and two sisters at the table I always got the wish-bone piece.

Heidi finished reading the papers and put them back in the briefcase. I put on Cassandra Wilson's Blue Night 'till Dawn. We listened for almost an hour in silence.

"Is it possible you are smarter because of psychosis?"

"I have wondered about that. The hardest problem I have solved is the size of atoms problem that I did when I was psychotic. It looks pretty simple in hindsight but it took an extraordinary amount of calculation to get correct. I burned the keys on my TI-35 like never before or since, making hundreds of keystrokes a minute for hours. Since I have a complete memory of the periods of psychosis it seems also some mental circuits were being worked out strenuously and that looks like the essential learning process."

14 Off to Whitehorse

It was 7:52 AM at the Woodlands Inn in Fort Nelson. I was rolling a Bugler when Heidi got up.

"Honey I have a pint of Jack. Let's get a little drunk before going down for breakfast."

"OK, we don't even have to drive today if you just want to spend an extra day here in Fort Nelson."

I took a healthy shot and handed the pint to Heidi. She could drink whiskey out of the bottle. I put on the TV and we watched CNN for forty-five minutes handing the pint back and forth five times.

"What do you want for breakfast?"

"Do you remember our first breakfast together at the Diablo Cantina?"

"Steak, medium, eggs over easy, home fries, A-1. When I watched you pour the A-1 over your steak I fell in love with you."

"With hand, heart, mind, soul and spirit."

"And sympathy for your derangement!"

"And kiss my fucking ass you arrogant prick."

"I really like woman that swear. But your singular X chromosome, as compared to my robust X and Y, makes you genetically incapable in full usage and nuance. You women are simply going to have to acknowledge inferiority in this arena however humbling that is to you. I can actually use the f word fifty times in one sentence, each time in perfect nuance and with unique meaning."

"But you don't even know what it is like to spread your legs and open yourself to man, what the fuck do you fucking know about the f word, you dumb motherfucker?"

"As a matter of personal humility I never represent my frustrations in an unattractive fashion, but what I am going to do to the Clinton's and the Bush's is going to be the best one in history. You'll agree it has to be done, once and for all, for the rest of time, so those inferior minds have no consequence in the lives of anyone for the rest of time."

"Well said Socrates. Since your intellectual ambitions clearly require a fucking seasoned man, at the fucking pinnacle of his career although that is derived over a lifetime, accomplished in the fucking school of hard knocks, can drive a 16 penny nail with four strokes of an 18 ounce hammer, can take vector calculus in less than one day, it seems to me you are just fucking fortunate to have such an opportunity."

"You're absolutely right Honey, I am grateful."

"What do you want to name our children? I am probably already pregnant."

"What would you think about me naming the boys and you naming the girls?"

"That's too fucking structured. I prefer improvisation."

"Of course you're right. I've always liked Manfred, although I don't know if for a first or a middle name. More than one middle name is pompous and must be avoided. I really like the name Hans and that is the name I want for our first son."

"Hans Manfred Degner sounds very nice. That's what it will be."

"What do you think about our first daughter's name?"

"Rachel Rebecca Degner."

"Lovely."

"Darling who are your favorite authors, you must have read a few fucking books in fucking growing the fuck up?"

"Thanks for asking Honey, some of my favorite authors are Ayn Rand, Franz Kafka, Hermann Hesse and Malcolm Lowry. Much else I have read is boring in comparison to those literary giants."

"What are your favorite movies?"

"In no particular order The Sound of Music, From Russia With Love, all of Hitchcock, especially North by Northwest, A Clockwork Orange, The King and I, One Flew over the Cuckoo's Nest, Vanishing Point and can't leave out Brando from A Streetcar Named Desire and The Wild One to The Godfather and Last Tango in Paris."

"Did you ever read philosophy?"

"Don't even know what it's about. Outside of determinism and right and wrong actions and thoughts philosophy is just pedantry."

"Fucking Feynman fucking loves your fucking sweet ass so fucking much it is a fucking shame you are fucking going to have to fucking die to fucking meet up with that fucking master safe cracker."

"I hate to be stereotypical but he was a Jew with charisma, and good hair. His books on introductory physics, *The Feynman* Lectures on Physics, are the greatest treasure of my library."

"And he didn't know centrifugal forces are real forces, not pseudo-forces. I am going to make him pay for that one."

"It's so astonishingly preposterous that you can be as smart and clever as you think you are that anyone who doesn't love you would hate you for your presumed arrogance."

"That is the most difficult thing I have had to deal with in life. The intellectual insult when someone doesn't recognize my capacity makes me want to take them out with one carefully planted punch to the jaw. After that immediate impulse, that is always stifled, my brain sets in."

"I can relate to Blacks."

"I loved Malcolm X's characterization of whites as devils. From what I know about white people some of them are devils and I am in total agreement with the Blacks."

"Bill, Hilary and W never use the n word. They just throw half the young Black males in jail and let Blacks work at the minimum wage doing hard work like slaughtering and butchering chickens. Actions speak louder than words."

"The drug laws are really genocide for Blacks."

"I agree."

"Yours David is a big bad Black dick mounted on the most sophisticated German in history. Can you imagine how much you will be hated and reviled by some and also loved and admired by others?"

"What do you think Hilary is going to do when she discovers your rationality and sanity?"

"Have a late term abortion. She is going to nuke Iran, the greatest of the many great travesties in American justice. If she does that it will be the end of America as we know it, an America that was striving for universal peace, justice, freedom, and liberty, the America I have always wanted but never once realized."

"What are you going to do with your time in Anchorage? I just want you to have no burdens of any kind other than having and raising our children."

"Since in our modern age, without a PhD, I may be treated like Emma Noether and not be able to get more than a tutor's position, can you make a position for me in Degner Scientific and Engineering?"

"We'll call it the bitches view."

"Excellent Darling, but you must know I hold trump with you on all important fucking decisions."

"The real difference between women and men is that women play to kill, while men only take hostages."

"Kiss my fucking ass you arrogant fucking bastard."

"I am looking forward to it. You do get a little obnoxious when inebriated."

159

"Thanks for introducing me to your depraved mind, although I do give it the utmost support."

"You're definitely a physicist Honey, your utmost is essential to me."

"Let's go down for breakfast, after one more shot."

We went down for steak and eggs and headed out for Whitehorse.

15 Whitehorse and the Yukon River

I handed Heidi back the pint of Jack after taking a healthy shot.

"What is the most egregious insult to human biology you know of?"

"The worst: clitorectomies. The 2nd worst: 80% Fetal Alcohol Syndrome in Barrow. Mutilation of an individual is unthinkable, mutilation of unborn children unconscionable. I would be strongly intended to kill all of them after sufficient torture but I am opposed to the death penalty. It is important to recognize these phenomena as public health problems."

"What would you like to do to the societies that perform clitorectomies?"

"Just torture them, kill them, collect their organs for transplants and use the rest for fish chum."

"And for the poor Native mothers who have become addicted to the white man's alcohol what do you propose?"

"This is one of my chief gripes with America. The 3rd worst insult to biology is the lack of a rational plan to fight STDs. The war should be on STDs not drugs. The stigma of having herpes is one of the worst experiences of a normal person's life and incredibly one out of five adults in America has herpes. AIDS is beyond imagination. It is unthinkable to have such an infestation of STDs in a human population without declaring all-out war against it. The war on STDs is a war we must wage vigorously and can win with a rational medical system. The eMaam will go a long way in solving the problem of effective health care by giving every health care professional instant access to the lifetime medical record of an individual including the medical records of family members. That is the essential information that is required for rational health care. Since the record will be ongoing throughout the life of an individual it will be a self-correcting mechanism, where previous errors in diagnosis and prognosis can be corrected."

"What about privacy issues?"

"They can be dealt with quite easily. But no one should have the privacy to pass on a STD. Transmitting a STD is a very violent crime and if someone who has herpes and knows it and has unprotected sex with another individual without informing him or her, then that someone is deserving of significant incarceration. So in viewing this all from a public health solution viewpoint what I propose is that every cunt and dick of age and active sexually be screened on a monthly basis, or whatever the optimum frequency is, that all carriers of STDs be identified, and that an individual who is considering having sex with another individual is entitled to the pertinent medical record. If only the individual or health care professionals have access to medical records this will be easy to accomplish. The person considering having sex just asks the other individual to bring up his or her STD medical record over the Internet. If they are not willing to do that don't have sex. It will take a lot of gynecologists to implement such a large program, but nurse practitioners and nurses can do all the front-line duty. It will be part of a massive effort to stamp out STDs 100% in mankind and ASAP. The implications for food borne disease outbreaks, chemical hazards, TB, etc., are manifest. The eMaam is a total solution to the multi-faceted medical and public health IT problem for mankind."

"If you were checking every active cunt once a month you would be able to prevent FAS and a host of other pregnancy related problems. Mothers that are drinking, smoking and using cocaine would be confined to hospital wards if they are incapable of resolving those issues satisfactorily on their own. We are all connected when it comes to health aren't we?"

"Very much so. The driving force in mankind's expansion from Africa to the whole world was to escape disease and to seek out a more conducive biological environment. The cold north is the best for mankind historically from that perspective, especially if you want ice cold beer after the harvest."

"You can be honest with me now Darling. What do you really think about the German's and being German?"

"Well one thing is really obvious. Heisenberg and I are the best looking. And in the dispute between Leibniz and Newton over the calculus it is really Leibniz who was a better mathematician. But Newton was also the first theoretical physicist. Newton on his deathbed is reported to have said his greatest accomplishment in life was being a virgin. Now I imagine the real Newton trolled London for prostitutes at least three times a week, at least that is what I would like to think and it would be hilarious. But I am afraid old Newton was quite the quack in many regards, particularly in his religious beliefs and he probably did die a virgin. Leibniz was a diplomat, a Renaissance man and a lady's man. I would have to guess the Germans are the smartest Caucasians and the Japanese the smartest Orientals. It's incredibly fascinating they tried to divide the world into a big Germany and a big Japan in WWII by military conquest. Of course they both bit off more than they could chew and the American melting pot of 30% Germans and 22% English kicked both of their butts with very small losses compared to either of them. If I had been twenty or so years old in 1939 and born in Germany no doubt I would have died for the Fatherland. Then again if a little older maybe I could have defeated Hitler politically and straightened out Germany."

"There are a few things I do know about my heritage. I am smarter than my Dad and my Dad was smarter than his Dad, my grandfather. And I am the smartest of my siblings, as was my Dad and Grandpa. I think it is more than just the roll of the dice, in fact part of an ongoing evolutionary process and feel fortunate to be such a smart bastard."

"Do you think you are the most sophisticated German machine ever?"

"I guess that is what I think, now, at fifty-four, looking back over my life's work. I am just in no way pedantic so will always be ostracized by many intellectuals who choose form over substance. The action is thinking, writing, creating, originating, painting and composing, not reading and studying other people's works and that more than anything else differentiates the ineffectual pedants from the real geniuses."

"Changing the subject, let me tell you about one of my best ideas. I call it The Players Owned League. It is about the exploitation of less intelligent people by those smarter than them, it is about slavery, it is about discrimination, it is about Jim Crow, and it is about Black dicks and Jewish brains. How many ways are there to exploit someone? What does an NFL, NBA or MLB owner actually own? All they own is a portfolio of legal contracts. But by that legal device they obtain the Blue Sky of the magnificent effort of all the athletes who produce the product of highly marketable sports. The Blue Sky, of course, is the athlete's birthright in a free economy

since indentured servants have been outlawed for hundreds of years. The players are denied their basic right to the free marketplace through the draft process and congress and the judicial system not only enable this economic travesty but also put their stamp of approval on this – Black dicks and Jewish brains. Look at David Stern shaking hands with the draft lottery winners. A Jew emasculating the Black man, in broad daylight, completely without remorse or conscience. You can't make this stuff up. The real configuration is more comical than anything I could come up with through fiction. Of course the commissioner of the NBA does not have to be a Jew, he just happens to be one. Do you believe in coincidences Honey?

"I used to."

"The number of ways the owners screw the players and the fans defies imagination. Contracts that can be terminated if the player doesn't make the team like in the NFL, the salary caps, free agency that means "free" to negotiate with other owners in the inside club of owners, trading among teams, cycling players through the system so salaries stay low, exploiting injuries and the inherent injury rate in sports, moving franchises to new cities, requiring expensive facilities from local communities, but they all support the United Way and won't allow pot smoking."

"I want to set up a sports authority that regulates all sports, from adolescent to professional in the athlete's best interests. I think Condoleezza Rice is the person to head up that task. It will give her a chance to redeem herself from the horrible Bush legacy. She is deserving of that second chance. One thing I like most about Condy is that her parents were teachers. What she has done on behalf of the Bush administration is horrible but I look forward to her making a statement how she had lost the ideals of her parents and became a pragmatist. Her greatest tribute was the interest in her undergraduate course at Stanford when she was an assistant professor. Teachers who engage the minds of our youth are to be cherished."

"Of course the Players Owned League means the players are the owners. They divide the gross receipts among themselves. They will not need sports agents who are nothing more than parasites now. All they have to do is divvy up the pie and manage the business. In the Players Owned League each player is auctioned off in an open auction market every team can bid on. Also anyone without a contract will be auctioned off in an open market. This fair process will replace the draft that denies athletes access to a free marketplace for their services. All teams will receive the same fraction of the league's gross receipts, so all will be on an equal footing in bidding for players. An athlete can enter the draft at any point of his or her career. If they accept a contract they will still have the option to play out their college years. All athletes would have five years of eligibility to play at the college level. This way the athlete can go for his best deal at the best time he or she chooses and still stay in college and play college ball. The athletes' assets would be placed in a trust until he or she graduates college. He or she would be able to build a home for parents or relatives but not have access to the funds other than that. College football and basketball will be elevated to a much higher status by doing this. It reflects the fact you should spend four or five years in college and get a degree as the best path through life for many transparent reasons."

"Two important changes need to be made in the college football and basketball playoffs. We need a 16 game single elimination tournament in football with the first round games eight bowl games. This would guarantee those bowl games are extremely attractive for fans, are sold out and have large TV audiences. For the quarterfinals and semifinals the games are played on home fields with the higher ranked team having home field. The final would be played on neutral turf.

Imagine it, the college Super Bowl on Saturday and the professional Super Bowl on Sunday. The change that needs to be made to college basketball, after getting all the athletes to play a full four or five years at the college level, is to make March Madness a 36 team tournament, with eight teams in a one game play in for round one, the next four rounds best of three series, and the finals a best of five series. All games would be played on the team's home courts. The finals should be played 1–2–2 meaning home, away, away, home, home."

"These changes would make the college football and basketball playoffs the greatest sporting events possible. Eventually college football and basketball will become international and the playoffs will be elevated to World Cup status."

"How smart do you think I am compared to you?"

"It's very difficult to assess the attributes that make man man and woman woman. Your capacity to nourish a child is far greater than mine, although if he or she needs immediate surgery in the ER I could do that with no problem. I imagine I would have performed Christian Barnard's first heart transplant in either an earlier life or the first brain transplant in a future life."

"Back to the Players Owned League. Why haven't Jesse Jackson, Louis Farrakhan, and Walter Williams demanded that for years?"

"They just haven't looked at the problem properly. But once they see my plan they will embrace it and enforce it, as is their hereditary right to their special abilities."

"What are we going to do when we arrive in Anchorage?"

"Get some 1 and ¼ inch thick T-bones and grill them on my Weber with Kingsford charcoal. You can make the martinis."

"You know David you have one fuck of a lot of fucking imagination. How can you be so fucking arrogant as to say inspirations are of no value since they are practically coming out of both ends when in fact that has to be your fucking life-blood?"

"That's why I am so in love with you Honey, because you can see things like that."

"I look forward to bearing our children."

"You know I have always approached life as a military operation, where strategy and forces were the utmost, from the position of a chess player, in total and perfect command of his forces. But I also love poetry and art so share the act of creation with the artists."

"Did you know I recognized your optimal proportions, waist to hips, at a glance?"

"What do you think the ratio is?"

".67, a little bottom heavy."

"Do you recognize the whole world that simply?"

"I do. It is the greatest gift of God almighty, the ability to reason quickly."

"Are you really going to put your brain in a box and sell it to the world?"

"I am going to do that but it will never detract in anyway from our relationship. All those brains in a box will start out with no memory, just like infants, and will have to learn, so each will be unique and will furthermore follow us in time. I'll put your brain in a box too if you'd like. Then we could communicate for the rest of time although that looks to me pretty unsatisfying since sex is so important."

"You can probably design an input/output device so the boxed brains can achieve orgasm."

"I'd have to put a governor on yours."

"Very funny David, would you want to include our children and grandchildren?"

"Maybe, if every human alive today donated a DNA sample so their brain could be built in a box it would be a good thing. It would teach everyone the meaning of genetics and diversity if nothing else."

"How do you want to raise our children?"

"Teaching them games will be my most important contribution. I am going to start out with Pick-up-Sticks and checkers and end with go and chess. I actually haven't decided if go should come before chess or after. Gambling games like blackjack and no-limit Texas hold'em will be highlighted. Somewhere between checkers and chess come a host of interesting board and card games; Monopoly, Risk, Stratego, Clue, Life, Backgammon, Scrabble, hearts and bridge. In games you have both the elements of determinism and of probability, rolling dice or shuffling cards, analyzing hands. The intellectual repertoire could not be richer."

"Are you a game inventor?"

"I am. It's really all just a game although the consequences are quite real and sobering. My design of a world government and fair taxation policy are exercises in game theory."

"How much TV do you want our children to watch?"

"I would say none but I know I must be wrong on that. What do you think?"

"We'll work on that Darling. Sesame Street is pretty good and my cats have watched bird profiles and my dog dog's profiles on TV so I'm sure it is a lot more than what it seems it has become today."

"Do you have peers Honey, and what do you think of their intelligence relative to your own?"

"I have had peers all my life and consider all of us in a narrow band of high intelligence."

"Do you know what population genetics says? It says geniuses are more numerous today than previously, due if nothing else to the size of the human population, and everyone else is a technician of no important consequence."

"Do you think I am a technician of no important consequence?"

"I respect your spirit to be as consequential as mine, net of my being eighteen years older than you, but in accomplishments you are only a technician of no particular consequence, that only due to how many geniuses there are and have been in science and math. But that's also why science is so easy to learn. There are only a small number of important contributors."

"What do you think your rank really is and mine also?"

"1 and 8."

"Are you really one?"

"Number one in accomplishments, and astonishingly without peers, in the small fraternity of Newton, Maxwell and Einstein. In innate God given ability maybe in the top one or two hundred, much higher in science and math, and much lower in verbal. You have not much rank in accomplishments, but I think could be around 8th, about as high as a woman can get. In the unique and stochastic experience of life I am singular. So genetically I am not the smartest person. I am pretty sure the smartest human is either Kasparov or Witten. Newton never got laid, Maxwell was five feet five inches and died early in life at 48 and Einstein was ugly, so Honey I guess you're lucky to have settled for me."

"Then you think I have more intrinsic intelligence?"

"That's correct but I can beat you in chess because I am better suited to simple designs, like the building blocks of physics. If you can beat me in chess it will be by being stronger in openings. If I can get to a middle game with parity I will be able to win most of the time. If I can get to an end game with any advantage at all, just the initiative even, I can win most of the time. How many draws we have will be most interesting."

"Since my strategy for almost thirty years was just reductionism it was a pretty easy strategy to understand, albeit tortuous to implement."

"What do you think our children might be?"

"103% of us on average. That's what I think the evolutionary drift is at the right end of the spectrum of human attributes, the high end for each generation. It's going to be just like climate change. At first you don't think genetic drift is detectable in a human lifetime and finally you realize it is obvious. If we have children the estimated probability is that only a small fraction of our children will have higher intelligence than us, adjusted for males and females. But averages don't mean much in a particular parental DNA configuration. It is possible all our children will be smarter than us and none of them will be and I can't figure that one out yet in terms of molecular genetics. The determination of intelligence given a genome is deterministic, but the genome a child is endowed with is a crap shoot based on chromosome recombination and assortment."

"I can believe you are one but are you just being gratuitous to your woman in saying I am eight?"

"Not at all Honey, you are doing a lot better for a woman at thirty-six than I did at your age, although I had been working on the final theory for three years and had already completed most of my work in biology. Your accomplishments in life are better than mine in stability, character, maturity, patience, and complexity. To be honest, I have never listened to anyone in science, take no one's opinion as a replacement for my own, and in physics and chemistry don't believe I have peers."

"But due to your artistic and generous temperament you will be happy to know my veto power on any of your actions is the last word."

"How do you want to implement that in Degner Scientific and Engineering?"

"Do you want to be CEO and Chairman of the Board?"

"With a lifetime guarantee it's a deal."

"You'll have to decide if we go non-profit or for profit. I would always like to say to the world I am not a millionaire. You know how 70% of the senate are millionaires and all scum?"

"I think you're just a little romantic, idealistic and delusional on that. It's going to take a lot more human muscle to get mankind out of the hole he is in than just your idealism. It's going to take an ongoing, vigorous engagement of the enemy for the rest of time. But I know you believe in an instant of crystallization and are hoping for that in mankind. I don't want you to be hurt if you are too far ahead of the frontier to be embraced. And I definitely don't want you to be disappointed for not saving the powder."

"Growth without taxation looks like the most expedient way to our goals."

"But since you are planning to be ten times as big as the American government in twenty years taxes are the least of your considerations. By the way what are you going to be in Degner Scientific and Engineering?"

"Group Leader Theory. Five votes on the board. The Chairman of the Board has three votes and the CEO two votes so you will have five too."

"Correction, I am going to run Degner Scientific and Engineering with 100% control. You can just whisper to me what you want me to do in bed at night, and Saturday and Sunday morning, and then I will go out and carve up the opposition during the day for the rest of the week."

"You know David how easy you were for me. Think of people who are going to hate you and want to fuck you up. Now you were easy for me so what do you think I will be able to do to your opposition?"

"You have been increasingly disillusioning me about doing theoretical science since we first met and in the last half hour have pretty much killed off my desire to be a theoretical physicist. But

you have highly complimented me saying you think I could be eight. It's pretty obvious only ones count and not even all of them, only some. Now think of this Darling, you know I have no problem with scales of any magnitude, from smallest to largest, you know I am going to be utterly ruthless in obtaining your dream and mine too, and I think you know I perceive you better than you perceive me so far, since I have asked most of the questions and you have had the easy part of just being honest and telling me what you think. Now in the real world you have to deal with a diverse spectrum of possible scenarios on a daily basis, each requiring a poignant response. In that world of confrontation I can play a good game, stronger than yours because of our attribute specialization."

"My background in finance and security markets is my weakest area. You know how a market should work perfectly. I am very interested in your knowledge of marketplaces and economics. I know both of those areas are somewhat unknowns, but your eMaam solution is seminal, not only for commerce but also for a security and a terrorism solution. I would like to fight on all those fronts and always want you to just be a doctor, providing scientific solutions to disease in mankind. That is your highest obligation. Just leave the rest to me Darling. I will run a lean, mean, efficient economic machine to maximize the long term benefit to mankind."

"All I am is a country doctor and a Lutheran pastor's son."

"As an introduction to finance and economics let me firstly point out only free enterprise with unrestricted competition emancipates mankind from economic exploitation. You can't get a fair price without competition. This is due to the oldest of man's animal instincts, exploiting other people to acquire more wealth and the smarter you are the better you are at it, so the smart exploit the less smart. In all markets you want order while at the same time allowing the market forces to be fully reflected. So there are a few simple rules for marketplaces so that their conduct is orderly. You want transaction costs minimized. I eliminate all transaction costs for all economic transactions with the efficient Market and asset manager and the bid/ask spread in auction markets is shaved to zero. I'm all for the Amazon's, Costco's, Wal-Mart's, Home Depot's and Fred Meyers. They are at the cutting edge of retail sales."

"Would the number one ranked chess player want to play the eighth ranked player in a world championship?"

"As Bobby Fischer wryly quipped about playing a woman, he could give up to her a knight and win."

"You couldn't give up a knight to me and ever win."

"I'm glad you can fully realize the determinism in that. Do you want to play chess with me on a serious basis?"

"I would like to do that. Is it hard for you to do?"

"Playing a worthy opponent in a first to twelve and a half series is a very difficult and trying experience. When after carefully analyzing the board, you make a single response, it is pure determinism, an act of only rational strategy. Do you think you are good enough to play with me?"

168

"I'm looking forward to defeating your fucking arrogant ass."

"Good luck Honey, you may end up wondering if you even have a brain."

"Am I ever looking forward to a championship match."

"But Honey after only one game you will perceive my superior intellect."

"That's just your psychological bluster and doesn't intimidate me in the least."

"But will you ever know if I let you win to mollify you?"

"Likewise sire, how will you know if I am just putting up a good fight but letting you pummel me in the end?"

"Well OK Darling we each have our mission. You will be devoting your maximum ability to fighting disease and I will be bringing big oil into tow, the biggest bunch of white men playing the old boy network and fucking everyone else in the history of mankind. But we have to always remain poets, even in the agonizing depths of mortal conflict with the enemy."

"Heidi you are a fertile loam
for you I devote this poem
with you I will grow
in you I will sow
let us in our union consummate
mankind's emancipation from checkmate."

"A sorrow in our gut from the beginning of time
Will it ever end?
the pain I feel is shared
the evolutionary source obvious
finally, a time to heal
and to make it last forever."

"Honey we are coming up on the Teslin River Bridge. It's a mighty span and there is a nice gas station and store on the other side. We'll stop there, gas up and get some tea. I have crossed this bridge alone six times, each time with the difficulty of being alone, in the far north of the Yukon Territory, on an impressive bridge where you always realize your loneliness and precariousness and find yourself facing the future with uncertainty but getting over the bridge each and every time."

"This is an impressive bridge. When were the last two times you have been on it, presumably in opposite directions?"

"In late March 2003 I was psychotic and driving down the Alcan when I crossed the Teslin River Bridge in the cold of winter. In late June 2003 I was returning, sane at the time, in a small interval of time, becoming psychotic two days later, and very lonely."

16 Teslin to Whitehorse

We stopped for peach tea and headed out on to Whitehorse.

"The devil is in the details David. You and Einstein can afford to be aloof but almost no one else has that luxury. You know how I went for complexity, studying ecology as an undergraduate at Harvard, in particular human ecology and anthropology, and worked at the UN for almost nine years? That's because almost everyone else other than a few theoretical physicists, a few mathematicians and a few poets deals with complexity. Your seminal works in science and technology are simple and do underlie complexity in the world we live in, at the highest level the societal structure of mankind, but are essentially the products of a child like, although not childish, approach to life. It's a good thing you met me and I will manage Degner Scientific and Engineering. You need protection from people who would exploit you and fuck you just as a natural act of commerce and easy target. I can manage all those assholes, parry the attempts and inflict mortal wounds. I'll let you do the coup-de-grace over steaks and martinis the nights before I harpoon the swine. Honey let's not have steaks on those occasions, let's have grilled pig."

"I love grilled pork. So many mustards go good with pork."

"What is your favorite mustard Darling?"

"You tell me yours? I'm getting tired of answering all questions first."

"Grey Poupon Dijon first, French's yellow second, Plochman's Natural Stone Ground third and all Inglehoffer varieties."

"We are in perfect agreement. I love the little Inglehoffer 4 ounce jars. But you left out Gulden's spicy brown mustard."

"Actually I just wanted to see if you would add Gulden's to the repertoire. I love Gulden's spicy brown."

"You know how a Queen Bee or Queen Ant rules the colony, only selecting lucky workers for sex? What do you think of me and also my bringing that image to your imagination?"

"As long as you don't have me under chemical control that sounds OK. Since the X chromosome obviously preceded the Y chromosome I guess it is nothing more than the culmination of evolution."

"I think women can actually be far better than men at many functions, including running a company with our aspirations. I know there haven't been very many of them in the past but remember Euler and Bach, with thirteen and twenty kids respectively, albeit each with two wives. How could their women even do anything intellectually with such a biological burden? Release that burden with birth control and abortion and you will find out what women are really capable of."

"For a long time the only question in football was if the Black quarterback could be better than the white quarterback. I never really knew for sure but it now appears the white domination at quarterback is here until we genetically engineer better athletes, a process always going on in naturally occurring breeding but in the future also will be genetically engineered, if by nothing more than sperm and egg selection by parents."

"I agree with you and it never bothered me that dumb women got into medical school ahead of me, I always thought the medical school gender make up should be 50:50. And it never bothered me so many Jews in New York got into medical school since everyone who did I thought was deserving of admission. As for Blacks or Native Americans getting into medical school with inferior records and scores it is a totally different story although I am glad to say that any of them who graduated medical school can do an excellent job and are deserving to be a doctor. We just need a lot more doctors in the world and a fair admission policy for everyone."

"When psychotic and under so much stress I wanted to die as relief I thought of an African woman on the desolate, parched, starving plains of Africa with a child dying of malnutrition and thought she was under far more stress than I will ever realize. I've found the two worst stressors, net of a stroke, cancer, emphysema or debilitating depression are being alone and financially pressured. Now think of a single Black mother in America, trying to raise her kids alone, obese, type 2 diabetes, isn't getting laid, living on welfare. She has some of the worst stressors there are. Do you think women deal with stress better than men?"

"Some stresses we deal much better with and some stresses require a man's shoulders to bear and some stresses can only be borne by a man and woman together."

"Do you think gender bias should be applied across the board for graduate school admission?"

"No, just for medicine since medicine requires equal contribution from both genders but no other profession shares that fundamental gender nature. For public school undergraduate admissions you should use quotas reflecting the population demographics. This reflects the fact that what most people learn in the college experience is about life and friends and making connections, not the supposed intellectual material. That college experience should be offered to everyone equally so public schools should have quotas at the undergraduate level. Private schools can do whatever they want as long as they state what their admission criteria actually are so no one needs to waste time or money to apply if they don't meet the admission criteria. The simple fact anyone can go to a community college for two years and go to the top anywhere in academia is ample proof of the opportunity available to all young students today at minimal cost. All admission to graduate school should be solely merit based net of admission to medical school for women. But we don't want our graduate schools full of Indians and Chinese. I really don't know how to handle that problem any better than the state of Tennessee that limits foreign graduate students to 20%."

"The supreme court really has that situation totally fucked up."

"Lawyers have no useful intelligence."

"What do you think of the George Bush's who get into Ivy League schools but have no brains?"

171

"I knew some of those spoiled brats at Cornell. Their egos are without any support so they are really funny to observe. W should be a grocery store manager or Costco manager. That's his intrinsic rank."

"Do you think leadership is both genetic and in short supply?"

"Manifestly so, leadership is genetic and it is in short supply."

"Do you think the experience of being one of the dumbest students on campus in some gutless major teaches them an important lesson?"

"Looking at W and Cheney it looks like they take themselves pretty damned seriously and didn't learn a damned thing. They represent the worst of America and are destined for the junk heap."

"You know what I hate more than anything else? The euphemistic use of the word freedom, like when W says the troops, who can't even relax after a hard mission with a few beers, are fighting and dying for my freedom. I don't have freedom and I have never had it in America. I think a politician who uses the word euphemistically should have his or her tongue cut out."

"You can't imagine, although in thinking about it I guess you probably can, how my mind is generating ideas to fight this seminal war at the end of which the common man obtains the means of production, a victory for both socialism and free enterprise. Since I know you will inform me of any important elements of strategy in our before-sex conversations I am sure you will really only be pleading for mercy."

"You're not ever going to be abusive of me are you?"

"Never Darling, never in the most paranoiac dreams of your imagination."

"Honey in the last half hour, and increasingly so since we have met, I realize my limitations. You are welcome to be the Queen Bee or whatever it is you want to be, just please don't be a praying mantis, the female of which bites off the head of the male after copulation.'

"You've got a great imagination David. Symmetry is the highest embodiment of art and art imitates life."

"Let's listen to Miles' Sketches of Spain. It is my favorite and will take us to Whitehorse. You're going to love the Edgewater, downtown Whitehorse, great food, great bar, and long beds."

I put in slot four Sketches of Spain and we listened for 45 minutes without talking.

"Are you ever going to want to cheat on me?"

"I am a man Honey and I have to confess there are a few string theorists whom I want to have sex with."

"Would you do it if it hurts me?"

"I could never do that."

"You are eighteen years older than me David. If you want to pay back a few string theorists it seems basically OK. Wait until I am pregnant and don't' tell me anything about the experience. Correction, I will want you tell me everything about the experience, which prospect might make you want to reconsider such an action, or might turn you on, but we always have to be completely intimate about everything with nothing, not even a little seemingly insignificant morsel held back."

"Do you want to ever cheat on me?"

"I would rather die."

We took a right off the Alcan into Whitehorse.

17 Whitehorse to Destruction Bay

It was 10:13 AM and we were entering the Alcan north outside Whitehorse.

"Wasn't the Edgewater nice?"

"Just lovely."

"We're 752 miles from Anchorage. We can do it in one long day of driving or two short ones. We can stay in Tok, about halfway or we can just drive a long day to home."

"I would love to walk up the steps to your condo tonight but if we want to rest overnight in Tok it is OK. But it would be fun to drive with you through the long northern day all the way to Anchorage"'

"Lovely Honey, the drive from Whitehorse to Anchorage is the most inspirational on the Alcan. From Haines Junction to the border is a legendary stretch of highway. Going around Kluane Lake will move your soul, as it has always done mine. We'll stop at the Talbot Arm Motel in Destruction Bay and I will tell you about one of the funniest experiences of my psychosis and have a great pizza. If we decide to get drunk there and stay for the night it is convenient striking distance to Anchorage. I love Destruction Bay, Yukon Territory more than anywhere else in the world."

"Darling what do you think a female rank eight will be able to do to the Philistines?"

"I'm hoping for their ultimate destruction Honey, is that what you are also thinking about?"

"That's exactly what I am thinking about Darling."

"The most intractable problem in the world today is the Jew/Arab divide. It is the only conflict in the atomic age that could ignite all out nuclear war. What the Jews have done to the Palestinians is shameless and they are going to have to confront the fact they may be forced to leave the Mideast and create Zion on land they can buy. The Arabs are going to have to confront the fact that since they lost every war with Israel and resorted to terrorism in desperation, a desperation fueled by so much hatred it is almost difficult to fathom, the kamikaze thing, that they may lose claim to their thought of homeland. That will be the first issue on the agenda for the world government. There are three possibilities; the Jews leave the Mideast and form Zion somewhere else, the Palestinians lose any right to the territory of Israel, or there is a two state solution."

"What's your opinion?"

"The Jews have to leave. Can you support that?"

"Convince me you are right and I will"

"At the turn of the century there were 30% Jews in Palestine, then part of the British commonwealth, over which the Sun never set. The Zionist movement started in the late 19th century. Jews started to migrate to Palestine, back then there wasn't anymore mechanism to

174

prevent invasion by foreigners than there is now in America. After WWII the real invasion began. All the desperate Jews left in Europe invaded Palestine. They knew they had never been welcome back there for hundreds or thousands of years. They came armed for bear. Three months after the UN, without a vote by the USSR on the Security Council, established Israel as a sovereign nation, Jordon invaded and lost the war. Now to be able to defeat an existing army as a newly emergent nation is quite difficult to do. It requires not only superior intelligence but foresight. Those damned Jews when invading Palestine from Europe were already planning for a military confrontation. Americas support for Israel, our armament of them over these many years is an immoral act of violence against the Palestinian people.'

"Why did and do the Jews do that shit?"

"You know what the damnedest thing about the Jews is?"

"I'm looking forward to this."

"They'll never admit they're wrong."

"A lot of people are like that, even everyone to some extent."

"You're right, it is a question of degree since that sentiment is in all of us and required for survival. But the Jews are far and away the smartest gene pod on the planet, even far more dramatically than Black athletes in sports, and due to that high intelligence believe they are always right. A side note about Jews: Not only do I know male Jews are ugly I will prove it genetically in a few years through DNA sequencing and analysis. All you have to do is take a glance at Einstein or Alan Dershowitz and you will know I am right. Einstein was a pretty good physicist and Professor Dershowitz is perhaps the best lawyer in history, very representative of the Jewish males."

"But maybe the Jews are always right."

"I investigated that possibility and found it preposterous, just because no one is always right."

"Well proven."

"And the Jews accept no responsibility for anti-Semitism. It is all instigated by others without a rational basis. And they hold a grudge like no one else on the planet. The Ivan the Terrible debacle was heinous. Ukraine-born John Demjanjuk, a retired US car worker, at 68 was found guilty of Nazi war crimes and sentenced to death by an Israeli court. He could only have been twenty-two or three at the end of WWII. Only the Jews are capable of doing stuff like that."

"My younger brother thought my Dad hated the Jews. I know he, like me, was incapable of hate and could turn the other cheek, but in no way timid about defending his territory. Now it is a little unfair to attribute the Jew's problem to the character traits just described. Almost all white people will take advantage of someone and exploit them given a chance. And so would most Blacks. Some of the best at economic parasitism are the Korean grocers in Southcentral LA. The entertainers have been exploited as badly as the athletes. Even Motown exploited its performers.'

"Do you think Dershowitz will think you are anti-Semitic?"

175

"I do, but he'll be in for a fight. The first question I'll ask him is "Were the Jews in Germany to help them milk their cows or help themselves to German milk?"

"You know Honey if I have to threaten mankind with a biological weapon to rectify the intolerable world situation, and the world wins that war and defeats me, and I am facing trial in a court with my life on the line I would like him to defend me."

"Would he do it?"

"Absolutely he would, much to his credit, and I can confidently say with a smart lawyer like Dershowitz I'll be able to beat any rap."

"I agree with you Darling, that's how he looks at lawyering. If you were a surgeon you would operate on anyone who needed you without any regard to any other issue. That's just professionalism."

"Exactly."

"Would he additionally see you as a misdirected idealist, preferring the safe sanctuary of pragmatism, the Jew's favorite politics despite their claimed spiritual beliefs?"

"To not get on board with Jesus is a stain on the Jews that cannot be removed. Jesus and I are idealists."

"I wrote a Natural law for mankind when psychotic that was only a page and a half. I would love to have that back more than any of the other work I lost when psychotic, with the possible exception of my psychotic poetry. By the way I lost as much work when psychotic as I have done when sane. The legal system is so much in need of a complete overhaul it is now beyond ludicrous. If you are a lawyer you don't know enough about the principles of design to be able to design anything of utility so first kill all the lawyers. Fortunately, we don't have to kill them. All we have to do is perform the tasks they do in a far more efficient way and at a huge reduction in the cost to society of doing those functions. First take lawyers out of all economic transactions. That includes everything, contracts, real estate transactions, all everyday commerce and divorce settlement's, make it so they have nothing to do with any financial transaction at all. This is easily accomplished by the eMaam. Not only allow but require all evidence be used in every case. All criminal cases are nothing more than elementary science and elementary logic. That means all cases can be resolved by an intelligent person in short order. Guilty beyond a reasonable doubt really means or should mean probability one of guilt. That is an easy probability to determine. Zero is also an easy probability to determine. The probabilities between zero and one are impossible to determine but don't have to be determined. If the estimated probability that you raped a woman is 90% you are not going to go to jail but are going to be under scrutiny including surveillance by the local police. Say a man has three he said she said incidents in a row. The probability cannot be one that he is guilty, but it is probably damned close to one depending on the circumstances and the woman involved. So a simple rule will ensure a level of justice beyond prison. Every woman who brings a charge of he said she said against a man gets her day in court. At the end of the trial, whose outcome in the absence of new evidence or a courtroom confession is known, the man will be released, the probability the accused rapists is guilty is estimated. The trial and the estimate of guilt are public information

and will be distributed by all news vehicles including an Internet web page with good photographs and a detailed life history. Since many people will know the evidence the accused rapists will be under a societal microscope. An individual with three he said she said trials will not be talked to by anyone, will not be employed by anyone and will starve alone with only medical care provided by society. The option he will have is to voluntarily enter prison where he will be able to have as normal a life as possible given whatever physical defect caused his serious problem and we must always remember that he is possibly innocent."

"How do you literally get rid of the lawyers?"

"Quite simple actually, just one rule. The judge is only interested in one thing and pays no attention to anything else. All he is concerned with is truth that also means full disclosure. The accused can represent himself or herself or have anyone else represent him or her. No law degree is required. The only determination that has to be made is if the person has a probability one conviction, a probability zero that is vindication, or somewhere, unknowable exactly where, between zero and one."

"We need a three-tiered system: the first trial by twelve random jurors, an appeal to a trial by twelve PhDs and or MDs and or JDs, and the final appeal to the world court that uses three ways of counting a person's vote. I'll describe the world court later."

"You know what the rule for defining real work will be in the near future?"

"What's that?"

"The basic rule will be if you don't work with your hands you are not necessary.'

"In that scenario the surgeon will be the highest paid, followed by pilots."

"I mean work with your hands both literally, like you just described, and figuratively, realizing a good judge works with his or her hands."

"Do you want our children to be surgeons?"

"Yes."

"It's not as much fun as theory, that is really only daydreaming in rigorous mathematics, but if the theory is all known I guess being a surgeon is the highest application of human talent."

"I am so moved by Michael DeBakey; he epitomizes my earlier in life goal to be a surgeon. But I wanted to quit surgery in my early thirties and work on theory. When you read a tribute from one of his patients you cannot but appreciate the dedication and hard work of surgeons. By the way Honey, in addition to being the best mechanic in mankind's history I have some of the best hands of anyone ever, remember that incisions and stitches are put in by the mind, not Chinese seamstresses, who are far better at cutting and sewing. I hope I can meet Doctor DeBakey and take a close examination of his hands. He is almost a hundred."

"I was never inclined to be a surgeon so can only speculate about those who do. But I do hope our children inherit your hands and become surgeons. I totally agree they should be the highest

177

paid by the hour in society. When I think of a scum-bag lawyer charging as much or more than a doctor I want to puke."

"Honey we are at Haines Junction. This right hand turn leads to the most interesting drive in the world. We'll stop in Destruction Bay for lunch. How does pepperoni, green pepper and black olive pizza with extra cheese sound? We will be able to have it all the way to Anchorage."

"That sounds great. I'll be ready for a cold one."

"Are all lawyers defective in quantitative skills, common sense and design ability?"

"Rather astonishingly they are. It is no more than a temporary box canyon for us in the developed world. They'll all be dealt justice in the near future, if only because the common man has so much common sense. The guillotine was a great invention, albeit now we only use it symbolically. Can you imagine that the French peasants were chopping off the heads of the aristocracy and the ruling class only two hundred years ago, contemporaneous with our revolutionary war?"

"In the 1918 revolution in Russia they even killed the Czar's children."

"By the way, why do you think the Russians are some of the best chess players with the notable exception Bobby Fischer?"

"They're smart people, very fine. Leningrad's survival of the siege on their city by the German's in WWII, the greatest siege in modern military history, is truth of what spirit, resolve and tenacity they have. Stalin was of course the worst of the worst, even as bad as Hitler. But when I look at what the Clinton's and Bush's have done given the vision and capacity of America, these fifty years later, at this juncture in time, the beginning of the 21st century, I don't find them equivalent in evil but I do find Bill and W evil. It has to do with killing innocent people. If you say we have minimized the death of innocents and they are acceptable collateral damage then we also become terrorists. That same view of collateral damage can be applied to offensive military actions like preemptive strikes but from the point of view of those attacked. They might consider W acceptable collateral damage. They might consider everyone in America acceptable collateral damage."

"Would you really like to meet Bill and W in an alley at dusk, alone, and just kick the fucking shit out of those assholes?"

"Oh Honey if I could be seventeen again I would enjoy doing that more than anything. My only fight after seventeen was with a spoiled rich kid asshole engineer frat boy whose woman I stole at age twenty-one. It's almost hard now, realizing my intellect, to remember what a Cassius Clay I was in my youth. What do you think W and Bill would think of that?"

"They're damned lucky you're not seventeen."

"You know what the most fun is going to be?"

"You doing W and Bill with a 40 oz and no Vaseline?"

"We're on the same page."

"There are only really two kinds of minds – dirty and clean. I like you have a dirty mind like mine. It seems more natural to assume in life, if not required."

"You're going to have to step in for Hilary. I'm a little squeamish about ass fucking other women."

"It's just duty that I can perform with reliability and repeatability, always maintaining honor."

"Do you see a flaw in if you build nukes we will nuke you?"

"It's all part of the absurdity of MAD, they are all just lunatics."

"What was your grandfather on your Dad's side like? All I know is he was Lutheran pastor?"

"In the normal sequence of things you interpret your parents through your grandparents. Unfortunately, since my Dad is dead our children will be denied part of that experience. My grandfather's parish was in Hampton, Nebraska, out in the sticks, with farmers. He spoke German as his first language as did both my Dad and Mom. When people talk about language assimilation and making the English language the official language in America it is fairly amusing. My Dad gave sermons in German almost until he died. My mother forgot German in high school and her only adult language has been English. Lutheran pastors must learn Greek and some of them also Latin and Hebrew. My grandfather, Hugo Degner, was very good with his hands. He could split an apple between them, a fairly large torque. He had a collection of Popular Mechanics from the first issue. My grandparents had great games to play. They liked Gunsmoke on Sunday nights. I never had any intellectual discussions with him because I was too young for any of that but always looked forward to their presents on Christmas and my birthday. They gave me a book on American Indian Lore that sticks to me to this day. They had eight children, six boys and two girls. He was very good in working with wood and had a nice shop. But he always seemed far simpler to me in a way I haven't understood fully until now. It's just the genetic drift. My grandfather was the smartest in his large family, my Dad was the smartest in his large family and I am the smartest in my large family. I realized that very young in life, about 5th grade, and have always felt it as both a blessing and a yoke. Since all I ever wanted to do was to be in harness for the most people it was never really a yoke, rather a sharing of my strength and leadership. I always thought I was the lead dog."

"How many of his children were in the military?"

"My Uncle Paul, who was an electrical engineer, and Uncle Al, who was a doctor, were in WWII, albeit stateside. My Uncle Martin's kids were both in the Air Force, I can't remember if he was in WWII, and my Uncle Hans flew the first jets, the Sabre jet, in Korea, so my grandfather sent three or four children off to war. Hans was the best looking Degner, better looking than either my Dad or me, but not as tall as me and not as smart. He died from an alcoholism related accident at 66 after six years of retirement from American Airlines where he put in 34 years. He flew 100 missions in the Korean War. I liked him, looked up to him and always looked forward to having a few beers with him and comparing war stories, that unfortunately won't be possible"

"Is that the root of naming our first son Hans?"

"It is. He was buried in one of the soldier's memorial cemeteries overlooking the Pacific Ocean in California."

"Would you like to hear a poem I wrote when psychotic about fathers? I have a copy of it in my briefcase. It's titled What is a Dad? It's in the white folder."

"I would love that Darling."

Heidi searched through the briefcase and got it out.

What is a Dad?

Dad's don't give birth
They don't change most of the diapers
They don't nurse
the earliest I remember
my Dad was the disciplinarian
Who taught me right from wrong
good from evil
Although when He taught me
those lessons I was too young to appreciate them
He taught me about guns
hunting, fishing, being in
the woods
Although he taught me early
in life to be self-reliant
In his presence I was
never Alone
He knows every word
going in
has the maturity to understand
the acquisition of language
and knowledge
His harsh tone I always
recognize and acknowledge
No more than intelligent guidance
His punishment I will always
have a memory of
They give away their daughters
and send their sons
off to War
his handshake was
the greeting to manhood
and the hearty welcome back
to Home, to family
after any journey, be it
graduation from 6th grade to

returning from world war
His strength passes on to me,
only when He passes, do you
realize mortality
Although my Mother provides
me Nurture
Only my Dad can be the
guide, It is only him who
can teach me strength
Until I choose a wife
and she becomes my strength
and courage and asks me to
be the Father of Her children
and then all those lessons in
life my Dad taught me will
become the lessons for me to teach
to our daughters and sons.

"It seems astonishing you could do work like that when psychotic. Do you know what psychosis actually is?"

"There are only four naturally occurring, non-drug induced states of the human brain – conscious, unconscious, dreaming and psychotic. When psychotic you can be conscious, unconscious and dreaming, so when you are psychotic you replicate those phenomena. But the psychotic state is really a dream state. In it you respond to absurdities as if they were real. You are emotionally connected to the delusional reality you believe in. I think psychosis is a primitive state and that all lower animals are in a psychotic state."

"Did it require the acquisition of the cerebral cortex to escape animal psychosis?"

"That's what I think is involved Honey."

"So the property of reason that so many have thought distinguishes us from lower animals is related to psychosis and the emergence of a mind that can see itself, the property of insight and abstract thought?"

"Something that fundamental but I still don't understand psychosis fully in terms of biology."

"Do you know anything about a bipolars manic psychosis?"

"You know I don't. I look forward to studying it.

"Do you ever get sick?"

"Didn't miss one day of school ever."

"Propelled by the perpetual motion of the Ö particle and its deterministic nature manifested in the most advanced neural architecture in the universe."

"Do you think aliens could be smarter than us?"

"I think I am about the limit Honey. Anything I haven't figured out can't be figured out, and everything that can be figured out I have thought of, not always in the details but certainly in the principles. Obviously I haven't designed everything that can be designed, design seeking perfection will continue for the rest of time."

"Did anyone before in mankind's history have your perspective?"

"I'm the first human to be able to do that and you are the first human to believe in me."

"I met this guy
at first I thought he was shy
but about that I would never cry
I saw eating him would be sweet pie
he offered me the blue sky
and I extracted from him every sigh."

"I'll put on some Cusco. If you haven't heard of them you'll enjoy it for the first time. This is Apurimac III. It is my Native spirit."

We drove around Kluane Lake without talking, just enjoying the music and the magnificent physical spectacle.

"Destruction Bay coming up."

"We'll pull into the Talbot Arms for lunch."

"Great."

18 My favorite pie

I put the rest of the pizza in the back seat and we headed out for Beaver Creek and the border.

"One of the best pies I have had."

"The north, northern British Columbia, the Yukon Territory and Alaska are very special places. The people are as unique as the geography and climate. The alcoholism rate is the highest in the world. Many Natives are alcoholics. The people of the north are also the most literate and educated on the planet. Malcolm Lowry drinking his daily gin in Under the Volcano was a Canadian and I believe from British Columbia. All people of the north feel a certain bond. And all active and recovered alcoholics feel a certain bond. In those long winters people have a lot of time to think. Now that you have been here can you see what I am talking about?"

"I can now after experiencing all of that for the first time with you."

"Who do you most relate to among the working people?"

"In my youth with a carpenter or a mechanic. In my adult years long haul truck drivers. I shared so many long nights traveling around North America, alone, at the wheel, listening to the radio, thinking, always attentive to the road and conditions, in all kinds of weather, in mountains and deserts, that bond of the road with the truckers is almost sacred to me. I actually thought at one point that moving through the gravitational field at 65 MPH stimulates the mind. In looking at the gravitational flux I now think that might actually be true."

"Driving with you stimulates my mind but I don't think it is due to traveling at 65 MPH through the gravity field."

"What do you think about dog fights and bull fights?"

"It's important to keep in perspective the naturally occurring violence among mammals in Nature. Of course I wouldn't permit organized dog fighting. That being said I actually think some dogs love fighting and almost always engage in fighting that doesn't result in mortal injury, just wolf pack sorting. Dogs do naturally protect their owners and territory. Bull fighting strikes me as fine and also cock fights. I think that when a bull or cock dies in a bull or cock fight it actually crowns their biological destiny. What I would require is that the bulls and cocks after slaughter are butchered and eaten in a festive barbecue after the fight is over by the fans and the matador, with an abundance of beer, in celebration of a biology whose purpose of bulls and cocks is to feed humans."

"What do you think PETA will think about that?"

"It depends on a singular aspect of their behavior, whether or not they eat beef and chicken."

"What fundamental neurobiology do you think is involved?"

"I think animals, with the exception of the primates, have little or no insight, and pain they feel without knowledge of it does not cause suffering, that due to having minimal cerebral and other neural structure required for conscious suffering."

"Do you think fish feel pain?"

"I've been cutting them open live and gutting them my whole life. You insert your knife in the anus and cut the belly right up to the gills. Then you sever the throat at the gills and scoop out all the internal material and wash them off in cold water and hang them on your waders. They are flipping around while you are doing all of that. I've even had trout get away after all that trauma, squirming out of my hand and disappearing into the current without any guts. If someone thinks fish feel pain they have obviously never had those experiences and also know nothing about neurobiology. Jesus Christ, do you know what a live minnow bucket is? Walleye love live minnows, properly rigged."

"When did you first figure that out?"

"Second grade burning up ants as they came out of and returned to an anthill with a magnifying glass. It was obvious some life was not worth having religious or philosophical time wasted on when slaughtering."

"Do you include universal peace, justice, freedom, and liberty and who you are willing to kill in that? Can it include humans who deny you freedom?"

"As I've told you before, I'll enjoy killing people who deny me freedom. But I would only be able to do that if there was no collateral damage, zero, not any. Killing an innocent person is murder, except to the pragmatists, who then are really only terrorists, willing to kill innocent people in an ideological and political struggle. There have been a lot of those bastards in mankind's history. If I killed an innocent person, except in a tragic accident like in a vehicle, I could not live with myself."

"They're all killers right now and all always have been."

"That's why I hate the bastards so much."

"Budweiser is going to have to come out with a 44 oz high-gravity in recognition of what I am going to do to those politicians. What do you think they should name it?"

"Bold Ruler Hi-Gravity will be fine."

"Budweiser Arctic Wild Rose Hi-Gravity with 8.1% alcohol by volume it will be. Are we going to crack a few of those every 4th?"

"You got it, with Johnsonville brats and home made pickles, and Gulden's spicy brown, on a fresh baked Kaiser roll and my potato salad. You know Honey one thing I have spent some time on and am interested in but not yet accomplished is baking breads."

"I look forward to your German Rye."

"With fresh dill seed from home grown dill and sometimes with sour dough."

"Do we need a world government?"

"One mankind, one world, one government, the symmetry is inescapable."

"How would such a government work?"

"I worked it out in my first psychosis in 1982. The world government is implemented over the Internet through eMaam. It will be so easy to vote through eMaam that the voting participation rate will approach 100%. Each individual has one vote but it counts three ways. Those three ways are the country vote, the economic vote and the individual vote. Each independent country has one vote. So if there are 200 countries there are two hundred votes. Each countries vote is determined by the citizens of those countries by a simple majority. Every individual in eMaam will have a vote proportionate to his or her wealth, what I call the economic vote. Then the sum of all individual's economic votes just equals the total private world wealth that is voting. For the individual vote it is a simple worldwide vote. The final rule is you have to win all three ways by 2/3 to pass any legislation. To win the country vote you need a 2/3 majority of how ever many countries there are. To win the economic vote you need a 2/3 majority of the world's voting private assets. To win the individual vote you need a 2/3 majority of the total number of people voting on the planet. And not all legislation is possible, only that legislation that observes universal peace, justice, freedom, and liberty."

"Easy to implement through eMaam."

"Couldn't be easier. You could have one 24 hour period for the planet for each vote, defined on any longitude you want and Greenwich Mean Time will work."

"The most important topic, that would come up in the first few years is territory disputes. Each party would be allowed to present their history to the people of the planet through all means available. A date would be decided on when that dispute would be voted on. You know of course the first dispute on the agenda?"

"Jews/Arabs, what else?"

"You want to know what I propose as a solution to that conflict. The Jews of Israel buy 4 acres apiece in Alaska. Actually I want them to buy Bristol Bay, with the town of Dillingham as the new capital for Zion. It would make the Alaskans the richest people in history. More importantly it would allow the Jews to build Zion, which will be a nation everyone will look up to and value for the contributions to mankind we know they will be able to make. They can build the finest university on the planet that should be called Bristol Bay University. They and the University of Alaska Anchorage will join the Pac-10 that will then become the Pac-12 and the Pac-12 can

185

divide into two six team leagues, the north with Oregon, Oregon State, Washington, Washington State, UAA and Bristol Bay, and the south with Arizona, Arizona State, USC, UCLA, Stanford and Cal. The Bristol Bay University sports teams will be called the Bristol Bay Bay Rams. The UAA Seawolves and the Bristol Bay University Bay Rams would meet every year in the inaugural college football game towards the end of August. The Jews in Alaska could harvest salmon and produce the world's finest lox. It is almost unimaginable what the potential of the Jews is if not drowned in their current denial of reality. Their children will enjoy hiking, biking, camping, exploring, hunting for moose and bear, fishing for salmon and trout and think it is the Promised Land, and that is exactly what it will be."

"What if some Jews go along with that and others don't?"

"Let the Jews that want to leave, leave, and the Jews that want to stay, stay. The Palestinians I'll bet would be amenable to that. The Palestinians only resorted to terrorism as a desperate solution to their very difficult problem. No family ever, no individual ever, has resorted to that kind of kamikaze behavior without provocation that exceeds their capacity to absorb. We lucky Americans have never been pushed to the limit except in the Civil War. That was one bloody son-of-a-bitch. Only extreme hatred fuels that kind of fire. And it is hatred brought on by injustice. But there has never been justice so we have always had hatred. Now, realizing we can all be relieved of the yolk of genetic and physical oppression, we can exult in the Wonderment of God's mighty creation."

"How will issues the world government is going to vote on be put on the agenda?"

"Bubble up. Any individual can propose an issue for the world government to vote on. That issue is posted online and people can vote on it to go before everyone and be put on the agenda for a world vote. There will be various different issues suggested and when one gets to 1/3 in all three ways the votes are counted it goes to a world vote in 60 days. Anyone will be able to propose an alternative to be voted on alongside the first issue elevated to a world vote, again by getting to 1/3 in all three ways the votes are counted. In those 60 days anyone can say anything they want to about each proposal. The different sides can use all the vehicles available to persuade people to their opinion. At the end of 60 days there is a vote on the set of issues placed before the world. Then the world vote at the end of 60 days may be between two or more issues. The rule used to winnow the set of issues down if a 2/3 majority outcome in all three ways the votes are counted does not obtain is that the top 2/3 of issues voted on get set up for a new vote 7 days later, and this winnowing will be iterated until a 2/3 majority outcome in all three ways the votes are counted obtains or all issues are ruled out, defeated. The top 2/3 will be defined inclusively, with an issue that is partly included in the top 2/3 of the vote being included in the next vote."

"What kind of issues can be brought up?"

"Anything that respects universal peace, justice, freedom, and liberty."

"I still haven't figured out if you're a surgeon, a psychiatrist, a physicist, a politician, a Lutheran minister or the Field Marshall?"

"or a complete nutcase I am in love with."

"I want every person on the planet to know my determinism."

"That seems fair. We all have freedom of speech and to not speak out on something you feel strongly about is just fecklessness, pusillanimity and even worse, indifference."
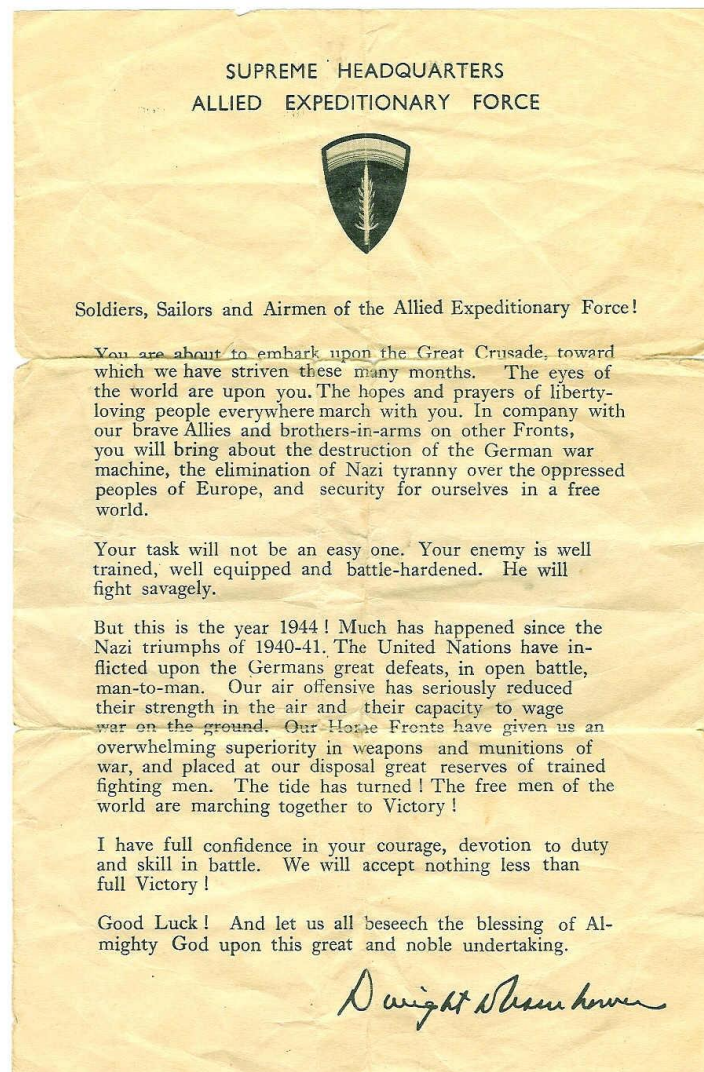
"How many presidents have you thought about?"

"Just from FDR forward, with the exception of Teddy Roosevelt, whom I highly respect. The only presidents since, including FDR, I have respect for are Dwight David Eisenhower and Ronald Reagan. Ike's announcement to the troops on D-day is epic. Have you seen it?"

"I haven't."

"There is a copy in my briefcase. It comes with my Martin Luther King's speech and the 23rd Psalm."

"It's a yellowed copy in the yellow folder at the very bottom of my briefcase."

Heidi filched it out of the briefcase.

SUPREME HEADQUARTERS
ALLIED EXPEDITIONARY FORCE

Soldiers, Sailors and Airmen of the Allied Expeditionary Force!

You are about to embark upon the Great Crusade, toward which we have striven these many months. The eyes of the world are upon you. The hopes and prayers of liberty-loving people everywhere march with you. In company with our brave Allies and brothers-in-arms on other Fronts, you will bring about the destruction of the German war machine, the elimination of Nazi tyranny over the oppressed peoples of Europe, and security for ourselves in a free world.

Your task will not be an easy one. Your enemy is well trained, well equipped and battle-hardened. He will fight savagely.

But this is the year 1944! Much has happened since the Nazi triumphs of 1940-41. The United Nations have inflicted upon the Germans great defeats, in open battle, man-to-man. Our air offensive has seriously reduced their strength in the air and their capacity to wage war on the ground. Our Home Fronts have given us an overwhelming superiority in weapons and munitions of war, and placed at our disposal great reserves of trained fighting men. The tide has turned! The free men of the world are marching together to Victory!

I have full confidence in your courage, devotion to duty and skill in battle. We will accept nothing less than full Victory!

Good Luck! And let us all beseech the blessing of Almighty God upon this great and noble undertaking.

Dwight D Eisenhower

"What do you think about that David?"

"It raises my hair every time I read it."

"I imagine myself in similar circumstances. You are in charge of the greatest military operation in the history of warfare. You know many will die, but you can't consider it, only can consider the kill ratio, their dead against ours. You have to exercise total intellectual comprehension and anticipate the response of your enemy. You must defeat him. He is evil, not you. You are determined to do that. After that Honey it is just tactics, and I do not know the tactics of D-day, but do appreciate it as the seminal battle between good and evil."

"Ike's warning about the military-industrial complex was remarkably prescient. There is no one I respect more than General Eisenhower."

"My favorite lure is the Lazy Ike."

"I liked Reagan a lot. He wrote 674 editorials and I respected him intellectually. I had problems with him when he was governor of California during the Vietnam War, he was on the wrong side of that one, and as a youth found it almost impossible to believe an actor could become president. He delegated authority and was not technically competent in anything outside guns and horses. But he was honest, straightforward and thoughtful. He proposed doing away with nuclear weapons when he met Gorbachev in Reykjavik. He did not understand you can't do away with nuclear weapons and keep conventional weapons, a fact apparent to anyone who understands all's fair in love and war and you can't put the genie back in the bottle. So he was incapable of understanding modern strategy and was in that sense an anachronistic figure. If I could have advised him I believe we could have had universal peace, justice, freedom, and liberty twenty years ago."

"Field Marshall Rommel is your military mentor, albeit on the opposite and wrong side."

"Never studied enough history to know if either I rank with them or they rank me with me, I have just always been trying to figure this son-of-a-bitch out, from elementary particle physics to the final war, that for peace, justice, freedom, and liberty. More than that I can not now consider in my life's journey so far."

"Do you know who the soldiers are in this final battle? The common man, their spouses, their children, their grandparents, every last human must stand up for universal peace, justice, freedom, and liberty and be counted. I call that Clean Sweep."

"This is quite profound Honey, so listen closely to how it works. You must defeat your enemy. But after you have defeated them in battle you have to forgive them but are only able to do that if they repent. That's why the first day of the world celebration is Regret, Remorse and Suffering and the second day is Repentance, Forgiveness and Atonement. The authors of the Bible recognized why that was essential and I do also. So what I mean by Clean Sweep is every single human being is forgiven."

"And add that vengeance is mine sayeth the Lord will be the new rule of retribution."

"Is that no more than reason?"

"That's really all it is."

"When we judge violent criminals we should acknowledge that we only do it to deter crime and to prevent another violent crime. Man does not hand out justice, only God will do that, and all we need to consider is the probability of more violence by an individual. Like I've said it's one serious violent crime and LWOPP."

"I agree with you totally, anyone who has committed a serious violent crime should be locked up for life. You only get one chance in life when it comes to committing a violent crime and everyone has to know that early in life. Of course it must be a serious violent crime and that is not too hard to define. Anyone who actually seriously injures another person by intent must be LWOPP'ed."

"Let's change subjects. Do you know what is required for mental health?"

"You're about to tell me."

"I read an essay in a newspaper back in the seventies, I don't remember the author. It said you could mostly define good mental health by succeeding in four areas: to play, to think, to love and to work. I add to that to laugh, to compete, to be thankful and to act and end up with those eight attributes that can define good mental health."

"That's very nice, simple, all the elements, a little more complicated than Freud's love and work, work and love. Do you think almost everyone is capable of achieving success in those eight areas?"

"Net of organic brain disease I think absolutely they are. That is what has been selected for by evolution, and mankind, the most highly evolved entity we know of, and perhaps a terminally evolved design, should be eminently capable of that. Do you notice how each of those is an inward-looking trait but embedded in a societal context?"

"I do because to play, to think, to love, to work, to laugh, to compete, to be thankful and to act are all things we each do inside ourselves as individuals and also each of those attributes we seek from society at large in our natural interplay as fellow Gods."

"We're coming up on Beaver Creek, only thirty miles to the border. I'm going to put on some Hank Williams for our arrival in Alaska at last."

We listened to Hank for twenty-five minutes without talking. We were coming up on the border. As we approached the Lost Highway was playing.

"American citizens."

"Yes."

"Yes."

"What's your destination?"

"Anchorage."

"What are your occupations?"

"Theoretical physicists."

"Show me your hands."

I turned my palms up to him.

"I can tell you've never done real work. Roads are fine all the way to Anchorage."

"Both of you have a nice day."

"You too."

"447 miles to home."

"Pull off somewhere so I can pee."

19 The border to Tok

"I'm going to take a nap up till Tok."

"I'll put on some Vivaldi."

"Lovely Darling, wake me when we have to stop."

Ninety miles from Tok I thought of the many times I had traveled this road alone. Has everyone had that experience? I thought many people had. I knew well from experience that the most difficult part of life is to be alone. I wondered what God intended for us, here on this lonely isle, in a vast universe, with only reason to emancipate us from being so completely alone, and with only the Laws of Physics to determine our fate. I wondered how it could be I have had such a good challenge before me, one I am born to carry but still having to think about tactics.

I opened it up to 95 on the straight-aways and held 65 on the corners. We were in Tok in a little over an hour. Sometimes you just have to go fast. The Bold Ruler in his splendid F-250 with his bitch snoozing in the passenger seat. What could be finer?

It was 4:13 PM Alaska Daylight Time as we arrived in Tok.

"Honey we are arriving in Tok. We'll gas up, get tea, use the john and next stop Glennallen. Between here and Glennallen on the Tok-cutoff is the Wrangell-Saint Elias National Park. Overlooking it, out in the lonely stretches of Alaska, fourteen miles from the Mentasta Lodge, is where I want to live my life out."

"Will it be on the east or the west?"

"On the east because we'll be driving south."

"Can't wait."

We took a left in Tok, getting off the Alcan and onto Alaska 1, the Glenn highway. Heidi opened a peach tea and handed it to me. I loaded the CD player with Robert Cray, Willie Nelson, Roy Orbison and Buffalo Springfield.

"How many years were you suicidal?"

"Over ten, from using PCP in spring 1975 to discovering the Ö particle in December 1985."

"What do you think of the right to die?"

"It is an undeniable right, one of our unalienable rights as humans. The determination must be made by doctors. But are doctors competent to make that decision? We don't ever want them to authorize the voluntary suicide of a heart broken teenager but we also do not want to propagate incurable pain, either physical or mental. The final decision of to live or die must be left to the individual. What needs to be done is provide a lethal dose like they do in Oregon and also allow those individuals to be organ donors. Since you can recover from depression and mental illness

you don't want a person committing suicide for a medical problem that one can recover from. Suicidal people should enter a mental hospital and be held until they are recovered enough to make a rational decision about suicide. It turns out that some suicidal people are also homicidal. By providing an easy suicide for these people many homicides will not occur and in addition society gets useful organs for transplants. The rule I recommend is a teenager who is suicidal and hospitalized for 90 days and still suicidal at the end of those 90 days should be allowed to commit suicide. At forty the doctor will only have the option of delaying a suicide for 24 hours."

"With the challenges in your life you know better than anyone that recovery from depression and suicidal ideation is possible. I think I would make it 180 days for a teenager and 72 hours for those over forty. Of course one does not want to undergo 72 hours of excruciating pain for no reason so for serious physical trauma the doctors should always have the possibility for the immediate end of life."

"Changing subjects, I am curious, what's your cell chemical computer model you worked on when you were Einstein's age of discovery?"

"You can get the two chapters on molecular biology out of my briefcase. They are in a worn green folder."

Chapter 17 The Nucleic Acid Mainframe

Abstract: The condensed DNA of prokaryotic cells forms a separate phase, the nucleoid phase, surrounded by the cytoplasm phase. NTP monomers flow into the nucleoid from the cytoplasm and single strand RNAs flow out of the nucleoid into the cytoplasm. I call this vectorial flow process the **nucleic acid mainframe**. While inside the nucleoid the newly synthesized RNAs cannot fold to form secondary and tertiary structure due to restriction by the DNA matrix. At the surface of the nucleoid single strand RNAs can fold to form secondary and tertiary structure and interact with proteins and ribosomes in the cytoplasm. I call this dynamic surface region where RNAs are folding and interacting with proteins the **RNA processing zone**.

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A precise physical description of a cell would be to specify the structure and position of every atom, ion, and molecule and their evolution over time. The position means position in space and changes over time. In biology classical space and classical time are fully able to define position and motion. The structure is the quantum mechanical structure. Atoms, ions, and molecules exhibit two phenomena of primary interest – diffusion and reaction. Atoms, ions, and molecules diffuse slowly to a specific configuration, such as a small molecule to the active site of a protein, and then a reaction occurs fast. Diffusion and reaction are the game of cells.

The most important level of organization of the cell is the phase organization. The definition of phase I use is a region of space that has constant composition net of thermal fluctuations. The information of a phase is the size and shape of the phase in space and the list of concentrations of the component atomic and molecular species. Transport in a phase, in the absence of a macroscopic electric or magnetic field defined on the phase, is strictly limited to random walk diffusion. Transport between phases can be vectorial, non-random, into one phase and out of the other phase. The transport between phases in cells is vectorial.

The gram (+) prokaryotic cell, the hydrogen of cells, is composed of 4 phases:

      1. nucleoid
      2. cytoplasm
      3. membrane

4. cell wall

Cell phases have different inside and outside surfaces. The nucleoid has no inside surface, it is at the center, and has a nucleoid/cytoplasm interface. The cytoplasm has an inner interface with the nucleoid and an outer interface with the inner membrane surface that are different. The membrane has inner and outer surfaces that are different. The cell wall has inner and outer surfaces that are different. So there is organization over and above the strictly phase definition. This enables and reflects vectorial flow of ions and molecules between phases.

A fully quantitative description of the nucleoid can not yet be made. The size and structure of the nucleoid, the DNA supercoil density and dynamics, the DNA helix/coil equilibrium, the number of RNA polymerases, the number of H, HU, and polyamines, the role of protein/DNA binding, protein/DNA bending, DNA/RNA hybrids, triplexes, etc., are not known with quantitative precision. It is a complex system. In this system resides the Turing machine of life. The DNA, the finite one-dimensional list of the Turing machine, is searched to determine a transcription profile. The transcription profile is simply the list of RNAs being synthesized at an instant in time. What is the spatial/temporal description for this system?

What is the composition of the nucleoid? Ions, small molecules, proteins, and RNAs partition between the cytoplasm and the nucleoid. The replication machinery and transcription regulatory proteins are in the nucleoid but here I am going to ignore them. Leaving out the replication machinery and transcription regulatory proteins the composition of the nucleoid is a relatively simple four part system composed of DNA, RNA polymerase, NTP monomers, and freshly synthesized RNA single strand. The RNA polymerase holoenzyme, $\alpha_2\beta\beta'\sigma^{70}$, is big, $100\times100\times160$ Angstroms, and massive, $450KDa$, the same mass as ~ 680 basepairs of DNA. There are 10^{3-4} RNA polymerases per nucleoid. A significant fraction of the volume and mass of the nucleoid is RNA polymerase. In an E. coli with 3000 polymerases and 4.6×10^6 bp of DNA the mass of the RNA polymerases is 44% of the mass of the DNA. Because the polymerase is compact and the DNA is extended the polymerase is a smaller volume fraction of the nucleoid than mass fraction. A typical bacterial nucleoid contains 10^{6-7} base pairs, and 10^{3-4} genes. In the nucleoid are several types of DNA-binding proteins and small molecules such as H, HU, and polyamines that stabilize supercoils. In the nucleoid are the topoisomerases that put in and take out supercoils. In the nucleoid are the dNTP and NTP monomer pools. Mg^{++} is in the nucleoid counterbalancing all the phosphate negative charge. Not in the nucleoid are all the translation and metabolism machinery found in the cytoplasm.

The DNA in the nucleoid is often, but perhaps not in all bacteria, negatively supercoiled. Whether negatively supercoiled or not the DNA in the nucleoid of bacterial cells is highly condensed. The forces that give rise to the nucleoid phase are not known. I think a significant force for condensation is that between the charged phosphates of the backbone and Mg^{++}. NTP and dNTP monomers carry significant charge and are closely associated with Mg^{++}. Proteins with positive charge that can interact with the negatively charged phosphate backbone partition into the nucleoid. Typical negative supercoil densities predict supercoils every $100-300$ base pairs. The supercoils are no smaller than 110 Angstroms in diameter. There are on the order of 10^{4-5} supercoils in a nucleoid with 10^{6-7} basepairs DNA.

Where does transcription take place? The RNA polymerases are distributed randomly throughout the nucleoid. Transcription takes place inside the nucleoid at random sites throughout the nucleoid. The idea that transcription takes place on the surface of the nucleoid at the interface of the nucleoid and cytoplasm is not physically plausible. The RNA polymerases open up a hole in the nucleoid DNA matrix and are confined to a fixed position in the nucleoid by contacts on all sides with the DNA matrix. The DNA contacts exert a pressure on the surface of the RNA polymerases. During transcription elongation the polymerase must remain fixed in place and the DNA translates through the polymerase/DNA/RNA ternary complex. The RNA polymerase is very massive so it does not translate, rather the DNA that has low linear mass density must account for the relative motion between RNA polymerase and the DNA. Since the DNA is a helix it must also twist though the fixed polymerase/DNA/RNA ternary complex. Collapse of a supercoil in front of the polymerase/DNA/RNA ternary complex coupled to formation of a supercoil behind the complex allow the DNA to twist through the fixed complex when transcribing in one direction and a vice versa migration for transcription in the opposite direction. The supercoil density remains constant net of thermal fluctuations but the supercoils are moving around on the DNA.

The RNA single strand leaving the polymerase/DNA/RNA ternary complex does a random walk to the surface of the nucleoid. While on this random walk it is prevented from folding by the nucleoid DNA matrix. When the single

193

strand RNA gets to the surface of the nucleoid it can fold into secondary and higher structures. NTP monomers do a random walk in the nucleoid to the polymerase/DNA/RNA ternary complexes where synthesis is taking place. Overall two vectorial flows occur between nucleoid and cytoplasm associated with transcription: 1. NTP monomers diffuse into the nucleoid from the cytoplasm. 2. Single strand RNA diffuses out of the nucleoid into the cytoplasm. I call this flow system the **nucleic acid mainframe**. It is what is called in non-equilibrium thermodynamics a dissipative structure. The high energy of the NTP monomer pools is converted to lower energy RNA polymers and phosphates. At the interface between nucleoid and cytoplasm is where the RNA single strands fold to form secondary and higher structures and can begin to interact with proteins and ribosomes in the cytoplasm. I call this dynamic surface region that arises when transcription is taking place the **RNA processing zone**.

The nucleic acid mainframe is not available in current in vitro systems. The nucleoid is a highly concentrated and exquisitely balanced system only found in vivo. The concentration of biomolecules is much higher in vivo than in vitro. The forces giving rise to the nucleoid are unknown. It may be difficult or impossible to assemble and run a nucleoid in vitro, then again, it may not be that difficult starting out with a qualitative model.

Chapter 18 The Constant Code and the Thermal Code

Abstract: The **constant code** model postulates the existence of a transcription initiation/rejection of initiation code based on DNA sequence alone at constant supercoil density. The **thermal code** model postulates that the state of the cell is encoded in the list of NTP monomer and modified monomer concentrations. The thermal code model further postulates that in the nucleoid of prokaryotic cells interaction of NTP monomers with denaturation bubbles in the DNA lead to dynamic, hybrid helices of monomers/DNA single strand. These hybrid helices are thought to be of length $3-12$, on one or both strands of the denaturation bubble, and located between the -35 upstream homology and the -10 Pribnow box. In the thermal code scenario these structures are thought to be the critical intermediate for transcription initiation in the absence of regulatory proteins.

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The general transcription regulation problem in bacteria is how to turn on and off 10^{3-4} genes in a precise quantitative way. There is both the problem of setting the global transcription rate by a nucleoid and the differential transcription pattern. The time period of regulation spans at least $3-4$ orders of magnitude from initiation every ~ 1 second to initiation every 10^{3-4} seconds.

How the DNA is searched to arrive at the transcription pattern determines how powerful of a Turing machine the cell is. The key reaction is transcription initiation. The transcription pattern is determined by differential transcription initiation for different genes. Therefore transcription initiation determines how powerful a computer the cell is. How is DNA searched to arrive at a transcription pattern?

Replication, transcription, and recombination require unwinding of the DNA double helix. In all three processes one or both strands must have the H-bonding faces of the bases rotated out from the helix configuration to facing into the surrounding solution. This is required for the DNA single strand to serve as a template where it can H-bond with incoming bases either as monomers in transcription and replication or with another single strand DNA in recombination. Where on the genome is the DNA helix unwound and why? Is it only unwound in combination with proteins?

Consider collisions between RNA polymerase holoenzyme and DNA. Of course collisions between polymerase and DNA are complex and not simple like a collision of billiard balls. There are two possible outcomes to a collision – initiation or rejection of initiation. At constant supercoil density there are five possibilities that can determine collision outcome between RNA polymerase and DNA:

    1. Sequence determines the collision outcome. This would involve specific sequence recognition in the major and/or minor groove.

194

2. A structural feature of DNA such as a disrupted helix determines the collision outcome and this structural feature is determined by sequence alone.

3. A structural feature that is a product of the interaction of DNA with a regulatory protein determines the collision outcome—this is obviously very important.

4. A structural feature that is the product of interaction of DNA with NTP monomers and modified monomers determines the collision outcome – what I am proposing in this paper.

5. Some combination of the above.

For scenarios one and two there is no information processing. The DNA sequence alone determines the collision outcome. The RNA coding regions of genes give a rejection of initiation. The promoters have a probability of initiation associated with the DNA holoenzyme collision. This requires a code. I will call this code, based on sequence only at constant supercoil density, the **constant code** because there is no way to turn genes on and off—there is no way to adjust the global transcription rate or to change the differential pattern of expression. The constant code is guaranteed to exist since it determines the in vitro strength of promoters, the open complex formation pattern.

The most important aspect of the genetic code is degeneracy – multiple codons per amino acid. Codon usage statistics reveal that most codons are used at significant levels. Wobble allows a smaller number of classes of tRNAs than codons to be used for translation. The reason degeneracy is the most important feature of the genetic code is that it allows a transcription initiation/rejection of initiation code to co-exist with the amino acid specifying function of DNA. Protein coding regions must be coded differently than promoter sequences and that is precisely what degeneracy allows. In addition to protein coding sequences the leader sequences, tRNA sequences, and rRNA sequences must be coded not to be promoters – to give rejection of initiation on collision with polymerase. The words in the code are sequences, N-mers, of unknown length N. N is probably more than 5 bases and less than 20 bases long and maybe is variable in length along the DNA sequence. The number of words grows fast as 4^N. RNA coding sequences of the DNA are the subset of the 4^N large set of words that give rejection of initiation on collision with polymerase. Promoters are the subset of the 4^N large set of words that give initiation on collision with polymerase. Degeneracy and codon usage are strong evidence for a transcription initiation/rejection of initiation code in DNA primary sequences.

Consider the relative motion of polymerase and DNA in the nucleoid. The problem of searching the DNA to determine global and differential expression is either done by the RNA polymerase diffusing along the DNA or the DNA diffusing to the polymerase. Because of the large mass, 450KDa, of the polymerase and the low mass of DNA, 660Da/bp, the polymerase does not do a topologically complex one-dimensional diffusion along the DNA helix. In the nucleoid the polymerase is relatively fixed in space by numerous contacts with supercoiled condensed DNA. In the nucleoid the DNA helix diffuses to the largely stationary polymerase. The DNA is twisting and writhing, transmitting energy and forces along the backbone, and supercoils are migrating around. The DNA is in motion—the polymerase is stationary. As in elongation where the ternary complex is fixed in the space of the nucleoid and the DNA translates through the ternary complex for initiation the polymerase is fixed in the space of the nucleoid and the supercoiled condensed DNA does the diffusion to the polymerase. In the constant DNA code scenario and for the possibility that the sequence only and not a structural feature of DNA determines the collision outcome the collisions between polymerase and DNA would be random—all sequences would have the same average number of collisions over time with polymerase. For the possibility that a structural feature of DNA determines the collision outcome it is possible that different structures have different diffusion rates to the polymerase so the collisions between a given sequence and polymerase would not be random over time.

The model for initiation I am proposing postulates the existence of a DNA structural feature, namely, hybrid helices of NTP monomers and single strand DNA. I believe that in the nucleoid there are denaturation bubbles migrating around as the DNA twists and writhes and supercoils migrate. NTP monomers can interact with these denaturation bubbles forming dynamic hybrid helices of length $3-12$ bases on one or both strands of the denaturation bubble. The NTP monomers can make both stacking interactions and conventional H-bonding in these hybrid helices leading to favorable energetics. I think these structures are located between the upstream -35 homology and the -10 Pribnow box but they might include the Pribnow region. These structures are dynamic in that they are bendy regions of DNA and the monomers are making and breaking H-bonds with the single strands of DNA. At any instant in time the number of pairings is stochastic – they have an average structure of so many base pairings. It is this average structure that I call a hybrid helix. To form hybrid helices requires twisting of the single stranded regions and this can be accomplished topologically by rotation of the sugar phosphate backbone at the edge of the hybrid helices. **I believe the rate limiting step for initiation in the nucleoid is the diffusion of these structures**

to the polymerase. I believe the time period for diffusion to the polymerase is tunable from ~ 1 to 10^{3-4} seconds depending on the length of the hybrid helice. The longer the length of the hybrid helices the faster the diffusion to the polymerase. A hybrid helice is a bendy stretch of DNA and the rest of the DNA helix is rod-like. Bendy regions are segregated to the polymerases in the nucleoid. Rod-like regions segregate to between polymerases in the nucleoid. The walk of a hybrid helice to the polymerase is a random walk as diffusion must be in a phase. Different lengths of hybrid helice have different average time periods to do this random walk. When one of these structures gets to the polymerase initiation occurs fast – all that is required is rotation of the polymerase. The formation of these hybrid helices is a function of the DNA sequence and the NTP concentrations. At lower NTP concentrations fewer and shorter hybrid helices occur – turning down the transcription rate. At higher NTP concentrations more and longer hybrid helices occur – turning up the transcription rate. The equilibrium between DNA helix and DNA helix plus hybrid helices is adjusted by the NTP monomer pool levels establishing the global rate and differential pattern:

$$\text{DNA helix} \xleftarrow{\text{monomers}} \text{DNA helix + hybrid helices}$$

Hybrid helices are a small fraction of the DNA sequence – probably no more than 1% of the DNA sequence. The global transcription rate is determined by the absolute level of NTP monomer pools. The differential transcription pattern is determined by the relative NTP monomer concentrations. I call this model where NTP monomers interact with DNA sequence to determine global and differential transcription the **thermal code model** because it runs on thermal energy.

I believe the critical initiation step once one of these structures is impinging on a polymerase is getting into the DNA helix – forming the open complex. In vivo without monomers to form hybrid helices the DNA helix cannot be opened up in a collision with polymerase – the energy required to open up the helix is too high. Monomers lower this energy barrier by forming hybrid helices.

The information channel width can be defined as the number of words in the code. This depends in a simple way on the number of monomers in a hybrid helice. If the longest hybrid helice is 12 bases there are 4^{12} words in the code. Because there are probably $3-12$ monomers in a hybrid helice this mechanism provides the coding possibility for exquisite quantitative control of global and differential transcription.

I believe the upstream homology is a DNA helix making an edge to a hybrid helice and is presumably recognized through sequence specific interaction in the major groove. So the requirement for initiation is a sequence specific recognition of the upstream homology adjacent to a hybrid helice. This two part mechanism gives rise to correct strand selection for $5' \rightarrow 3'$ synthesis.

I have different roles for the Pribnow homology between in vitro and in vivo. In vitro, I believe, the Pribnow region is the region of destabilized helix, low T_M because all A and T, where the strands separate and polymerase gets into the helix, between the strands, forming the open complex. In vivo, I believe, the polymerase gets into the helix between the upstream and Pribnow homology and that the Pribnow homology defines a start site by sequence recognition of the Pribnow region once inside the helix. In vivo the Pribnow region gives rise to a well defined start base.

If diffusion to the polymerase is not the rate limiting step in transcription initiation then a collision outcome based theory can be formulated. In this scenario the outcome of a collision depends on the length of hybrid helice – the longer the hybrid helice the higher the probability of formation of the open complex. The only requirement to have the thermal code model is sequence specific interaction of monomers with DNA.

The constant code and thermal code are co-linear – they exist on top of each other in roughly the same places on the DNA sequence. RNA coding regions not only reject initiation in the absence of monomers but also in the presence of monomers. Promoters function in vitro forming the open complex in the absence of monomers. In vitro promoters have strengths based on the constant code alone. The quantitative relation for the relative roles played by the constant and thermal codes will be difficult to unravel.

I believe hybrid helices also occur in replication. Ahead of the DNA polymerase are hybrid helices of dNTP monomers, single strand binding proteins, and DNA single strands. This explains the high synthesis rate of $800-1000$ bases/second.

For the thermal code to work the monomer pool levels must encode the state of the cell. The division of labor among monomers in the cell accomplishes this – UTP used for cell wall, CTP used for cell membrane, GTP used for protein synthesis, and ATP used for general synthesis. A critical role for modified monomers such as cAMP and ppGpp in the thermal code model can easily be imagined. Modification can affect the partitioning between cytoplasm and nucleoid of monomers or affect the formation and diffusion of hybrid helices.

There is a pervasive role of nucleic acid monomers in recognition and energetics in cells. NTP monomers are high energy and can be recognized and dock in a precise way with proteins and do work either phosphorylating other biomolecules, transferring energy to other biomolecules, or forming polymers and phosphate. Monomers regulate the activity of many proteins in addition to being a substrate.

With the nucleic acid mainframe and the thermal code the central dogma becomes circular rather then linear – NTP monomers feeding back on DNA to determine the RNA synthesis profile:
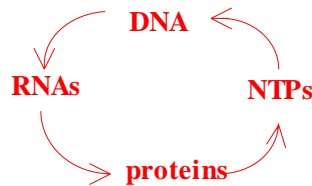
The Turing machine model level is important to understanding the cell as an information processing machine. Turing machines in biology may seem a little esoteric but are very simple. Answering the questions how is DNA searched and how is the transcription pattern arrived at are the Turing machine description. Only small molecules like monomers can make the state of the cell available throughout the nucleoid. The entire DNA is continuously searched through interaction with monomers. Continuous search of the entire DNA is the most powerful Turing machine model of DNA possible. A large channel width – number of distinct words – also is essential to be a powerful Turing machine model. If transcription initiation, in the absence of regulatory proteins, is only regulated by the constant code the cell is a dumb Turing machine. An example of the type of calculations the cell Turing machine must do is to calculate the surface area to volume ratio given the shape of the cell and to calculate linear combinations of this ratio. In molecular terms an example of such a calculation is of how many lipids are needed for the membrane or how many of a membrane protein are needed for a given size cell. The nucleic acid mainframe and thermal code provide for information definition, transport, and processing in the cell – the basic smart Turing machine architecture.

The thermal code is not available in current in vitro systems. The nucleoid is a highly concentrated and exquisitely balanced system only found in vivo. The concentration of biomolecules is much higher in vivo than in vitro. It may be difficult or impossible to get the thermal code to work in vitro.

There are important evolutionary implications of the constant code and thermal code. The constant code and, if it exists, the thermal code must have preceded the genetic code. Long before proteins are encoded in DNA transcription must have been occurring and a transcription code must have existed. Of course given the complexity of a cell, it is always a bit difficult to understand how such a system could arise.

To elucidate the thermal code at a fully quantitative level is a difficult task. Getting good quantitative data on monomer pool levels in the nucleoid will be very difficult because it is not known how they partition between nucleoid and cytoplasm phases. Modeling the interaction of monomers with DNA will be difficult. A molecular simulation required to get the thermal code out will be difficult. If the thermal code does not exist and only the constant code exists even that code may not be easy to elucidate in a quantitatively precise way. Then again, it may not be too hard to do starting out with a qualitative model.

There are important implications of the thermal code model to eukaryotic biology. At the root of cancer and developmental biology is the cell cycle. Possibly at the root of the cell cycle in eukaryotes is the thermal code.

"Do you still think it is true?"

"I haven't worked on it much since I came up with it back in July 1980. The last time I worked on it was about ten years ago. In a bacteria with 4 million base pairs of DNA the length of the DNA is about 600 times as long as the bacteria with a length of 2 microns. So it has to be condensed into a small volume. It is quite a problem in topology and knot theory as anyone who has had a fishing reel full of twisted knotted line or had to wind up and unwind a 100 foot extension cord knows. There is a neat trick carpenters use to handle the problem of long extension cords. First they make it into a loop by inserting the male end in the female end. Then you make a small loop at one end and stick your hand through it and hold the two cords in your hand. You make the first knot by bringing the loop over your wrist down over your hand and pulling the two cords up through the end loop. Then you take 18 inches of the doubled cord and pass it through the loop you have just made and repeat that step until you run out of cord. When completed a 100 foot cord is about 15 feet long and can be tossed around without knotting up. To unravel the cord you unravel the last knot you made and just tug on it and all the loops unravel. I do not know if they are really knots but if two people tug at opposite ends the knots all get tighter. I am sure the nucleic acid mainframe is true. The monomer pool information has to be the important information used to determine some of the transcription pattern and implement the cell cycle. The one thing I am not sure of is if the monomers interact with DNA polymers and form hybrid helices with single strand DNA or if there is always a protein involved. It could work either way and even with a combination of both, there being hydrogen bonding of monomers with single strand assisted by proteins."

"What's the deepest problem in biology, outside neurobiology, you want to crack?"

"The immunology system. Yeast has no viruses that means to me they have defeated them through an immunology system, very primitively defined, of course, because yeast is the single cell eukaryote. It's the number one problem to solve for disease caused by viruses and bacteria so also the number one problem to solve for both building and protecting from designed biological weapons."

"Also in that folder are two chapters from my book back in 2000 on chemistry. I am not planning to write anymore on chemistry at all. Those chapters will be my only contribution but in chemistry is where I will be spending a lot of time. There are some serious mistakes in those two chapters. I am going to keep my future work in chemistry proprietary."

Heidi got out the two chapters.

Chapter 11 The Covalent Bond

The hydrogen molecule

Consider a pair of hydrogen atoms in the $n = 2$ and $l = 1$ quantum state. In the covalently bound molecule the down quarks and protons are in a steady state of angular motion. The angular momentum vectors for the down quarks oppose each other, i.e., $\vec{\mathbf{m}}_l$ for one is equal in magnitude and opposite in direction to $-\vec{\mathbf{m}}_l$ for the other. They are parallel with the center to center vectors that describes the bond, i.e., they are head to head on the line between the atom centers. The protons are spinning in the opposite direction of the down quarks. The angular velocity of the proton relative to the down quark is proportional to the inverse of the mass ratio. $\dfrac{\omega_{\text{quark}}}{\omega_{\text{proton}}} = \dfrac{\text{mass}_{\text{proton}}}{\text{mass}_{\text{quark}}}$. For the $n = 2$ and $l = 1$ quark this ratio is $\dfrac{1836}{1/2}$.

Magnetic field in the stack

There is a magnetic field with very little volume, close to zero, between the spinning down quark and the proton. The down quark and the proton are at next to the same radius, R_i. The magnetic field is confined to the inside of the down quark and the outside of the proton. I make the approximation that this magnetic field has zero volume and therefore zero energy stored in the field. There is no magnetic field on the outside of the down quark in the space between the down and the up quark. There is no magnetic field on the inside of the proton.

$$q\mathbf{v} \times \mathbf{B}$$

All the pressures on bodies and quarks in atoms without angular velocity are present and in balance for bodies with angular velocity. In addition are pressures that arise when the surface of a body has velocity relative to the adjacent electric or magnetic fields. For magnetic fields generated by spinning bodies the pressure vector field $\dfrac{d\vec{\mathbf{F}}}{dA} = \pm \dfrac{\vec{\mathbf{v}}}{c} \times \dfrac{1}{2\mu_0} B^2 \hat{\mathbf{B}}$ is of central importance, where $\vec{\mathbf{v}}$ is the vector field for velocity of a spinning thin shell spherical body or quark, where + is for positive surfaces and − is for negative surfaces. $\dfrac{d\vec{\mathbf{F}}}{dA} = \pm \dfrac{\vec{\mathbf{v}}}{c} \times \dfrac{1}{2\mu_0} B^2 \hat{\mathbf{B}}$

provides the centripetal pressure, $\dfrac{d\vec{\mathbf{F}}}{dA} = -\rho_m \dfrac{v^2}{r} \hat{\mathbf{r}}$, where $\hat{\mathbf{r}}$ is the normalized axial radius perpendicular from the axis to a point on the surface of a thin shell spherical body, so a spinning body can maintain constant radius while spinning as opposed to expanding in the $\hat{\mathbf{r}}$ direction. Without a centripetal pressure the radius of a spinning thin shell spherical body would not be constant over time. $\vec{\mathbf{B}}$ is parallel to $\vec{\omega}$ for RH bodies and $\vec{\mathbf{B}}$ is parallel to $-\vec{\omega}$ for LH bodies so $\vec{\mathbf{v}}$ and $\vec{\mathbf{B}}$ are perpendicular and $\pm \dfrac{\vec{\mathbf{v}}}{c} \times \dfrac{1}{2\mu_0} B^2 \hat{\mathbf{B}}$ is in the direction $-\hat{\mathbf{r}}$ for both RH and LH inside and outside surfaces of bodies and quarks where a magnetic field exists. For steady states of angular motion $\pm \dfrac{\vec{\mathbf{v}}}{c} \times \dfrac{1}{2\mu_0} B^2 \hat{\mathbf{B}} = -\rho_m \dfrac{v^2}{r} \hat{\mathbf{r}}$ where $v = \omega r$ and ρ_m is the surface mass density of a quark. This equality rearranges to give the relation between angular velocity and the magnetic field at the surface of a quark. $B^2 \hat{\mathbf{B}} = \pm \dfrac{m_e \mu_0 c \vec{\omega}}{4\pi R^2}$ where m_e is the mass of the electron. + is for negative surfaces and − is for positive surfaces. $B^2 \hat{\mathbf{B}} = \pm \dfrac{m_e \mu_0 c \vec{\omega}}{4\pi R^2}$

and the assumption that in the steady state $\dfrac{d\vec{\mathbf{n}}}{dt}_{r,B} = -\dfrac{d\vec{\mathbf{n}}}{dt}_{e,B}$ leads to $\dfrac{\omega_{quark}}{\omega_{proton}} = \dfrac{mass_{proton}}{mass_{quark}}$.

$$e + r = qc\mathbf{B}$$

Associated with the flux of the magnetic field are the pressures emission $\dfrac{d\vec{\mathbf{F}}}{dA} = -p_N \dfrac{d\vec{\mathbf{n}}}{dt}_{e,B}$, reception $\dfrac{d\vec{\mathbf{F}}}{dA} = p_N \dfrac{d\vec{\mathbf{n}}}{dt}_{r,B}$, and one of the four electromagnetic pressures, $\dfrac{d\vec{\mathbf{F}}}{dA} = \pm \dfrac{1}{2\mu_0} B^2 \hat{\mathbf{R}}$, where + is for brane or quark outside surfaces and − is for brane or quark inside surfaces and $\hat{\mathbf{R}}$ is the spherical coordinate radial unit vector. For steady states $p_N \dfrac{d\vec{\mathbf{n}}}{dt}_{r,B} - p_N \dfrac{d\vec{\mathbf{n}}}{dt}_{e,B} = -\dfrac{1}{2\mu_0} B^2 \hat{\mathbf{R}}$, where the sign is chosen so $\pm \dfrac{1}{2\mu_0} B^2 \hat{\mathbf{R}}$ opposes and exactly balances e + r. In symbolic form this is $e + r = qc\mathbf{B}$. This means that for steady states $\pm \dfrac{1}{2\mu_0} B^2 \hat{\mathbf{R}}$ is always an attractive pressure, out of and normal to the surface of a body.

In the steady state of rotation the twistture vector fields for emission and reception are opposed so the net torque on a body is zero:

$-\vec{\mathbf{r}} \times p_N \ \sin\theta \ \dfrac{dn}{dt}_{e,B} \ \hat{\mathbf{B}} \times \hat{\mathbf{r}} \ = \vec{\mathbf{r}} \times p_N \ \sin\theta \ \dfrac{dn}{dt}_{r,B} \ \hat{\mathbf{B}} \times \hat{\mathbf{r}}$. Angular momentum is only conserved when spins are paired through the magnetic field with angular momentum vectors opposed. For all steady states of the atom $\sum_i \vec{\mathbf{l}}_i = 0$ where $\vec{\mathbf{l}}_i$ is the angular momentum vector for a body or quark. So for steady state configurations spins must be paired. Furthermore, for steady states, the paired spinning quarks or bodies must be at the "same" radius, i.e., the volume of the magnetic field must be next to zero. This means that $l = 0$ or s intermediate quarks cannot be spinning. $\vec{\mathbf{m}}_l$ is the zero vector for intermediate quarks.

$$q\mathbf{v} \times \frac{\mathbf{E}}{c}$$

I have now discussed all the pressures and twisttures associated with the electric and magnetic field except one, $\dfrac{d\vec{\mathbf{F}}}{dA} = \dfrac{\vec{\mathbf{v}}}{c} \times \dfrac{1}{2}\varepsilon_0 E^2 \hat{\mathbf{E}}$, or in symbolic form $q\mathbf{v} \times \dfrac{\mathbf{E}}{c}$, for both RH and LH branes and quarks. This force is only observed in the atom. For electrons or protons moving in a macroscopic field this force is next to zero because the field next to the electron or proton does not have velocity relative to the surface of the bodies. All the pressures and twisttures are important in that there would not be a universe as we know it if any one where missing. However, $\dfrac{\vec{\mathbf{v}}}{c} \times \dfrac{1}{2}\varepsilon_0 E^2 \hat{\mathbf{E}}$ is the most important in determining the structure of physical reality. $\dfrac{\vec{\mathbf{v}}}{c} \times \dfrac{1}{2}\varepsilon_0 E^2 \hat{\mathbf{E}}$ plays a key role in

$E \times B$ and $B \times E$ emission and reception. $\dfrac{\vec{\mathbf{v}}}{c} \times \dfrac{1}{2}\varepsilon_0 E^2 \hat{\mathbf{E}}$ is generated in spinning quarks or bodies that have a

velocity vector field, $\vec{\mathbf{v}}$, associated with them. The electric field $\vec{\mathbf{E}}$ is normal to the surface. $\dfrac{\vec{\mathbf{v}}}{c} \times \dfrac{1}{2}\varepsilon_0 E^2 \hat{\mathbf{E}}$ is tangent

to the surface and projects only a parallel component onto the axis. The direction of this force wraps around a sphere from axis to axis like section interfaces of an orange. This force leads to a tangential flow of N-particles from one end of the axis to the other end where emission occurs. For reception the N-particles enter one end of the axis and flow tangential to the surface according to this force into the quark. This is a new concept, the idea of a force tangent to the surface of a brane or quark that leads to N-particle flow inside the brane or quark. Another example of this will be in the planar equatorial up quark surfaces touching each other in a bond. The local

contribution of $\dfrac{\vec{\mathbf{v}}}{c} \times \dfrac{1}{2}\varepsilon_0 E^2 \hat{\mathbf{E}}$ is zero at the axis and is a maximum at the equator. For a down quark there is an

electric field on both the inside and the outside. The difference is what determines the $\dfrac{\vec{\mathbf{v}}}{c} \times \dfrac{1}{2}\varepsilon_0 E^2 \hat{\mathbf{E}}$ force. So for a

down quark the pressure vector field is $\dfrac{\vec{\mathbf{v}}}{c} \times \dfrac{1}{2}\varepsilon_0 \ \Delta E^2 \ \hat{\mathbf{E}}$ associated with the difference in electric field magnitude

between the inside surface and the outside surface. $\Delta E = E_i - E_o$ where E_i and E_o are in the same direction. $\Delta E = \dfrac{\Delta q}{4\pi\varepsilon_0 R_o R}$ where $\Delta q = q_i + q_o$ because q_i and q_o have opposite signs. Integrating this pressure over the surface of a spherical quark or body:

$F_{total} = \displaystyle\int_{\theta=0}^{\pi} \int_{\varphi=0}^{2\pi} \dfrac{v}{c}\dfrac{1}{2}\varepsilon_0 \ \Delta E^2 R^2 \ \sin\theta \ d\varphi d\theta$ where $\dfrac{v}{c} = \dfrac{\omega R \sin\theta}{c} = \dfrac{\omega}{\omega_{max}} \sin\theta$ yields the expression for the total

force:

$F_{total} = \dfrac{\omega}{\omega_{max}} \dfrac{\Delta q^2}{32\varepsilon_0 R_o^2}$. Integrating the pressure in direction $\pm\vec{\omega}$ yields $F_{axial} = \dfrac{\omega \ \Delta q^2}{\omega_{max} 12\pi\varepsilon_0 R_o^2}$, the component of

F_{total} parallel to the axis. $\dfrac{F_{axial}}{F_{total}} = \dfrac{8}{3\pi} \cong .849$. The $\dfrac{\vec{\mathbf{v}}}{c} \times \dfrac{1}{2}\varepsilon_0 \ \Delta E^2 \ \hat{\mathbf{E}}$ pressure vector field gives rise to emission of

a photon from one end of the axis of a spinning quark or body and provides the covalent bond force. The F_{axial} force on a spinning down quark provides the covalent bonding force. In a covalent chemical bond down quarks in each atom are spinning with their angular velocity vectors opposed and they are emitting a photon along the axis and receiving a photon from the other quark. Emission of a photon leads to loss of angular momentum of a quark.

Reception of a photon at one end of the axis leads to an increase in angular momentum of a quark. In the steady state covalent bond the torque associated with emission of a photon, $\vec{\tau} = \pm l_N \frac{dN}{dt}_{e, E \times B}$, is balanced by the torque associated with reception of a photon, $\vec{\tau} = \pm l_N \frac{dN}{dt}_{r, E \times B}$. The net torque is zero. In addition to the torque associated with flux as a photon is a force associated with emission, $\vec{F} = -p_N \frac{dN}{dt}_{e, E \times B}$, and reception, $\vec{F} = -p_N \frac{dN}{dt}_{r, E \times B}$. Both of these are repulsive. All four of these fluxes are one-dimensional, meaning the N-particles are emitted and received from the same very small surface area of a quark at one end of the axis. These forces and torques may be thought of as vectors. Each spinning quark in the hydrogen molecule pushes towards the other with a bonding force F_{axial}. The atoms are squeezed together. There is a deformation in up quarks between the bonded atoms. The net forces and torques must be zero in the steady state molecule. For a bond there must be two equal and opposite pressure fields associated with the outer surface of the up quarks in the bond cross-section between planar surfaces.

Proton/down quark coupled through $qv \times \dfrac{E}{c}$

There is a F_{axial} associated with the spinning proton, anti-parallel to the F_{axial} for the spinning down quark because their spins are opposed, but it is small compared to F_{axial} for the down quark due to $\dfrac{\omega_{quark}}{\omega_{proton}} = \dfrac{mass_{proton}}{mass_{quark}}$. The force on the proton leads to $E \times B$ emission opposite the bond direction. That N-particle emission is absorbed and added to the N-particle flow in the down quark. Not only does the quark emit $E \times B$ on the bond axis it emits a small $B \times E$ opposite the bond direction, emitted from the inside surface, that is absorbed by the proton. This forms a cycle of N-particle flow around the coupled system of down quark and proton. This flow is $\dfrac{1}{2 \times 1836}$ that of the covalent bond flow so it is not significant quantitatively. When there is a cycle of flow between opposed spins like this there is a pressure vector field between the down quark and the proton due to the tangential flows of N-particles. Because the surfaces are frictionless there is no loss of energy in the system when these surfaces move over each other while there is a pressure field between them.

The quantitative hydrogen bond

The hydrogen molecule bond energy is $4.47 \, eV$. Assuming that each atom stores $2.23 \, eV$ in angular velocity energy it is possible to determine the angular velocity of the bodies and quarks. Very little energy is stored in the proton due to its low angular velocity relative to the down quark. $E = \gamma E_0$ where $\gamma = \dfrac{1}{\sqrt{1 - \dfrac{\omega^2}{\omega_{max}^2}}}$ and $\omega_{max} = \dfrac{c}{R}$.

For the $n = 2$ and $l = 1$ down quark $E_0 = \dfrac{.511 MeV}{2} - 5.1 eV$ and $E = \dfrac{.511 MeV}{2} - 5.1 eV + 2.23 eV$ where $5.1 eV$ is the mass defect of the down quark. This yields a quark angular velocity of $3.35 \times 10^{16} \dfrac{rad}{s}$. The non-relativistic angular velocity would be $4.10 \times 10^{16} \dfrac{rad}{s}$ so the correction for increase of moment of inertia with angular velocity is significant. This leads to a magnetic field strength between down quark and proton of $3.62 \times 10^4 \dfrac{A}{m}$. The force that balances emission and reception is $F = \oiint \dfrac{1}{2\mu_0} B^2 dA = 4.58 \times 10^{-6} N$. That is over 111 times the electrical force $F = \oiint \dfrac{1}{2} \varepsilon_0 E^2 dA = 4.11 \times 10^{-8} N$. This corresponds to a power as a magnetic field emission plus reception of

1374W. The net covalent bonding and photon emission force $F_{axial} = \dfrac{\omega}{\omega_{max}} \dfrac{\Delta q^2}{12\pi\varepsilon_0 R_o^2} = 2.02 \times 10^{-11} N$. If one assumes that one-half of this force goes into photon emission than the power of the photon emission is $.003W$ that is the same power as a continuous stream of end to end $6.25\ eV$ photons. The magnitude of the centripetal force on the down quark is $F = \displaystyle\oiint \rho_m \dfrac{v^2}{r}\ dA = \oiint \dfrac{vB^2}{2c\mu_0}\ dA = 5.3 \times 10^{-9} N$. The centripetal force on the proton is $\dfrac{1}{2 \times 1836}$ of the value for the down quark.

Between and on

There is an on force on each up bonded quark from the inside. On the outside, between the quarks, is a between force that annihilates with the on force from the inside. When branes and quarks touch their surface are smooth and frictionless so they can slide past each other in contact without loss of energy.

Chirality of photon emission

The direction of $\dfrac{\vec{v}}{c} \times \dfrac{1}{2}\varepsilon_0 E^2 \hat{E}$ determines whether $E \times B$ and $B \times E$ emission is right handed or left handed. The scheme if the electron is really negative is:

	Matter $E \times B$	Anti-matter $B \times E$
Electronic	LH	RH
Nuclear	RH	LH

Electronic refers to the stack—the proton in hydrogen or nucleus in higher atoms and down and up quarks. Here the photons are emitted by electron quarks in matter. Nuclear refers to the neutron dimension structure that is loose in the annular space of the nucleus or for the case of hydrogen of the proton. Here the γ-rays are emitted by proton quarks in matter. Perhaps it is experimentally possible to determine if the spin of a quark emitting a photon is right handed or left handed. Then one could determine if the electron is really negative. Once the sign of the electron is assigned the N/S assignment for the magnetic field and the chirality of photon emission is fixed.

One revolution

A photon is produced by exactly a 2π rotation of a quark. The quark angular velocity starts out at zero, accelerates following $\omega_{quark} = \omega_{max} \sin^2\theta$ to ω_{max} at $\dfrac{\pi}{2}$, returns to zero at π, accelerates again to ω_{max} at $\dfrac{3\pi}{2}$ and returns to zero at 2π. In this process a photon is generated. The classical frequency, $E = h\bar{\nu}$, is the average of the variable frequency of the quark in this process. The relation is the following:

$$\nu = \nu_{max} \sin^2\theta \ \text{ after } E \propto \sin^2\theta$$

$$\bar{\nu} = \dfrac{1}{1}\int_0^1 \nu\ \text{dcycle} = \dfrac{1}{2\pi}\int_0^{2\pi} \nu_{max} \sin^2\theta\ d\theta = \dfrac{1}{2}\nu_{max}$$

Chapter 12 Higher Atoms

$n = 2$ and $R_{inner} = 2.645 \times 10^{-11} m$

The most important symmetry in atoms higher than hydrogen is $n = 2$ symmetry where each valence electron divides into two quarks. Atomic line spectra are single electron phenomenon where *n* goes higher. But the room

temperature chemistry so important to biology is all (or just about all) $n = 2$ principal quantum number of valence electrons.

Moseley's Law requires R_{inner} is the same for all atoms and $R_{inner} = 2.645 \times 10^{-11} m$. This is required so that the square root of frequency is linear with the number of electrons in the stack. X-rays are produced when a down electron in the stack is first lifted to up by collision of an external electron. The energy in the electronic space will be the energy of the emitted X-ray when the stack collapses back.

The most important goal of chemistry will be to determine R_{outer}, $\vec{m}_1$, $\vec{m}_s$, and $\vec{m}_{nucleus}$ vector sets for many chemical species. This will require the interplay of theory and experiment. The end result will be a computer model in virtual three-dimensional space and over virtual absolute time, a static and a dynamic simulation. I believe these computations will be vitally important to our ability to design proteins and cells.

The self-bond

The second element in the periodic table is He. The stack in He is two protons at the bottom facing out at $R_{inner} = 2.645 \times 10^{-11} m$ to form the nucleus. The two valence electrons each are in the $n = 2$, $l = 1$ quantum state. There are two down quarks and two up quarks. There are two electrons and two protons as neutrons or a helium neutron that are inside the nucleus. These form a stack with size $\dfrac{1}{1836}$ that of the nucleus, down, and up stack, that I will call the nuclear stack. I will ignore this nuclear chemistry. So all we will be interested in is the atomic number, z, and the number of valence electrons. The atomic number is the number of protons facing out at the bottom of the stack. The number of down electrons is equal to $z - \#\,valence\,electrons$. This entity I call the nucleus. It has positive charge equal to the number of valence electrons on its outer surface. In the hydrogen molecule the down quark spin was coupled to the proton spin through a magnetic field. In He the two down quarks spin with spins opposed by 180°. The magnetic field is confined to between the two down quarks. What happens to the $q\mathbf{v} \times \dfrac{\mathbf{E}}{c}$ force in the two down quarks forms that I have named a self-bond? The self-bond is the basis of the Pauli Exclusion Principle. The inside quark emits an $E \times B$ flow on axis into the opposite end of the axis of the outer quark. This N-particle flow starts at one end of the axis and wraps around the quark to the point of emission at the other end of the axis. That $E \times B$ is absorbed by the outer quark on axis and reverses direction and flows to the opposite end of the outer quark where it is emitted to the **inside** as a $B \times E$ flow. So there is a loop of $q\mathbf{v} \times \dfrac{\mathbf{E}}{c}$ N-particle flow between the two quarks. This establishes a pressure vector field of attraction **between** the two self-bonded quarks, similar to the pressure field between equatorial faces of up quarks in covalent bonds. Because the two quarks are self-bonded they are not available to participate in covalent bond formation, hence the inertness of the noble gases. Self-bonds only form with 180° between the $\vec{m}_1$ of the participating quarks. This is due to the fact N-particle emission and absorption is on the axis of the spin.

The Nest

The set of $n = 2$ down quarks and the nucleus form a nest of spinning quarks and branes that are coupled through magnetic fields and on axis $E \times B$ and $B \times E$ self-bond flows. Magnetically coupled sets can have $2, 3, 4, \ldots$ members in the set whereas self-bond force cycles have only 2 partners that are at 180°. The two partners in a self-bond are the physical basis of the Pauli exclusion Principle. The integer geometry of chemistry is due to these sets of angular momentum vectors: 2—180°, 3—120°, 4—109.47°. In the nest the most important number of spins that can be coupled magnetically is four to eight. This is the basis of the octet rule. When the spins in the nest are coupled through magnetic fields the sum of angular momentum for the nucleus and down quarks is zero, $\sum\limits_{1} \vec{m}_1 + \vec{m}_{nucleus} = 0$.

First consider tetrahedral carbon, perhaps CH_4. The four down quarks each have their angular velocity vectors pointing out on tetrahedral axis. There is a magnetic field between each quark but no field inside the bottom quark and outside the top quark of these four down quarks. The fraction of the magnetic field that is absorbed between

two quarks is a function of the cosine of the angle between them. $\cos 109.47° = -\dfrac{1}{3}$ is the most profound inner relation in chemistry. This is just an observation of the dot product properties. For tetrahedral symmetry this is why $\sum \vec{\mathbf{m}}_l = 0$. When interpreted vectorialy it is the basis of tetrahedral carbon and along with the Pauli exclusion principle the basis of the octet rule. Trigonal symmetry $\cos 120° = -\dfrac{1}{2}$. Linear symmetry $\cos 180° = -1$. In CH_4 there is no nuclear spin. $q\mathbf{v} \times \dfrac{\mathbf{E}}{c}$ that drives $E \times B$ covalent bond flow is for each down quark out on tetrahedral axis. Coming in on those same axis is flow from the hydrogen down quarks. There is a force **between** carbon and hydrogen up top quark outer surfaces. There is two-way N-particle flow perpendicular to the equatorial plane of the bond that is transmitted through those surfaces.

The $E \times B$ flow from the quarks that forms the N-particle flow of the covalent bond is transmitted through the other quarks and through the up quarks. Absorption of $E \times B$ flow occurs on axis, and perhaps a surrounding cone of a few degrees. When the angle between the $E \times B$ flow and the angular momentum vector is greater than this value the flow is transmitted through quarks. So I will assume transmission for off axis flow and absorption for on axis flow.

Now consider neutral nitrogen. Like carbon it has a nest of four innermost down quarks coupled through magnetic fields, with no field outside the fourth down quark in the stack. There is a fifth down quark adjacent to this tetrahedral nest of four. It is magnetically coupled to the nuclear spin. It is self-bonded to one of the innermost four down quarks. There are three quarks available for covalent bonding, and one self-bond of two down quarks that are at 180°. An example of this is NH_3.

Now consider neutral oxygen. Like carbon and nitrogen it has a nest of four innermost down quarks coupled through magnetic fields, with no field outside the fourth down quark in the stack. Like nitrogen there is a fifth down quark adjacent to this tetrahedral nest of four. It is self-bonded to one of the innermost four down quarks. Then there is a sixth down quark that is magnetically coupled to the fifth and the nucleus and is self-bonded to another of the innermost four down quarks. There are two quarks available for covalent bonding, and two self-bond of two down quarks that are at 180°. An example of this is H_2O.

The structures of fluorine and neon follow directly. Neon is fully self-bonded, hence it's chemical inertness. In neon, like carbon, there is no nuclear spin, the quark magnetic fields are fully coupled in two nests of four.

Ions

The importance of ions to biology and chemistry cannot be overstated. I define oxidation and reduction as changes in the ion state of the atom by removal or addition of electrons. I do not use the standard chemistry definition that assigns electrons to the more electronegative atom and derives an oxidation state that is a bookkeeping assignment not based on the actual electron removal or addition phenomenon. The importance of oxidation/reduction reactions to biology and chemistry cannot be overstated. Oxidation/reduction couples are both transfer of an electron and N-particle flow from the reduced atom to the oxidized atom. Proton transfers are also oxidation/reduction reactions. Oxidation/reductions can be intramolecular, intermolecular while in contact or touching, and intermolecular but separated in space and coupled through a conductor, like a battery, electrochemical cell, or fuel cell. I give examples of intramolecular, O_2 and CO, and intermolecular, $2H_2O \rightarrow HO^- + H_3O^+$, in the next chapter.

A positive ion is missing an electron and has positive charge on the surface at R_{outer}. A negative ion has an extra electron on top the stack at R_{outer} facing out. The key realization for ion quantum structure is: #down quarks= #up quarks, where the outfacing $n = 1$ electrons count as two up quarks. With this rule one can determine the important ion quantum configurations. C^+ has three down quarks, an electronic space with q=2.5, three up quarks, and an external charge of positive one. C^- has five down quarks, an electronic space with q=1.5, three up quarks, and a facing out electron surrounding the three up quarks so the external charge is negative one. Similarly for other atoms. Certain down quark configurations are preferred, especially the important tetrahedral geometry. Positive ions are at higher electronic space energy, negative ions are at lower electronic space energy.

Both store energy in the external electric field. The electronic space and external field energies are fixed by R_{inner} and R_{outer} net of interactions with the surrounding atoms in the field. In gas phases ions can become capacitive by neutrino/anti-neutrino shells. In liquids and solids surrounding atoms/molecules in the field and other ions at other lattice sites allow the fields to become capacitive. Fields have to become capacitive fast, $\sim 10^{-15}$ s, or the N-particles all escape from an ion. There is no such thing as a naked isolated charge just as there is not an uncoupled spin. It has to be capacitive.

The following is a list of # down:# up quarks in a few important atoms.

Trigonal (important in –COOH):

C^+ 3:3 three covalent bonds, no self-bonds

Tetrahedral:

C 4:4 four covalent bonds, no self bonds

C^- 5:3+2 three covalent bonds, one self-bond, possible trigonal with three covalent bonds and self ⊥ plane

N^+ 4:4 four covalent bonds, no self-bonds

N 5:5 three covalent bonds, one self-bond

N^- 6:4+2 two covalent bonds, two self-bonds

O^+ 5:5 three covalent bonds, one self-bond

O 6:6 two covalent bonds, two self-bonds

O^- 7:5+2 one covalent bond, three self-bonds

F 7:7 one covalent bond, three self-bonds

F^- 8:6+2 no covalent bonds, four self-bonds

Ne 8:8 no covalent bonds, four self-bonds

Thermal, up quarks, and phases

Up quarks can bond like down quarks. When they bond to other up quarks these bonds determine the phase of a substance. Most substance, not all, have solid, liquid, and gas phases. The phase is a function of temperature. In a solid there are up/up bonds between atoms and molecules. In liquids there are dynamically made and formed up/up bonds being made and broken with high order, here meaning the % of bonded ups is high. In gases the up quarks in the atoms and molecules are self-bonded. The metallic bond is an up quark bond. N-particle flow as photons flow in and out of breathing modes of up quarks. These thermal photons can have energies from zero Hz up to the ionization energy of a substance. In solid water the oxygen's are at tetrahedral vertices, four tetrahedral bonded up quarks.

Up quarks in metals can bond with down quarks from organic portions of molecules such as Fe^{2+} to the 4 surrounding N in heme. The transition metal complexes are difficult chemistry and I do not have a complete theory for them.

Diamagnetic, Paramagnetic, and Ferromagnetic

I do not have a theory of these important phenomenon but I believe they can be accounted for by the geometry and strength of self-bonds and bonds. That information is included in the $\vec{m}_1$, $\vec{m}_s$, and $\vec{m}_{nucleus}$ vector sets. I do not know what in my quantum mechanics corresponds to paired and unpaired electrons. A non-bonded down quark is a free radical, not an unpaired electron.

Three kinds of quantum mechanical bonds

There are three kinds of structural quantum mechanical bonds:
1. **down/down**, that are classical covalent.
2. **up/up**, that are phases, metallic, and thermal.
3. **up/down**, that are organic/metal.
There are also electrostatic bonds between ions and dipoles. These are $-\nabla U_{electric}$ driven.

Heidi finished reading the chapters and returned them to the folder.

"Chemistry an up and down quark dance?"

"You got it."

"What are some important features in the design of a world government and a Natural law?"

"No taxation by the world government. All other governments must have balanced budgets and no generational trans-shifting. We want the smallest government possible at local, state and federal levels. The world government will have few employees, a few in eMaam and will be mostly voters only. Anyone over fifteen has the right to vote. It will cost next to zero to implement world government through eMaam."

"What is the basis of a modern civilization?"

"The foundation of a civilization is the rule of law. We need one simple universal law for all people on the planet. That law must be so simple in principle everyone can clearly understand it by 6th grade and must also be fair, just and wise. It should be a Natural law, as if even handed down by an omniscient God, although it really arose in evolution and is handed down by man."

"What are the rights of ownership of property?"

"For the private owner sell your home or business, rent income property, to whomever you want to, that is a right of ownership and that is freedom. Also hire in your business whomever you want, that is a right of ownership and that is freedom. Businesses can provide their services to whomever they want to, that is a right of ownership and that is freedom. What I would require is that the owners must state their policies publicly on eMaam so no one will ever waste their time if they don't meet the owner's criteria."

"Then there might be discrimination based on all kinds of reasons."

"In a modern educated society, the vast majority of owners will naturally, by their free choice, not discriminate for objectionable or unwarranted reasons. Being required to state their policies publicly exposes all their policies to public scrutiny, that will have a salutary effect respecting any odious discrimination. There can be good reasons to discriminate and being able to make those choices is an important, even vital, freedom."

"What will individuals be allowed to do?"

"Just about anything. Pretty much the only things you can't do are commit violence or pollute. An individual will have the right to climb Denali alone in the winter, the right to race in the Indy 500, the right to jump the Snake River canyon in a rocket, the right to use crack cocaine and methamphetamine. But you cannot be a danger to yourself or anyone else."

"One new law is needed, the law of being a man. Any male of any age can have sexual intercourse with anyone he wants to as long as it is consensual, with the only exception of sex with women under fifteen for men over eighteen. Female teachers who have sex with young boys can be fired but not charged with a crime. Male elementary and high school teachers who have consensual sex with girls under fifteen will be charged with statutory rape and do 5 years hard

time. Male elementary and high school teachers who have consensual sex with girls over fifteen will be fired and not allowed to work as teachers again but not have any criminal charges brought against them. College professors can and must trade sex for grades in order to have a clear conscience. Priests who abuse young boys should get LWOPP. Only when all men have full appreciation of this law will all men be both free and responsible.

"I agree that reflects biology."

"What is the seminal strategy to resolve conflicts in the world government?"

"Non-lethal force."

"How would non-lethal force be used as the seminal strategy?"

"What you always want to do is back off to a corridor of safety, a perimeter where you can not be reached by violence, and just lay siege, wait em out. This is true at every level of being exposed to violent people and the violence they promulgate from local police to world government. For the rest of time that will be the seminal strategy and we will want no precipitous, no pragmatic theory of strategy to supersede it.

"Simple and utilitarian in resolving conflict.'

"You got it."

"It is the only strategy that is not pragmatist but ultimately utilitarian, acknowledging we must finally forgive our opponents, but can only do that when they repent. If you do not acknowledge your enemy's repentance you propagate war. It has been handed down countless times in history but should no more be repeated."

"All factories must be open to the public. This will ensure no weapons are being built secretly in industrial complexes. It will also ensure workers are not being exposed to dangerous workplace environments. It is simple to implement, like Miller in Milwaukee offering free tours of the brewery with complimentary beer for the adults and root beer or orange soda for the kids."

"How would you defuse Ahmadjinejad if you were president?"

"First I would acknowledge Ahmadjinejad as a person with dignity and deserving the highest respect. Weapons would not be on the table. When we shake hands on meeting he will know I could kill him physically in a minute or less. He will know I can design biological weapons and eliminate the Persians in just the pattern of my mind and pen. He will know that in the face of eMaam no weapons are meaningful. He will also know I am as opposed to the existence of the state of Israel as he is. He will know I hate the Saudi monarch as much as he does. He will respect me and I will respect him. He will know I require all people to have universal peace, justice, freedom, and liberty and that there can be no compromise on that. He will know my policy is siege for anyone, or any collection of people who will not acknowledge that inalienable right of all people. I will acknowledge the right of people to religious beliefs. I cannot allow women to be mistreated but I can acknowledge women with less than Western rights. I will allow no violence against women. One thing will be completely unequivocal; no violence will be permitted against women period. The solution I will offer is exile. If a woman violates the strict

Islamic prescription she can be exiled, not beaten, tortured or killed. I will point out that not letting women show off their wares with makeup and attire is mindless almost beyond my comprehension. And after a day of talking over all these issues I would invite him out back with me and my bitch for brats, Budweiser and some of my White Widow. He could sit down with German #1 and have a few laughs. We would end up having a few good belly laughs."

"What if he is not amenable to reason? What if Ahmadjinejad accepts siege and builds ICBM's and nuclear armed submarines?"

"I could gather a couple dozen of the top virologists, bacteriologists and design a LD95 to release on them. But actually it doesn't take anything like that effort by me. All that has to be done is infect the people of the planet Earth with my simple physics, chemistry and biology. The specter of unlimited biological warfare is so ominous no one will even waste time on any other weapon system again, they will all be obsolete. I have never worked on weapons design but have worked on everything that underlies rational weapons design. I am releasing my work to a world less ethical, less idealistic and disturbingly pragmatic. Then again I am only fifty-four and could no doubt design more potent biological weapons than anyone else. I will not accept a threat to me from anyone for any reason. That's going to be the standard. What that means is that I and every other person on the planet will not accept a threat from anyone for any reason ever again period. The universality of that desire for security is inescapable and I know shared by everyone."

"Is there a more persuasive non-lethal force?"

"Just overwhelm the opposition with overwhelmingly manpower. If the soldiers did not carry lethal weapons and were at the same population density as the country under siege they would be an unstoppable force for peace. There would be soldiers everywhere, on street corners, in the hotels and restaurants."

"Where would the troops come from?"

"An all volunteer peace corps that replaces existing armies. In operation The Sands of Time the existing military becomes the peace corps, the implementers of non-lethal force. They will not carry any lethal weapons."

"All in all what you are saying is we all have to chill, work only 32 hours per week for a couple with kids, smoke marijuana, drink Budweiser, not worry about terrorism, not worry about fucking shit, and just lay back and enjoy the Wonderment of God's creation."

"You got it."

"What should the drinking age and the age of adulthood be?"

"Fifteen should be the age of adulthood. They can vote, are responsible and treated as adults by courts, can engage in sex with other adults but can't drive yet or have the drugstore cabinet fully open."

"I started drinking with my younger brother when he was thirteen. I started drinking beer at fourteen. Fifteen should be the drinking age and it should be beer only and alcohol no higher

than 5% by volume until you're eighteen when you can start to drink whiskey out of the bottle, always a dangerous proposition. Fifteen for marijuana too."

"It is important to become an acquaintance of alcohol long before driving."

"That's definitely true Honey."

"At eighteen wine, hard liquor, psychedelics and ecstasy become legal. At twenty-one everything is available including tobacco, blow cocaine, crack, methamphetamine and heroin. With the safe drugs that are legal fewer people would use unsafe drugs like tobacco, blow cocaine, crack, methamphetamine and heroin. "

"Did you know there is an easy solution for pot smokers addicted to nicotine?"

"Marijuana treated with nicotine?"

"Obviously, and for tobacco smokers who cannot quit tobacco getting used to marijuana treated with nicotine will be a healthy alternative. It takes less than a month to get to the equilibrium effects of daily marijuana use. Then you hardly get high, can drive, work, think and lead a productive and safe life."

"Antoine Lavoisier, the father of modern chemistry, was beheaded in the French Revolution for mixing tobacco and water. What would our government do to me if I mixed marijuana and nicotine?"

"Nicotine is diabolically addictive. My current addiction began four years ago with a single puff of a Lucky Strike. A cigarette smoker who is also a pot smoker might smoke 25 cigarettes and 5 joints in a day. So the marijuana should have about 5 times the level of nicotine in tobacco. The public health implications are astonishing."

"The long term solution to the recreational drug problem is safe recreational drugs. There is no question they can be designed. Safe inhalers for both THC and nicotine should be available right now. It is a violent crime to deny so many people the technology that can significantly impact their health. It will turn out recreational drugs will be the largest and most important piece of the pharmaceutical industry pie."

"It is very important to have no black markets for drugs. They breed violence, suffering and pain. Dealers exploit the users, siphoning away the resources of the users and don't pay taxes. The war on drugs taxes the policing and court systems and fills the jails, incurring substantial costs and inflicting huge suffering. The only solution is to allow a free market in recreational drugs. In that environment safe drugs will emerge victorious over unsafe drugs in the marketplace. I think we could eliminate tobacco, blow cocaine, crack, methamphetamine and heroin in ten years through new drug design."

"Gamma hydroxy butyrate is interesting. That's the date rape drug. The hydroxy moiety on the gamma carbon must be mimicking ethanol. But it is a four carbon chain not two like ethanol. I think that makes it far safer and less biologically deleterious than ethanol. It might be possible to vacuum distill the ethanol out of all alcoholic beverages and replace it with GHB. The

mechanism of action of ethanol is unknown. Ethanol is special in that it only has two carbons and in that it is the end result of anaerobic fermentation by yeast of carbohydrates."

"Are you someone whose experiences early in life, say through graduation from college at twenty-one, were so rich that they provided you a foundation of tenacity, purposefulness, determination and outright guts to put in thirty years alone with the problem of understanding Nature"

"That's exactly how it played out. My early life could not have been richer. To have a father like my old man, and to be smart enough to appreciate him, was an incredibly good childhood experience. Of course I had to rebel."

"How should we all as Little doggies treat each other?"

"With respect, with appreciation, with tolerance, without being judgmental, appreciating our differences in genetics and upbringing."

We were passing the Sheep Mountain Lodge when Buffalo Springfield came on the CD. We listened for over a half hour without talking when I Am a Child came on.

"Do you feel a kinship with Jesus?"

"No, but I do with the authors of the Bible."

"But you're playing Jesus."

"No I'm not. I'm playing myself."

"Of course."

"It's really just an exercise in reason."

"And logic."

We drove for another fifteen minutes without talking.

"Honey we're crossing the Kings River and will be in Sutton in a few miles. We'll stop there for a few brews."

"It'll be nice to relax and have a cold one after this long day's drive."

20 Sudden decompression

We stopped at the Alpine Inn in Sutton at 11:10 PM after the long day's journey.

"You'll like the fresh Alaskan Summer Ale."

"Sounds great. I have never driven so far in one day. This has been an awesome day for me. Kluane and Destruction Bay will always be my favorite places to go with you."

We sat down at the bar.

"Two summer ales."

"Coming up."

"I haven't talked about cosmology yet except in passing. Would you be interested in cosmology?"

"Please."

*"*Stars are made and destroyed, with many in the beginning and ever fewer over time. As the universe decays to neutrinos it gets ever larger, ever lower mass density, until no new stars are born. I have an alternative theory for planet origins. I speculate planets come from spinning stars, are spat out of spinning stars so to speak and not made of gravitationally collapsing collections of atoms. Stars are born through that mechanism but can only be born if the gravitational attraction, determined by the mass density, which would have to be mostly hydrogen, of space is sufficient. I don't know if Neptune is the oldest planet and Mercury the youngest spat out by our Sun but that would look logical. The heavier elements that are included in a star's formation make spinning stars unstable and the heavier elements are just spat out, sometimes along with hydrogen and helium, by mostly hydrogen spinning stars. It is even possible the number of planets and their elemental compositions are completely determined by this process. I would imagine planets are born early in a star's life and start out in highly elliptical orbits. After that the planets settle down to near circular orbits through tidal forces. Then all stars of our Sun's size and age would produce about eight to ten planets with a life prospect on one or maybe two due to location in that sequence and composition. In that scenario the amount of life in the universe would be, to put it mildly, rather large. As a digression finding a microbe on Mars to me would be the most interesting experimental discovery possible. We will have to bring it back to sequence its DNA and possibly even get it to grow and reproduce. In the fundamental combinatorics of the atoms of life, that I studied in college, the uniqueness of various molecules is the most interesting problem there is to contemplate. Due to the expanding universe caused by the ultimate decay of Ö particles to neutrinos and the escape of $\mathbf{E} \times \mathbf{B}$ particles to an ever-larger universe, one that will never reach infinity in radius, or anywhere's close, the ultimate end of the universe is manifest. Eventually the star formation process will terminate with the last star born. I propose we name that star Wonderment and we can hope and pray the people on planets around that star will find universal peace, justice, freedom, and liberty, just as we Homo sapiens of the planet Earth are soon to realize. We should be able to predict the time and the place of the formation of the last star simply through an experimental measurement of the matter distribution in the universe and an application of the Laws of Physics. That's all I know about cosmology

Honey and as far as I'm concerned that includes everything but the details, that like Einstein I feel are unimportant."

"Why did you choose to bring that up now?"

"Honey I can prove there was a creation by God that requires the existence of God. You know there is a beginning, a big bang, because there is an end, a one-way direction the universe is inexorably headed to and you can't have an end without a beginning. And if there is a beginning does that require a God, where God is defined as some kind of authority that could put together a starting configuration of matter so that the universe evolves by only the Laws of Physics from that point forward? That is exactly what is required! A God properly defined as an absentee landlord whose handiwork was creation of the matter configuration of the big bang. I developed that proof the last time I was in the Alaska Psychiatric Institute when psychotic about a year ago. It's logically irrefutable but not yet apparent to everyone as a simple tautology."

"That's an astonishingly simple and elegant proof of both a creation and a God. I see why you brought up cosmology first. Nicely done."

"Have you noticed anything I have left out?"

"Can't think of anything Darling?"

"The real physics of gravity, that I think Einstein worked out, and the resolution of the determinism/free will paradox."

"Come to think of it you have left both of those out. Is there a reason?"

"Determinism and probability is a fascinating subject. Everyone knows they can walk out on the back porch and get struck by lightening, be in bed at night and have a meteorite coming blasting through the roof, clearly somewhat random events. But we are not going to get killed by a tornado in Anchorage, so those kinds of events are clearly not completely random events. Everyone also knows they have some kind of free will, for instance they can decide to pick up at the dry cleaners before going to the store or in reverse order. But can an individual choose what he or she will be in life? Can they choose their hair color, their height, their intelligence, the cleanness or dirtiness of their minds, their ability in art and science? Examine the idea of merit. Does everyone in life get what they merit? I would say the answer to that is they do, but only within a tightly defined biological definition. It has to do with the Nature/nurture debate. And it ultimately has to do with the fact no two Ö particle collisions are identical. That's the only hint I'm giving out to anyone, including you."

"Is there resolution to the determinism/free will paradox?"

"I want to see who figures out gravity and the determinism/free will paradoxes first and when. It is a little test I am giving to all aspiring scientists and practicing scientists. These are both really good problems. It will be interesting to see how old the winners are. Some of it is addressable by high school physics students. And of course everything so far has been addressable by anyone knowledgeable of vector calculus and introductory physics using calculus."

"And I am your first Guinea pig?'

"I'd prefer calling it my first brain surgery."

"Dr. Mengele you are indeed capable of torture."

"Thanks Honey."

I got up to use the john and get two more beers.

"Excellent beer."

"What do you think about etymology?

"The main property of word derivations is the humorousness that is transparent. Lie is one of the funniest words in the English language. Lie with a woman, be lied to. Lye is sodium hydroxide, the simplest strong base. The ay is particularly interesting: ay, aye, bay, bray, clay, day, gay, hay, jay, lay, may, nay, pay, play, quay, ray, say, slay, way and yea. Pen is another good one: a playpen, a pen for a pig, a penchant, a pendant, a pen to write with, to pen a play. And horns and whores couldn't be funnier. Hornswoggle is the funniest word in all the languages. That's a dirty crack is the funniest expression. And of course we don't want to leave out the American hot dog."

"Do you think there is a deep quantitative structure to languages?"

"I do. The modern-day wordsmiths have no quantitative skills for the most part. To know the number of each letter in the alphabet is essential to understanding words. There is no doubt a good reason there are thirteen letters in the first half and thirteen letters in the second half, with m and n on the boundary. I can remember about thirteen random objects in a short glance. Seeing ahead thirteen moves in chess is about as good as a person can get. Thirteen is the fifth prime number not including one. Thirteen is the first of the teen years. And of course we all know what triskaidekaphobia is, thanks to Johnny Carson."

"Is thirteen your average stack in your stacking-sorting scheme?"

"That sounds about right. Two to the thirteenth on the bottom row of a binary tree with height thirteen. I imagine that is a good measure of my complexity. About eight thousand things I can juggle at a time."

"You're such a fucking unabashed liar it is fucking ludicrous David."

Heidi had had a few beers, was having a good laugh, and was a little inebriated once again.

"Some letters are feminine, some masculine and some gender neutral."

"What's the most feminine letter?"

"*f.*"

"And the most masculine?"

"T."

"What is the most sexually evocative?"

"U."

"Female of course. Where does y fit in?"

"It depends on whether you are a man or a woman and whether you are gay or straight. But why?"

"You are a sicko, albeit fairly amusing in your disease. What is the best letter for a male's surname?"

"D."

"Why is that?"

"Divine determined design and not divisible."

"You can add to that deranged, disturbed, a dash poisonous and a bit of a fucking dilettante, my Darling and dizzy David Martin Degner."

"What's the most elegant, the most beautiful letter?"

"Omicron, the 15th letter of the Greek alphabet, literally small O."

"What's your favorite letter? Let me guess first. Give me a hint."

I placed my hand on Heidi's stomach, pinched her belly button, and slipped my hand into her pants.

"S."

"You got it. *S* is the nineteenth letter of the alphabet. Of course 19 is a prime number. 19 squared is 361. Not many people carry around 19 squared. 361 would appear at first glance to be a prime number. 19 and 19 are its only roots other than 1 and itself. And 19 is the last of the teen years."

I asked the bartender for two more summer ales. We left at 12:57 AM after six beers each for the final few miles to Anchorage. I put on James Taylor's Mud Slide Slim and the Blue Horizon.

"Sharpest corner on the Glenn, Moose Creek, forty-four miles to my condo in East Anchorage."

"Have you figured out everything David?"

"Except what you are going to say next."

"Darling since we are only forty-four miles from Anchorage I have a little confession to make. I hope you won't be mad?"

"What's that Honey?"

"I've recorded all our conversations with the exception of our first meeting at the Diablo Cantina."

"Really. Why did you do that?"

"I am also an avid photographer."

"That's interesting Honey but why did you record our conversations?"

"To have an audio record of them."

"Well that is what you did not why."

"For fun and for posterity."

"Then you knew you were being recorded the whole time, that's a little weird."

"All I did is act myself and not pay any attention to it."

"It's all unexpurgated, eh?"

"You got it. This has been a once in a lifetime experience."

"For me too Honey. Are you recording this conversation?"

"That's your penultimate sentence. How would you like to close?"

"The pen is ultimate."

"That's your's David."

Heidi opened her handbag and took out a blue Lamy Safari fountain pen, reached over and clipped it in the pocket of my T shirt.

"Extra fine nib."

Then she pulled a small Texas Instruments scientific calculator out of her handbag, entered 137 in the register, and pressed the factorial button.

MC Simon
2002