GOD EXISTS:
An Engineer Explains Why

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Introduction

What, specifically, is this book about? At one time or another many people wrestle with a very personal question for themselves: "Do I believe that there is a God?". The question is very private for a variety of reasons. Some people have a very strong faith in God, yet they may not like to admit that there may be times when they have doubts and questions: they likely rely on a strong faith that carries them forward. Others may strongly believe that God does not exist and they may in fact resent verbal discussions on the matter. Both sides have made up their minds and verbalizing their position is not an option. Of course, there is the full spectrum of beliefs from one side to the other. I know there must be many other reasons that people do not like to get into discussions with others about God or religion.

At times, it is easier for someone to read an article or a book to consider and to understand matters that they may view as being very private. That is one of the reasons for my writing this book: to satisfy those who would wish to review it quietly and independently. This suits me well as I consider myself to be a private person and not good with discussions in a large group. There is another important reason for me to express the subject in a book, and although it is far from easy for me to write, I find that the written word is better to express my thoughts, ideas, and feelings most completely.

In today's technological and scientific world we are challenged more and more in our beliefs. As a society, we are accustomed to constantly seeking answers and explanations. As human beings we need to be reassured. We need to have logical and understandable reasons for who we are, where we came from, and where we are going. For some, religion and a belief in God provides their answers, for others, science provides the explanations they need. Some may rely on a balance of both. This book is my attempt to examine both science and religion from an engineer's perspective. While the science we are taught throughout our lives may provide us with some of the answers, there is an over simplification and it leads us to the easy conclusions. Some things are more complex than we are led to believe and this complexity is not in keeping with the base forces of the known universe.

At times, it is as if all the scientific answers are a little too convenient. Other times it seems as though science has avoided even asking the right questions, never mind providing an answer. We have all heard that phrase: “All things are not as they seem”. In our universe, I believe this to be entirely true and I will not be shy about asking the questions.

The purpose of this book is to present my perspective and to explain just some of the reasons why I know, without a doubt, that there is a God. It is an engineer's viewpoint and it is my sincere desire that it be based on known facts and observations. The explanations are not meant to be too technical in their nature. The intent is to describe some incredible laws and theories that exist in our universe, but to do it in the most straightforward manner possible. For me, it is quite important that this book is understandable to all who read it. Also, the explanations are intended to come from a perspective that may never have been presented to you before.

While a lot of information may be supplied to you, do not expect this book to provide you with all the answers, we all know this is never possible. Although there will be a number of interesting laws, theories and facts from science, there will also be some very different questions for you to consider. This is a key point I wish to emphasize: you need to review the information, consider the implications and the questions it raises, and draw your own conclusions. No one else can or should do it for you. I have strongly avoided trying to force conclusions onto the reader and becoming viewed as being very one-sided.

With this all of the above in mind, I must also be honest and open with you on the intent of this book. After completely reviewing all the material, it is my hope that you will arrive at similar conclusions to my own. I have given the matters in this book substantial thought over long periods of time. These, together with other personal experiences and feelings that I have not been able to put into this book, have formed my beliefs. Very simply put, my conclusions and beliefs are that this is truly an amazing universe and I am certain that God exists and is behind it all.

There are things you should not expect this book to be. Since I am not an expert on religion, by any stretch of the imagination, this book will not be a deeply religious explanation of why you should believe there is a God. Neither will there be strong statements made in an attempt to force your conversion to such a belief.

Who is this book written for? It is written for individuals on one end of the opinion poll right through to the other. It is written for the firm believer who may never have heard these explanations before and, for them, it may only serve to reconfirm their beliefs. It is written for the sworn non-believer so that they too may have these explanations and be certain that they have considered everything. It is written for everyone in between and maybe especially more so for them. Everyone gets indecisive at times and finds themselves stuck on the edge of the fence. In terms of happiness, I hope that this material will help those people choose and get on the right side of the fence.

How is the material to be presented? The book is roughly divided into three sections. The first section explains what I feel are some very fundamental concepts and is important to the overall understanding of the later parts of the book. These concepts and ideas are described in the first three chapters.

The second section of the book is contained in the next five chapters. This section addresses my perspectives and outlooks on the various sciences. Not only are very basic explanations on the subjects provided, but also they are given from a viewpoint that may not be very commonly considered, if at all. The sciences to be described in this manner include: physics, mathematics, ‘engineering’, chemistry, biology, a little astronomy, and evolution.

These first two sections lay a foundation for my rationale and belief in God based on ‘scientific’ explanations, if I may take the liberty of calling it that. The third and last section consists of chapters that are not so scientifically based. Instead, they are my answers to what I think are common challenges issued by people on whether or not God exists. Several of the last chapters are a little more nebulous and they are my endeavors at philosophizing on the subject.

While it may appear like a sales pitch to read the whole book, unfortunately this appeal must be expressed. There is not one simple example, explanation, or line of reasoning that allows me to get the whole point across. On the contrary, it takes all three sections

Chapter 1 The Forces of Simplification

We are going to begin with a theory about the universe and a force that exists. For the sake of getting started, we will merely give it a name and call it the Force of Simplification. Before I get too far into an account of the actual theory, there is something that you should know about the word 'science'. Science has an incredibly plain meaning in the dictionary: it is the state of knowing. While the dictionary definition makes 'the state of knowing' sound elementary, to a well-trained scientist there is a lot of effort put into this concept of *knowing*. For a scientist, it is not good enough to merely say, "I know". They almost totally avoid the use of such a personal phrase.

Instead, what science does is to methodically go about proving that something is known. Believe it not, there are varying degrees or states of how well something is known. Even the phrase, "You practiced good science", is an indication and a compliment to the proper execution and art of establishing knowledge. We have all taken the subject of science at some point through our school years and many of the facts I may state, you have likely heard before. If this is the case, please bear with me and look upon these occurrences throughout the chapters as refreshers.

So, how does one go about practicing good science? We all remember being taught in school how to properly perform experiments, the various steps that must be followed, and the way to write up the experiment as a report. This is where science traditionally likes to start with establishing knowledge, through experimental evidence. Science then moves up the ladder in terms of establishing increasing degrees of certainty about the evidence. Wherever possible, there first needs to be either a lot of observations or experimental evidence to record that events and outcomes happen the way they do. It must all be very well documented and very repeatable. It must be so repeatable that another scientist anywhere in the world could make the same observation or conduct the same experiment and obtain the same results.

Although the methodology is being somewhat oversimplified, the strength and certainty of the knowledge follows a prescribed path in the scientific community. If the observations and experiments are about something non-trivial and the events are important to science, the first step on this ladder of knowledge is to refer to the conclusions or ideas as a hypothesis. Only after much further investigation and substantiation may the hypothesis be called a theory. Theories are also intended to cover the broadest area possible of a given topic. For example, there is the theory of flight and it addresses all of the aerodynamic principles involved with flying. It does not make sense to just have a theory about wings as this is would only provide part of the picture. Science would frown upon this incomplete picture and would require that more work be done to improve and expand the knowledge to provide as complete coverage as possible.

Beyond a theory, science requires that the knowledge becomes so profound, so well understood, and so predictable that it may be referred to as a law. A law in science is something that is nearly impossible to break. If a person could find numerous ways to break a scientific law, there would be a major furor in the scientific community and the

law would likely go into 'obscurity'. For example, the average person would be hard-pressed to disprove the laws of gravity.

Science is the state of knowing and it may build from a mere experiment to a hypothesis, then a theory, and finally to a law.

Returning to the subject matter, let us begin to describe the force of simplification. This theory is really quite straightforward and it states that over a period of time any object or any material will be reduced to its most simple and most random form. The simplicity and randomness may be referred to by some as chaos or disorder.

This force is incredibly powerful and it is constantly at work throughout our world and the universe itself. The force of simplification is extraordinary and applies to everything and anything in the universe with only one exception. The exception is that it does not apply to anything that is living. All living things are governed by another force that is totally different. In the simple model of our world and universe that I propose, everything can be separated and identified as being affected by one force or the other. For the model, all of the matter in the universe goes into two categories and it is either living or non-living.

There is nothing incomprehensible or difficult about this theory. In fact, once it is described you may comment that it is extremely rudimentary. The theory is not very detailed when it comes to quantifying the force. There are no units of measure such as you might find with other concepts like weight, speed, temperature, or pressure. Also, there is no quantification as to the amount of time required for the force of simplification to act and complete its effects.

The theory of simplification is that over a period of time anything that is complex will eventually be reduced to a simpler form. Any complex item will be reduced to its most basic elements and all structures and shapes will be reduced to random forms. Also, this force is extremely powerful. Absolutely nothing can stop this force from eventually acting upon on any type of matter and reducing it to a more random and simple form. It is as though this force has an abhorrence for the complex and wants to reduce it to a natural and simpler state.

It is important to remember that this force acts throughout the entire universe and applies to everything except matter that is in a living state.

The force is easy to observe and it is all around us, but we seldom bother to formally recognize it. Yet without taking serious notice of its existence, many human beings, without realizing it, are in a constant effort to counteract and labor against what could be considered its continuous onslaught. The force of simplification, and the state of universe it desires, can be observed everywhere. Let us consider some examples of what is meant by this. Picture a sea coast. If observed from an airplane, its shape and outline is totally random. Upon a closer view, if there are cliffs, they will likely be jagged, totally erratic in shape, and without any organization. If there is a beach, contours in the sand will be random. Random shapes will be created and changed by the blowing of the wind, falling of the rain, and the washing of the waves. Even the chemical makeup of

these materials will be comparatively simple and will be close to the base chemical elements.

The force is acting constantly and nothing complex is allowed to stay static, or the same, for an indefinite period of time. The time period might be very short. For example, you might take a close-up picture of a portion of sand on a beach framed by some naturally occurring objects such as small stones. The photograph captures the exact patterns, uniqueness, and the formation of the surrounding objects. Returning the very next day, you go to the exact same spot and find that the sand patterns and its surroundings are no longer the same. Regardless whether the change occurred that day, or the next, we know for this example it is bound to happen due to the forces of the wind, waves, or rain. Another situation might be that a child uses their imagination and creativity to build a sand castle on a beach. The next day it will be quite likely that the forces have taken their toll and reduced the intricate shapes to far simpler forms.

Think about a range of mountains. Their size and grandeur appear to make them complex, but upon careful examination of their shapes and structure the disorder becomes apparent. Then, when you reflect on the vastness and size of the mountains you might want to conclude that they are indestructible, invincible, and will last forever. For mountains, the time period might be very long for the force to act in any noticeable manner. You might go up into that range and take a photograph of a majestic mountain with its irregular silhouette against a beautiful sky. There are jagged cliffs, rocks and outcroppings of all kinds. You may come back several years later to the same spot to 'compare' your photographs, only to find them identical. How long can you be assured they will stay identical? We realize that you cannot be totally assured of this. Heat, cold, wind, ice, rain, snow and glaciers may all act as part of the force to wear the mountain down and change its shape. These effects may take hundreds and thousands of years to become observable. Yet, the force can act far swifter than that. There might be an earthquake, or volcanic action, that changes your picture the very next year or the very next week.

Next, you look out over the ocean. The waves are random shapes and patterns. There is no organization or complexity as you cannot predict the next large wave and where the next crest will break. One day the waves are still and the ocean is calm. The next day may bring great waves due to turbulent weather. Everything is simple and random. Drop a stone into a quiet pond where the surface is calm and smooth. This act has caused a more complex pattern to emerge. The waves formed by the falling stone radiate in a circular manner and the pattern of wavelets looks organized, looks complex. Wait, you continue observing for just a short period of time and the force of simplification has already acted. No pattern will remain. Nothing will remain complex.

If you examine or imagine any place on this Earth, in its oceans, deserts, fields and mountains: the makeup of all of these places is random and simple. They are totally and absolutely without organization. It is only when you add living things that these same places look organized and complex. Without the trees and the grasses, all these places would be desolate. That is one of the very deceptive features of this force when people try to observe it. What happens is that there is so much living matter that it is very easy to be confused. You see all that is living with its beauty, regularity, and complexity, that it is easy to be misled. The field looks complex and organized, but it is

because of the living grasses. The mountain side may look regular and organized, but it is because of life in the form of trees or bushes. They cover the simplicity and obscure the disorder that is beneath them.

Due to the abundance of life, maybe the better viewpoint to witness the force of simplification is to leave the planet Earth. The surface of our moon is as irregular, random and as simple as it gets. There are relatively flat and unscathed surface areas as well as innumerable craters of all shapes, sizes, that even overlap each other. How complex do you think the chemical makeup of the moon is? Is it a mere aggregate of chemical elements and minerals that vary in size from dust particles to major outcroppings?

If all life was stripped off the Earth, the beautiful blue water, white clouds and land shapes would remain. What would the Earth be like without life? It would not be as stark and as desolate as the moon, but everything would be as random, irregular, and as simple as possible.

Think of things that human beings are capable of creating. Some of these creations are very complex and organized. Can they be affected by the force of simplification? The answer is a definite - yes. There is nothing that human beings could construct or create that would not be overcome by the force of simplification. Just to illustrate this fact, let us think about some creations that we, as people, are capable of fabricating. To be complete, let us consider a very wide range of items, from the very easy to the very difficult and elaborate to build. The items I would like us to consider include: a sand castle, a house, a skyscraper, a pyramid, and a 'time vault'. Are any of these human creations capable of withstanding this force of simplification? While none are living, some are indeed very organized and complex shapes. The latter items are the most robust in terms of their design, construction, and time to build. Surely, they can withstand the force. As it is for all creations of human hands, the answer is a very plain and emphatic - no. None of these 'complex' items will survive the force of simplification.

A sand castle finely and carefully built on the beach will not last. We know that it will not take long for the wind, waves or the rain to take effect and reduce the sand castle to its simplest form: particles of sand. The phenomenon is the same for the house and skyscraper. We know that these constructions will last much longer. However, if there are no people laboring at maintenance and upkeep, it is just a matter of time. The force of simplification will finally reduce them to mere random particles of material. How long does it take a house to be reduced to dust and particles? The exact answer is not that important. What is important is that it *will happen* eventually, as long as there is no intervention by people laboring to counteract the force. The force may act very slowly and take a lifetime, or more, to prevail through its agents of weather and the environment. Yet, we have all heard of ancient civilizations found in the jungles. Only the major and most robust stone structures seem to survive and even these are nearly reduced to rubble.

There are extremely sad times when the force may be terribly quick and devastating through such acts as: earthquakes, tornadoes, hurricanes, a volcano, or disasters from space. The force may be quite rare in these types of occurrences, yet it is very powerful and extremely quick to reduce, destroy, and simplify. Entire cities, towns, or villages

could be devastated in relatively short order. Regardless of the form they take, one thing about this force is quite certain, whether fast or slow to act, the forces of simplification will prevail.

The pyramids are a good example of structures that have lasted thousands of years. Created by the ancient Egyptians, they were meant to serve as monuments to endure for all time. Will they? Will they last several thousand more years? What about a hundred thousand and what about a million years? Will they be under an ocean one day, or, part of subsurface geological formation? It is hard to predict precisely, but in terms of this inescapable force, it does not really matter. Time is on its side and it does not care. The pyramids will comply with the theory of simplification. Given time, the material that forms their organized structure will be reduced to the simplest of chemical elements and they may become randomly spread over the Earth.

What about the example of the 'time vault'? That seemed to be a strange and cryptic example. Be patient as I weave the circumstances for this exotic scenario. Let us imagine the best scientists and engineers working together to create a time vault that will survive and escape this force of simplification. Can it be done?

How should they go about constructing such a time vault. Where is a safe place? What are the strongest materials? The scenario might be as follows. They would place the time vault deep underground. Geologists would be consulted for an area on Earth with the most stable underground formations and that is the most free from earthquakes. The outside the vault will be made of one of the strongest and corrosion resistant metals; titanium. Maybe they will further protect the vault by encasing it in concrete that is reinforced with the strongest steels. They will surround all of this in a thick layer of rubber to cushion it from any movements of the Earth and to stop any liquids from penetrating it. The whole structure will be taken down a shaft, deep into this safe zone of the Earth’s crust. Now it is protected from all the elements of weather, the environment, and even objects from space. Surely this elaborate fabrication will withstand the force of simplification?

Already, some may be thinking of ways that this complex structure will eventually be reduced and broken down to simple and random elements. Is there a trick and gimmick to this situation? This time vault may last thousands and even millions of years. However, you know that the earth's crust is not stable and that eventually over time the layer of the earth containing the time vault may rise to the surface; end up exposed on the top of a mountain; bared at the bottom of the ocean; or fall victim to the force of subduction and become exposed to molten magma under the Earth’s crust. What if these things do not happen? Maybe our geologists were very sharp and astute in the practice of their science. Have we finally overcome this theoretical force? If it cannot be overcome, is there a chance this theory is already a law?

No, we have not won because the force of simplification shall prevail. It is always just a matter of time. Why?

Eventually the Earth itself will no longer exist and be the complex and 'organized' shape that it is. The force of simplification will eventually reduce the Earth itself to more simple elements and more randomness. When I studied science I recall a certain teacher who

was very knowledgeable on astronomy and the types of stars that have been categorized throughout the universe. There was even a complex diagram that he described for pictorially placing the various star types (Hertzsprung - Russell Diagram). I remember him speaking about rare binary stars orbiting each other; blue dwarf stars that are smaller but far hotter than our Sun; red giants that are cooler but incredibly larger than ours; pulsating stars; and, stars that go supernova and explode. We were in junior high, so I am sure that with the last explanation he could see the concern in our faces or maybe someone asked the question, “Will our Sun explode?”.

I still remember his intelligent and reassuring voice that was accompanied by a gentle smile. “No, our Sun is not of the exploding variety.” he stated. He reassured us that it would take billions of years for the Sun to consume its remaining hydrogen fuel and that our Sun was still relatively young. Being young myself and amazed by such information, I thought that this was great. Our sun was not the exploding type! It is funny being young as the emotions are somehow heightened and not yet dulled with age. I look back on those feelings now and remember that I was happy and relieved, even though I understood I would never be around to physically witness the ‘end’ of our Sun.

However, the teacher went on to explain that after billions of years our Sun will start to cool down as it consumes more of its fuel. As it cools, its color will change from yellow to orange or red. However, for the Earth, the worst part will be the change in size of the Sun. As it cools, it is predicted that the sun will greatly expand in size and it may expand to include the orbit of our planet Earth. This is not a good thing.

So how will our imaginary time vault fare? Not too well, I am afraid. It would be consumed, like every 'complex' shape and material on earth, through the countless nuclear fusion reactions that occur on the sun and through all the incredible heat. Even though it has 'cooled down', you may be sure everything on Earth will be ‘reconstituted’. All the complex shapes, all the complex elements and chemical structures will likely be reduced to their simplest elemental form and all nicely and evenly mixed. The Sun is a nuclear furnace converting matter to different elements and also converting it into energy: energy that is being given off in the form of light and heat. This is a nice thought - our time vault might turn into a heat wave for a remaining planet!

You may be questioning this and asking, “What if the science is wrong and the Earth remains unscathed? Maybe the expanding Sun does not reach our orbit, and the time vault remains intact?”. Well, you may be right, but the force still has a lot going for it. The Sun is one of many stars on the spiral arm of our galaxy called the Milky Way. If I remember correctly, we are on the outer two thirds from the center of the galaxy. What awaits us, and our time vault, as the Sun and all the planets spiral in towards the center of the galaxy? My bets are still on the forces of simplification to prevail over the complex time vault.

While it will be discussed further in a later chapter, the vast majority of the universe is made up of the simplest of the chemical elements: hydrogen and helium. Some people are likely to vigorously challenge the concept being put forward. What about the creation of the stars, and our Sun in particular, with its intricate planets and orbital systems? Look at how uniform and round these objects and orbits are. Is this not complex and organized? For myself, I only reply with a simple, “Not really.”. While it

does take a pretty sophisticated stretch for comparison purposes, it is not much different from dropping the stone in the quiet pond and seeing beautiful circular waves, in almost perfect symmetry, radiating from the center. Just like the ebb and flow of this short event, the stars are born, planetary systems created, and stars and their systems eventually 'die'. Of course there are significant differences when compared to example of the pond. Yet, the biggest variances are only the shear dimensions involved and the vast difference in the amount of time for both events to happen. However, as science always states - space and time are relative concepts.

Are the colored bands and clouds on Jupiter organized and complex, or are they just simple results of different gases, some additional chemicals, temperatures, affects of gravity, and rotation of the planet? Is the Great Red Spot something organized, is it a storm, or is it a result of gases interacting with an anomaly on the surface of the planet such as a 'volcano' or open 'hot spot'?

I hope that you are beginning to understand just how powerful the force of simplification is. It is present throughout the universe that we know. It affects stars, galaxies: everything! It does not matter what the latest theory is on the creation of the universe. It does not matter if cold gases and matter coalesce to form stars, planets, or galaxies. It does not matter if there is a 'big bang' theory or a great contraction of the universe. Eventually the force of simplification will prevail.

Now that the fundamental concepts of this force have been adequately put forth, we next need to move onto a different aspect of the force that is more personal to us and within time periods of our human life spans. You may question the existence of this force and that it is always in action around us. A question you might ask could include the following. If this force is so prevalent and dominating, why have not I noticed it more often? Why is this force not more obvious to me? Maybe the answer goes back to a tired and old cliché - we cannot see the forest for all the trees that are in our way.

The answer to the question lies in the fact that as human beings on this planet Earth, most of us live in cities. If we do live outside of large population centers, we are still surrounded by all types of life that are organized, complex, and beautiful. There are only very small portions of the Earth's total population that are in totally desolate areas without substantial quantities of visible life forms all about them. We are social creatures, and living in our villages, towns, cities and mega-centers, we love to surround ourselves with our complexities. We need our houses, buildings, streets, automobiles and all manners of items and gadgets of convenience.

We are so busy going about making 'our living' and then spending some recreation time that we lose sight of the force of simplification. We dissipate so much of our existence absorbed by the constant effort of making a living, that our heads are constantly bent down and looking at the ground, just like staring at one tree after another and not seeing a beautiful forest. We are caught on the gerbil wheel of surviving. Rarely is it that we take time to get off that wheel and take a good look around.

As the force acts continuously, we as human beings are always busy rebuilding, repairing and continuing to surround ourselves in organization, complexity, and the 'neatness' of our desires. If you think about your personal circumstances, this condition

is likely present. For myself, it is a constant battle against the forces of simplification. Something in the home needs painting because it is becoming worn or weathered. I have one very old vehicle and it is rusting away and forever breaking one of its parts. It seems as though one of my main missions in life is to repair and replace worn-out items around the home. The force never seems to give me a break.

It does not stop at just a personal level as it is a global and universal force. If you live in a major population center, just make a hard examination of the conditions when you travel about. Through taxes, we pay for and have teams and departments of people who are organized to combat the force. Large city departments with expensive equipment, technology and people are created for the maintenance of roads (my vehicle has 'magnetic' tires attracted to potholes). There are waterworks departments for water main breaks and problems with the sewers. Painting and maintenance crews are needed to refresh worn paint on city structures of all types. Bridges wear out. Our complex electrical systems wear out. You name it, and the force wears it out. Stop the maintenance and the effects may become drastic. Stop them for decades, centuries, or more, to get the full repercussions and affects of the forces. Go visit an ancient city created by past civilizations to observe what happens when the maintenance stops. We even have specialists, archeologists, to unearth and restore such sites so that they may be observed in the state they once existed.

We have just grown so accustomed to seeing living things around us and everything at least in some state of decent maintenance. We think that this is the way it always is, and the way it always will be. Our life spans are so relatively short when compared to the periods of time that the force operates in. We further try to counteract these affects by compensating through designing products to last longer: home sidings that last a lifetime without painting, and so forth.

Yet, the vast majority of people on this Earth truly spend their efforts on a continuous basis insulating and protecting themselves, and others, from the force of simplification. They do not even realize it. Since we are so surrounded with our own creations and organization, it is difficult for us to accept that this force exists and is so predominant in the universe. We are lost in the forest of our complexities. To truly view simplification you must go where there is nothing made by people and where nothing is living: a barren mountain side, a desert, an ocean, or a barren seaside. Then observe the lack of organization, the simplicity of what you are viewing and the irregularity. This is where the forces on Earth have been left alone and where there is no confusion with the force of life. The force has been left alone to make everything random and simpler.

When you find yourself in such places you will have a strange feeling, a feeling of being someplace foreign. You sense that something is missing, that you are alone, and possibly unprotected. Even at that, you are able to stay in some of those barren conditions only for so long. If you are in the mountains and a strong snow storm occurs, or if you are at the ocean side and a violent rainstorm with winds and pounding waves happens: you will find yourself seeking shelter in human complexities. Rare is it, that you would stand unprotected and unprepared in these environments with only the plain clothing that is on your back. How long could you remain without the complexities?

In summary, no matter what a person may create during their lifetime, no matter how complex the item, the force of simplification will eventually act on that item and reduce it to a simpler and more random form. It is almost as though the force of simplification dislikes, even hates, anything that is organized and over time it will drive all things to the desired state - simplicity and randomness. The force prevails throughout all the universe and is unrelenting - it has an infinite amount of time to act. Furthermore, there are forces so strong that they dwarf all of human endeavor to stop or alter. Typically, we see only the slow and milder forces that are on the planet Earth.

Sometimes the force acts very slowly and you cannot perceive it. Other times it acts suddenly with very visible results that we notice immediately: a fire, an earthquake, or a flood. Our reaction to the sudden power of the force in these circumstances is that we spend a period of time saddened by the loss. Yet we strive for our continued survival and seek once again to organize our lives and the immediate environment around us. The net result is that we re-build or move on to another place to build again. We do this individually and on mass as part of humanity.

There is fantastic elegance all around us. Look at the sea, the wind, the Earth, and the Sun. All of these harbor immense and truly incredible forces. However, do not be deceived by them. They do not have some sense of organization or creativity. The desire, the end state, for these forces is for simplicity and randomness.

I believe that it is impossible for this force to be involved in creating something as complex as life. Forces of complexity are involved with life and each of us has our beliefs in what is behind that force. It is true that the Sun and the wind may be vital for sustaining life and providing energy, but do not make the mistake that they are capable of organization or adding information for an increase in complexity. Just the opposite is true. The sea, the wind, the Earth, and the Sun are at times agents of the force of simplification. To understand this, just build a house, an organized and complex object, that is too close to the sea. The sea is beautiful, but it simplifies.

Through the study of ancient civilizations it is interesting to learn what people may have worshipped. Some believed there were gods of the sea, wind, thunder, or the Sun. Maybe this was done because those elements can display such immense power. The power could be both destructive and supportive to their civilizations. The Sun and rain were vital to good crops, thus ensuring that some of the foods needed for their survival were plentiful. I feel their beliefs were in error, because they did not understand that they were looking at forces of simplification. They were looking at forces that may have supported life, but not at forces that created life.

There is a field in mathematics that it is capable of describing and defining highly irregular objects. This area is referred to as fractals and was pioneered by the mathematician Benoit Mandelbrot in the 1970s. He established a more abstract definition for the term ‘dimension’ than what people are normally accustomed to. We commonly think of dimensions to be in whole numbers such as one, two, or three. Examples would be a two dimensional picture or a three dimensional object. Mandelbrot proposed that irregular objects may be treated mathematically as though they had a fractional dimension. Fractals have been used to define irregular objects and also to compress complex still and video images on computers. The application of fractal

geometry in the sciences has been rapidly expanding. Mountains, clouds, aggregates, galaxy clusters, and even natural phenomena were suggested by Mandelbrot as being fractal in nature.

This is quite an achievement as now the most irregular and ill defined item may be described by using this new field of fractal mathematics. However, I could not find any references to forces that are 'fractal' and that there might be some connection or explanation for their irregular or random action.

In reviewing the manuscript, much input was received in regard to the forces of simplification. The comments centered on the fact that much of what has been stated is just the second law of thermodynamics and this is indeed true. The following is a brief encyclopedia definition of this law. However, I will leave it to the reader to judge and compare the pure scientific description to that previously provided.

> **Second Law of Thermodynamics**
> The second law of thermodynamics gives a precise definition of a property called entropy. Entropy can be thought of as a measure of how close a system is to equilibrium; it can also be thought of as a measure of the disorder in the system. The law states that the entropy—that is, the disorder—of an isolated system can never decrease. Thus, when an isolated system achieves a configuration of maximum entropy, it can no longer undergo change: It has reached equilibrium. Nature, then, seems to "prefer" disorder or chaos.
>
> "Thermodynamics," *Microsoft® Encarta® 97 Encyclopedia.* © 1993-1996 Microsoft Corporation.

Notice in this definition, there is an important use of the phrase 'isolated system'. If one considers an isolated system, is it contained within a laboratory, the planet Earth, the solar system, or the universe?

There is one last area and force that needs to be described before we move on to the next chapter and the next subject. I referred to it earlier as the second force that was almost in opposition to the force of simplification. Using the most basic of terms, I call it the force of complication.

To be absolutely fair, it is not totally in opposition to the force of simplification, because the forces mainly act on different types of matter. For the force of complication, it only acts on living matter. *The item must be living.* This is extremely important. For when something is no longer *living* and it dies*,* the force of simplification once again takes over.

Living things are extremely complex and organized. They are organized not only in their physical structure, but may also be very organized in their living behavior and even the habitats they occupy. Most living creatures display a physical structure that is very symmetrical and contributes to this sense of organization. Many plants and animals display this symmetry and therefore it is difficult to state categorically that they look like a random structure. For animals, the prevalent structure is a bilateral symmetry. If you take an animal and consider its lateral line and then think about both halves of the animal, they are almost totally symmetrical. As human beings, we too have this bilateral

structure and have become very familiar with seeing organization in terms of two eyes, two ears, two arms and so on. Although there is nothing 'miraculous' about the bilateral nature and occurrence in pairs, it is however very far from being random and simple.

Although the animal population around the globe is very plentiful in the oceans, air, and land masses, so too is the plant population. The best 'disguise' to cover all the irregularity and randomness of land shapes and surfaces on our Earth is that provided by plant life. From vast areas of grassland to expansive forests, their organization and regularity shields and covers the simplicity and randomness beneath them. This leads us to our false sense of security and comfort. We take for granted that since this is all around us, we have the mistakenly innate feeling that our entire universe must be like this as well. This is why I emphasize that you must separate the living from the non-living when you are looking for the forces of simplification.

Not only are the major habitable land masses covered in this complexity and organization, but so too are portions of the oceans. Although it is not part of the average person's daily experience, I am sure that scuba divers witness this complexity and organization that covers habitable parts of the ocean beds. Instead of seeing nothing but simplicity and irregular surfaces, they are witness to beds of plant life and coral structures that add to the organization and complexity of the oceans. Of course, this is in addition to all the other swimming and moving aquatic life.

Living creatures, in my opinion, are the only forms that are observable to us, throughout the entire universe, that display this trait of complication. Not only are they capable of *getting* more complicated, but they can affect their surroundings to make them more complex or organized. From a bird that weaves a simple, but elegant round nest, to all of human kind: they take the simple, make it complex, and constantly expend effort to maintain their complex environment.

How these forces of complexity came about depend upon your personal beliefs. Some people only have a belief in science, that life was created spontaneously, and then subsequently evolved into the more complex life forms. The scientific term for this is abiogenesis that the dictionary defines as "the supposed spontaneous origination of living organisms directly from lifeless matter".

Instead of calling it the force of complexity, as I have referred to it previously, science has termed this force as evolution. Later, there will be two chapters that further explore the details of primordial life and evolution. So, this present explanation on the force of complexity will be cut short.

However, if I might quote a cute phrase, the purpose of this chapter has been to first understand the simple. If you cannot understand the simple, how can you go on to understand the complex?

The exact nature of the forces has not been determined or even quantified. Also, there appear to be various agents that act as part of this force and reduce things to randomness and break them down into simpler forms. The second law of thermodynamics does not provide clarification at this level.

We all are capable of naming the agents that act within our environment on Earth. It gets more difficult to describe the agents that reduce and simplify within the universe. Yet, we know the forces are there. Although a relative term, time itself is almost an integral part of the force. Whether something is complex on Earth and can be dispensed with in short order, or whether it takes billions of years to act on something of astronomical proportions in our universe, the force of simplification has time in its corner to achieve the desired state of simplicity. There is no known place in the universe to seek shelter from its affects. To maintain a position of complexity requires a constant effort by a totally unique force.

This description of the forces of simplification, or the second law of thermodynamics, if you prefer, is important to keep in mind for the balance of this book. There will be other concepts and ideas for you to consider. At times, there will be references back to this force and you will need to evaluate it fairly within your deliberations.

Chapter 2 Possibility & Probability: So What is the Difference?

The topic of possibility and probability is likely to raise a few eyebrows and create a few questioning looks. Why is this a subject that should be reviewed, is it that important a matter, and what does it have to do with God? This is where some trust and patience on your part will be required. The different meaning between the two words and an interesting illustration will be provided. Later, this should prove useful in permitting your independent assessment of events in science that some would like you to believe. An interesting definition of those two words was taught to me that I would like to explain and share. The illustration that a teacher gave, which was so strong in terms of putting things in perspective, will also be explained.

The definition and illustrating example on possibility and probability has stayed with me for a lifetime. In later chapters you will see that it is significant. Questions will arise as to whether or not something was possible or probable to occur. I feel that the example described in this chapter will help considerably to put things in a clear perspective and allow you to draw your own conclusions. Do not worry, the subject matter is going to be kept light and the explanations are not going to become complex in a technical or mathematical sense. The whole topic is too important and I do not want to lose you during any part of this.

Believe it or not, I first became exposed to these two words, possibility and probability, when I was in elementary school. The ironic part is that although I spent quite a bit of time with those two words in a school project, I believe that I was too young and did not fully understand the difference between the words. It was not until senior high school that I was to learn the true meanings. The key to their difference and the profound example I remembered will be compared against several subjects in science, including the scientific explanation for the creation of life. Before I get to that, a short digression back to elementary school days will be made.

While I was in grade five or six, we were told about an major annual event that was held between all the schools and grades within the City of Winnipeg: a Science Fair. Our elementary teacher strongly encouraged the class to come up with ideas, either individually or as a group, and enter them into the Science Fair. One of my best friends in elementary was Bruce, we lived about one block apart, and we rode the Cathedral bus back and forth each day to Robertson Elementary School. I even rode lookout on the bus for Bruce. I was an early riser and caught the bus before it headed on its loop around Scotia Street and came right back to where I got on. The plan was to meet him at the first stop, but Bruce was not an early riser. There were many times when I stood beside the bus driver as we looped back and I would peer down St. Cross Street looking for Bruce to be running and myself yammering at the driver to wait. The morning bus was always crowded and usually had standing room only. Students going to St. John's High got off at Salter Street and we continued on with our sudden expansion of free space and available seating. Before the Salter Street exodus, an elementary student, with a cute lunch box, had to be careful with the giants as they were not to be messed with.

Bruce and I decided to enter the Science Fair together and our topic: none other than Possibility and Probability. To be totally honest, I have no recollection as to how we

came up with this subject for our project entry. I learned much later that Bruce's Father was a physics professor at the University of Manitoba. While not sure, I am somewhat confident that the project idea likely originated with Bruce. It was certainly a different project for some elementary kids to be working on and this became very apparent when we attended our first Science Fair. While other projects were building volcanoes and the like, we were working on a math project dealing with odds and possibilities.

With youth, enthusiasm usually prevails and we had a great deal of fun putting the project together. Our display backboard was an elaborate fold-out structure that stood three or four feet tall above the table surface. I faintly recall that we used a black and red color scheme. Huge letters were traced and cut out from colored paper; spelling out our project title proudly across the backboard. Even the words themselves were complicated for us and we were constantly checking the spelling. Below the title, we had all kinds of room for our drawings, typed explanations on the odds involved with the topics we selected, and the meaning of possibility and probability. The most difficult thing for the two of us was to develop a list of topics that involved possibility and probability, and then create visuals for them. We eventually came up with: coin tossing, getting heads or tails; rolling dice; playing cards, getting a royal flush; and, a game involving different sized disks and rearranging them in the least amount of moves on three spikes. Making the stand with the spikes and the disks from wood was easy. Not only was it a good visual for the table, but everyone wanted to try their hand at it. For the royal flush, we took actual cards from a deck and glued them to a colorful backdrop. The dice were also easy to place on the table. However, we were stumped as to how to display a coin toss in an interesting way, but after some brainstorming we came up with what we thought was a brilliant solution.

We decided to suspend a coin in the air, by using a thread, so that it would look as though it was just tossed. On the table under the dangling coin, we would place a hand that looked as if it was in the act of flipping the coin. For the hand, we would just go to a department store and ask for a hand from a display mannequin. The plan was good, but the actual execution turned out to be difficult. One Saturday, young Bruce and I hopped on the downtown bus and went to most, if not all, of the major downtown department stores along Portage Avenue. Large suburban shopping malls were not in vogue yet. On a weekend, downtown was the place to be.

Not only was it difficult to find a mannequin hand that would look like it was in a suitable position for tossing a coin, but it was near to impossible to get a major department store to part with one. Picture it, two small kids explaining to a busy sales person what their science fair project was about and that they literally wanted a hand. We received many strange looks, pauses, slight smiles, all to be followed with a curt and a polite: "Sorry, we can't do that". After we tried what seemed like a dozen places, we found a small store that sold nurses uniforms which had a sympathetic and kind lady who listened patiently to two small boys describe their plight. Without saying she could help us, she went into a back-room and returned with the miracle we so desperately needed. Not only was it a hand, but instead of being a rigid plaster one, this hand was made of a special rubber that was life-like and all the fingers were flexible and moveable. After what seemed was going to be a disastrous outing, we jumped back on the bus and headed home clutching and admiring our newfound treasure.

After making a wooden stand that the hand could be attached to, we adjusted the fingers and the thumb so that it looked as though it was flipping a coin into the air. With our write-ups and displays complete, we were ready for our first Science Fair. To us, the city-wide event took up a colossal amount of space to house all the science projects. The event was held in a new and recently completed shopping center. Every type of science project under the sun was on display. While there were many from elementary schools, the most projects originated from the high school grades and these were the most impressive. After getting our display set up, we wandered around for a good part of the day, examining with awe and admiration the elaborate array of science projects ranging from: airplanes and flight; to colorful complex models of chemical molecules; to astronomy and models of the solar system; and, to biology displays with living plants and live animals.

The Science Fair spanned an entire weekend. One day was set aside for the judging and I remember anxiously waiting for the team to arrive to our booth. The questions came from directions that we were not totally prepared for, but I am sure our enthusiasm came through. The next morning was filled with excitement as we literally ran the length of the mall. We flew by other projects and occasionally caught a glimpse of one displaying its colorful winning ribbon. We arrived at our table breathless, quickly scanned the display, and were overjoyed to see that it had a ribbon for honorable mention. Well, this is the way the saga ended.

What I find as an interesting coincidence, and without intentionally planning it in any way, is that over 35 years later I am writing a chapter with a title that is identical to that Science Fair project.

Robertson Elementary School is at the junction of Cathedral Avenue and Robertson Street. I went there for three years, grades four to six, as part of a program called Major Work. Without knowing the history behind it, Major Work may have been one of those educational experiments that was phased-in and then phased-out. With a vague recollection, I remember being summoned with my Mother to meet the grade three teacher and being told I was selected to go into this program. Being relieved that I was not in some kind of serious trouble; having no concept of what the program was really about; being only nine years of age; and, answering “Sure, I’ll go” was delivered far quicker than it took to write this sentence.

Three years of taking a bus and three years with the same teacher was a different experience. While this time-span might make the experience seem tedious or repetitious, the exact opposite was true. The teacher was from England, complete with accent, and provided us with some years of education that I would not trade for anything. I look back on that teacher as being extremely gifted, full of new ideas, and offering different learning experiences to his pupils. Our whole class was extremely impressed to find out that he had written a small television series for broadcast into the schools. The subject of the series was the human body. Each broadcast covered a different area such as the skeletal system, respiratory, circulatory, and so on. He not only wrote the scripts, but he hosted and narrated the entire series.

Not only did we take all the regular subjects that you would expect for the elementary grades, but the years were supplemented by all types of other learning situations. While

I cannot recall them all, they included such things as: taking typing lessons; constructing and painting huge scenery backdrops for a school play; holding mock civic elections; each row in the class giving a mock radio broadcast with assigned roles of host, news, weather, sports, and humorous commercial segments; and, a weekly project.

Once every week, all students were required to hand in their weekly project on a large eleven by seventeen inch piece of art paper. These were then posted on the back wall of the classroom by the teacher. The morning after they were posted, there was a rush of students to find out what grade they received on the project. A score of 20 was a perfect mark. The wall displaying the projects was an impressive site and everyone spent some time studying the other projects. This was done not only to learn about the topic but to find out what techniques were successful at receiving a good grade. Lettering stencil sets were coveted and in vogue. Projects with one inch high titles and colored letters were the rave. Changing the lettering style to exotic types came next. Hand typed description pages invisibly taped in place would fair well. Diagrams and maps with everything neatly labeled and in color would work. Neatness, style, and color seemed to be important to get the top scores. If possible, students even attached real objects to the sheet. I remembered doing one on acetylsalicylic acid, common household aspirin, and I attached an actual tablet to the project paper.

Projects varied each week and the students might not have been allowed any choice on their topic, other than presentation style. The fixed assignments may have been on geography and a particular country or province we were studying. Then the project ended up being a map with text. We had to create proper map legends, label all major cities or geographic features, and of course use plenty of color. As your memories probably include, a huge set of color pencils and expert techniques in color shading of large areas came in handy. The following week the project may have been an area of science that we would have to work on. The type I liked the most was when we had a free choice to do any subject matter we wished.

For one free choice, I remember a near obsession with a particular topic. I had an idea for a real object that I was determined to include with the project. My topic was X rays, but I wanted to display a real X ray of a person's head showing a detailed view of the skull. Since my Mother was a nurse, I assumed, quite naïvely, that she could bring anything back from the hospital. Being persistent, I hounded her week after week for a head X ray: any old head would do. Unfortunately, I was not able to get the X ray which was so passionately desired. At this young age, I could not understand the concept of this being an important patient record. Hospitals and doctors were just not routinely issuing X rays to be taken home.

It was also surprising to see the amount of effort put in by my classmates, and myself, on these weekly projects. Yet, I do not recall there being an inordinate amount of competition or that the assignments were being viewed as a real chore. Instead, it seemed to become a fun, challenging, and creative thing to undertake.

These were three pretty good years of learning, fun and friendship. Also, this was a time period when certain world events or major trends became permanently associated with my memories; just as I am sure exist for you. For my generation, this is when the music group the Beatles became the biggest sensation and changed all the boys clothing

styles to 'beatle boots' and turtle neck sweaters. It was also a sad time in world events, when a teacher came in to advise us that President Kennedy had just been assassinated. For those of us that used the bus and did not go home for lunch, this was announced to us in our classroom during the noon lunch.

For my next encounter with the words 'possibility and probability', and to progress towards the point, I have to fast forward to a grade 11 chemistry class. However, as to why we would be discussing the meaning of such terminology in a chemistry class, I cannot clearly remember.

The chemistry teacher was describing to us topics such as the density of matter, molecules, their random vibrating motions, and the differences between, gases, liquids and solids. Everyone who has had some exposure to science will likely have heard similar types of descriptions, but just in case, I will go through them in as simple a manner as possible.

The teacher started out by describing a concept called absolute zero. It was explained to the class that this is only a theoretical temperature and that it cannot actually be reached. All molecules and atoms vibrate due to heat energy and have some degree of motion. The theory he described was that at the coldest temperature possible, absolute zero, all motion would cease because there would be no heat energy at all. Hence the name absolute refers to the absolute absence of heat. For quantitative purposes, absolute zero has the following temperature. Using the different temperature scales, it is expressed as: minus 459.69 degrees Fahrenheit; minus 273.16 degrees Celsius; or, zero degrees on the Kelvin scale. A temperature of minus 459 F is pretty darn cold and while we joke about how cold it gets in Winnipeg in the wintertime, this is not even in the same ball park. Scientists have gotten extremely close to achieving the temperature of absolute zero using highly specialized means, but have not achieved the theoretical value. The whole field of studying low temperatures is called Cryogenics. We are aware of this term from the film documentaries or the science fiction movies that employ cryogenics to imaginative ends.

After delivering the explanation of absolute zero being the total and absolute lack of heat, combined with the total lack of molecular motion, the teacher went on to explain what happens when you add heat. The way he explained it was that as you add heat to the molecules, or atoms if it is a pure element, they become more energetic. All molecules that make up any matter are vibrating in place and have spaces between them. It was something we just had to picture and the teacher did not quantify the amount of vibration, motion, or the amount of space involved.

As an aside, if you have a microwave oven, it works on the principle of increasing the vibration of molecules. Water molecules in food substances are vibrated by the microwave energy that is radiated into the cooking chamber. The microwaves increase the rate of vibration of the water molecules and thereby their heat energy. Being an engineer, and having studied microwave theory, I always show respect for a microwave oven and express this concern to my children. While an oven may be in excellent condition with good door seals, I am forever asking family members to always stand back to be safe. This is because there sometimes is a tendency to stand right next to the machine while waiting for the food to cook. Engineers know that radiated power

drops off substantially based on a mathematical function involving the distance. I also know that I have a pretty good content of water in my head, and the rest of my body for that matter.

Returning to the chemistry class, the teacher went on to describe that the majority of materials have both a melting and a boiling point, but there are always a few exceptions. The state of any material, or matter as it is properly referred to, depends upon its current temperature as to whether it is a solid, liquid, or a gas. Matter has varying melting and boiling points. For example, we all know the familiar transition temperatures of water. The freezing, or solidification point, for water is 0 degrees Celsius or 32 degrees Fahrenheit. The boiling, or vaporization point, for water is 100 degrees Celsius or 212 degrees Fahrenheit.

As a class, we began to understand the concept of when matter is a solid. The molecules are still vibrating and jiggling about, but they are somewhat 'locked' into place and do not have the same freedom of movement as in a liquid. When you add energy, or heat, to the molecules, their vibration levels increase until the melting point is reached. This is when a solid transitions, or melts, into a liquid. Now, the molecules in the liquid are vibrating more, spaced further apart, and are no longer strongly bound or locked in a solid form. If you add even more heat energy to the molecules, the liquid will reach its boiling point. At that temperature point, the matter goes from the liquid phase to a gaseous, or vapor phase. It is at this phase that the molecules are highly energetic in their vibrations, have the highest degree of spacing between each other, and the most amount of random motion. Gases are as loosely bound as it gets, so to say. All the spacing between molecules relates to a term for matter referred to as density. Gases are the least dense, liquids denser, and solids have the highest density.

This all made a lot of sense to the class, was readily accepted, and became a good model on which to base our understanding.

We know that air is actually a mixture of gases such as oxygen, carbon dioxide, nitrogen and many others. How cold do you have to make these gases in order to turn them into liquids or solids? As one example, it is possible to make liquid oxygen (-297 deg. F.) and even solid oxygen (-361 deg. F.). Just as the television program would state, these are not temperatures you want to try and achieve at home. So, when we consider important gases, like the air we breathe, we should appreciate the average temperatures that we have on Earth. The same cannot be said for some of the outer planets where incredibly low temperatures do exist.

What does all of this have to do with possibility and probability? Be patient, we are getting there. While I have added some details to the above material, after the chemistry teacher finished explaining the vibration and random motion of air molecules, he abruptly switched topics. He asked the class if we knew what was the difference between possibility and probability. The class was mildly stunned as this query seemed to come out of the blue and no one understood what it had to do with chemistry. After a silent pause and no one volunteering an answer, he commenced to go through an illustration that was intended to help us learn and remember the difference.

Although it was a chemistry class, our actual classroom was not a specially equipped lab or anything like that. I guess we were into the pure 'theory' part of chemistry and did not need any extraneous paraphernalia. The class was held in just a regular square shaped room. The teacher went on to explain his illustration. He stated that we now understood how air molecules were all highly energized, giggling and moving about in a totally random manner. That is, they were 'bouncing' off each other and jostling around in what could be considered a totally random fashion and in random directions. Millions and trillions of little motions are occurring all about us, but because the molecules are spaced so far apart we can see right through the air and we cannot observe any motion whatsoever with the human eye. We can affect the motions by moving our hands through the air, and if vigorous enough, we can cause the air to move strong enough so that we feel masses of molecules hitting our skin. This all made perfect sense to us students. Next, we were asked to picture the entire classroom filled with air, and with all these trillions of air molecules and atoms moving and jostling about in an apparent total random fashion.

Then suddenly the teacher posed his question. With all seriousness, he solemnly asked the class: "What are the odds or the possibility of the air molecules moving about, and, just for an instant, migrating up into the top corner of the classroom, leaving the rest of the room in a vacuum, and the entire class momentarily without any air to breathe?".

There was a good long period of silence as the question seemed to both stun us and be somewhat outlandish at the same time. How do you even start considering something like this? How would you even begin to calculate any odds or possibilities? After the silence, the debate began. Opinions were stated and clarifying questions were posed to the teacher. Some students stated it was just impossible to occur and that there was absolutely no possibility of this happening. The teacher kept probing and pushing us to consider it further. He tried to make it more possible by expanding on the situation. He again asked the question, but in a modified way: "You are alone in the room. You are strictly an observer in the room and no movements you make will disturb the air or affect the outcome. The room is totally sealed and totally undisturbed. Furthermore, you are allowed to observe for a billion years, or more, if necessary. Will the air molecules in the room with their apparent random motion, even for the tiniest fraction of a second, move into any corner of the room leaving the rest of the room in a momentary vacuum?".

There was more silence from the class as we considered the enormity of it: you could be an observer for billions of years. Could the event possibly happen? There was more debate and more questions. How would you calculate the odds, all those trillions of motions, suddenly after millions or billions of years of 'waiting' it happens, all the air molecules simultaneously move in the same direction towards a corner of the room. It could happen, or could it?

The teacher would let the discussion, which was getting pretty excited by now, go on for only so long. All answers were volunteered: yes it could happen, no it could not. So he quietly gave us the answer and the definitions that remained with me for the rest of my life. The answer is yes. Yes, it is possible. Anything is possible. The odds may be absolutely incredible against it, but the answer always is: anything is possible.

He let that 'sit' with us for a while. I was quietly mulling this over, "Wow, wait maybe billions of years, and the air migrates to the corner of the room for that freak split second accident.". After the silence passed and no one had the courage to challenge or question him, he posed yet another question. He asked the class, "Is it probable?".

Again there was stunned silence. What was going on and why was he asking the same question? There was a little more discussion, but we were exhausted from the debate, class time was running out, and he just gave us the answer: "No, it is not probable.". The explanation was that while anything may be possible, you have to also consider whether or not it is probable to happen. For the illustration he just gave us, he went on to explain. With so many trillions of molecules in a room erratically moving about and having such a large distance for some molecules to travel, unhindered, from one corner to other, in the same concerted direction, it was just not probable to occur. Possible - yes; probable - a big no.

Those knowledgeable in the complete physics of the illustration and versed in probability theory could actually try and calculate the probability for you. You may take my word for it that the probability would be so infinitesimally small that you may consider it to be zero.

That definition of possibility and probability has stuck with me ever since that time. Later on when I was taking engineering, or a course involving statistics, every time the question came up in my mind as to what word meant what, I went back and used that example to think it out. Anything is possible, but whether or not it is probable, that is an entirely different matter and requires calculation.

Again, I cannot explain why our chemistry teacher went off into mathematics and a description on the differences between possibility and probability. He must have had a secret passion for math and for amazing students with fascinating scenarios, but for me it was one of those 'great' illustrations that we all receive from time to time.

Now that the webs of reminiscing are cleared and the explanations are complete, you should be asking, "So who cares anyway, and what could this have to do with God?". While it may not be absolutely clear now, the explanation that was provided for possibility and probability, and even the illustration of air in a room, is quite germane.

In the following chapter we will consider what some people in science would like us to believe was the source of life on Earth. One theory is sometimes referred to as the primordial soup. This is a theory that early in the Earth's development the oceans were full of organic compounds that were the basic building blocks of early life. Unique circumstances or processes came to bear upon these compounds with the result being the spontaneous creation of life. This is sometimes referred to as abiogenesis.

Analogies are never 100% perfect, but when I think about the spontaneous creation of something that is considerably more complex than its surroundings, I wonder what the probabilities might be. Proponents of abiogenesis argue that there were millions, if not billions, of years available for this event to happen. Are there not millions and billions of years for the air molecules to migrate? Personally, I am not nearly satisfied that supplying an adequate amount of time is the answer that allows complexity to come into

existence. I am not using the analogy of "air in a room" as my only basis for this skepticism.

In the first chapter we reviewed what I termed as the forces of simplification and what is succinctly described in science as the 2nd Law of Thermodynamics. How would primordial compounds overcome these forces to form into something that is more complex and that is living? Proponents for abiogenesis state that the 2nd Law, and nature's seemingly "preference" for disorder or chaos, is overcome by the energy provided from the Sun. The logic is that the Earth should not be considered as an isolated system that has reached its final equilibrium. The claim is that the energy provided by the Sun results in a change in the Earth's entropy. This makes it possible for an increase in complexity that counteracts the tendency for disorder or chaos.

Disorder and chaos prevail on all the other planets in our solar system. They also are provided energy by the Sun. Yet, from a purely probabilistic viewpoint, the other planets have not benefited and they do not display a comparable increase in complexity of any type that is observable to us. The counter argument is that this increase in complexity on Earth, called life, requires other conditions that exist on our planet.

Consider the illustration of air molecules in a room and the benefit of changes in energy levels. Does this improve or change the probabilities of air molecules migrating in a room? Would they become more complex or organized in any type of way? Adding heat energy to the room would likely not improve the probabilities. The molecules would only become more energetic and the pressure in the room would increase just like hot air expands a balloon. Maybe removing heat energy would improve the probabilities for our desired state of complexity? If we removed enough heat energy, the gases would liquefy and condense on the walls and form "puddles" on the floor.

While this appears to be progress, something is still missing from achieving the desired end state. The droplets and puddles needed to "migrate" into one corner of the room. What is missing is information. Information is needed in terms of directional data, or some other parameters, that would have the molecules move into one corner.

The concept that information is needed for complexity to arise may not sit well with the proponents of abiogenesis and evolution. This is because a source for the information may be difficult to explain scientifically. Instead, it will likely be debated that complexity can arise without the need for information whatsoever.

It was stated earlier that analogies are not 100% perfect. You will need to evaluate for yourself the comparisons between "air in a room" and a "primordial ocean of organic compounds". Is the complexity of migrating into the corner of a room easier or more difficult than combining into something that is alive ***and*** which can reproduce itself?

I ask that you reflect on the following concepts as we move on to the next chapter and the topic of super labs versus primordial soup. The concepts are: the forces of simplification (disorder and chaos, if you prefer); probability; and, the requirement for energy and information. In this hypothetical competition, the super labs should have a distinct advantage as they are allowed to intelligently collect and harness the power of information.

Chapter 3 The Super Labs vs. The Primordial Organic Soup

There is a hypothetical challenge that I would like you to consider. It is a challenge between two sides that I have named the Super Labs and the Primordial Soup. They are to be set against each other in a competition. It is a important challenge because it pits all the cumulative intelligence and scientific horsepower harnessed by human beings against the awesome powers of nature. The challenge - create any living organism from scratch. The definition of 'scratch' is quite plain and simple. The challenging sides may use any components or organic chemicals as long as there is absolutely no life in any of the raw ingredients.

Before we get too far into the details of this challenge and try to establish which side is successful and why, we need to first consider the starting points and strengths of the members involved in the competition. Let us begin with nature's side, Primordial Organic Soup, as it is sometimes referred to. What is a good description of the strengths, conditions, content and early settings for the primordial soup?

To find descriptions of primordial conditions and some theories on how life may have originated, I sought out two references. One reference is quite old, from the 1960's, and comes from the biology textbook that I used in high school. The particular reference that was found is a short and succinct description. The text is quoted completely, as follows:

> **The Origin and the History of Life**
>
> Several billion years ago, when the earth was vastly different from what it is today, the primeval seas became rich mixtures of organic molecules. Probably a chance combination of molecules produced a larger molecule (similar to the DNA of today?) that had a chemical structure giving it a pattern for exact duplication. Slowly, the duplicating molecules became parts of more complex systems, until - perhaps after one or two billion years - they could be called "organisms." From these humble beginnings life spread over the earth and evolved into its innumerable species - each an experiment in living in a particular way.
>
> *Biological Science - An Inquiry into Life.* © 1963 by the American Institute of Biological Sciences.

The complete chapter entitled "The Origin and the History of Life", which is part of the textbook, goes into substantially more detail and elaborates on the previous reference. To be completely fair though, I felt that instead of describing the theories of primordial soup and the early life it yielded from the vantage of this textbook, a second modern reference should be found to ensure better credibility and provide a more current state on the scientific theories about the origins of life.

However, before I leave that older textbook, the chapter also included a photograph of the laboratory apparatus for a famous experiment. In May 1953, Stanley Miller published his paper called "A Production of Amino Acids Under Possible Primitive Earth Conditions." The picture shows the actual laboratory equipment used in the experiment that demonstrated amino acid synthesis in a simulated primitive atmosphere. While this

has been a digression, we have started to build a picture, albeit somewhat dated, of our challenging team: the Super Labs.

For some, this may seem to be pretty intellectual material. What is an amino acid? Do not worry about some of these concepts or details at this point. Later, there is a chapter on biology that goes into a few of these subjects and gives some plain and straightforward explanations. The chapter on biology also takes a look at this area of science from a totally different viewpoint. For now, the present intent is to deal with the subject matter on a higher level to gain the big picture, so to say. Are we going to get pulled into a vortex of complicated biological terms? The answer to this question is not for very long.

The second more modern reference that follows may get slightly cerebral, but I would not be overly concerned about it. Unless you are well versed in such material, please just read it patiently and slowly to obtain the best grasp and understanding of the material. Then we will come back out of the vortex, to the higher ground and examine the big picture. The following text is a direct quote from a computer based encyclopedia available on a compact disk.

> **Origin of Life and Evolution of Cells**
>
> Scientists have formulated many theories about the origin of life and how it evolved into the various forms known today. These ideas are deduced from the evidence of the fossil record, from laboratory simulations of conditions on the primeval earth, and from consideration of the structure and function of cells.
>
> The earth was created more than 3 billion years ago, although more than 2 billion years probably passed before life as it is now known developed. Scientists believe that the atmosphere of the young earth was mostly water vapor, methane, and ammonia, with very little gaseous oxygen. Laboratory simulations have shown that all major classes of organic molecules could have been generated from this atmosphere by the energy of the sun or by lightning and that the lack of oxygen would prevent newly formed organic molecules from being broken down by oxidation. Rain would have carried these molecules into lakes and oceans to form a primordial soup.
>
> When the concentration of organic molecules in this soup became high enough, molecules would have begun to form stable aggregates. For example, lipids might coalesce into droplets the way cooking oil does in water, thus generating simple membranes and trapping other organic molecules in the interior of the droplet. Randomly formed aggregations that could harness energy to grow and reproduce themselves would eventually far outnumber other combinations. DNA may have been an essential component of the self-reproducing aggregates; it and RNA are the only organic molecules able to duplicate themselves. These supramolecular aggregations would have been extremely lifelike and with some refinements would have resembled primitive prokaryotes. This concept of the origin of life, however, does not explain the development of the genetic code and the precise interdependence between the code and protein synthesis.
>
> The relative absence of oxygen from the atmosphere of the young earth meant that no ozone layer existed to screen out ultraviolet radiation and no oxygen was available for aerobic respiration. Therefore, the first cells were probably

> photosynthetic and used ultraviolet light. Because photosynthesis generates oxygen, the oxygen content of the atmosphere gradually increased. As a result, cells that could use this oxygen to generate energy, and photosynthetic cells that could use light other than ultraviolet, eventually became predominant.
>
> Eukaryotes may have evolved from prokaryotes. This idea comes from speculation about the origin of mitochondria and chloroplasts. These organelles may be the degenerate descendants of aerobic and photosynthetic prokaryotes that were engulfed by larger prokaryotes but remained alive within them (endosymbiosis). Over the years the host cell became dependent on the endosymbionts for energy (ATP), while they in turn became dependent on the host for most other cell functions. The fact that mitochondria and chloroplasts are surrounded by two membranes, as if they had originally entered the cell by phagocytosis, supports this theory. In addition, these organelles contain their own DNA and ribosomes, which resemble the DNA and ribosomes of bacteria more than those of eukaryotes. It is possible that other eukaryotic organelles originated similarly.
>
> "Cell," *Microsoft® Encarta® 97 Encyclopedia.* © 1993-1996 Microsoft Corporation.

Well, if you managed to get to this point and are still reading, you have survived the most complex and technical portion of this chapter. Both of the foregoing descriptions, being direct quotations, have done a reasonable job of describing one of the challenging teams - the team which I refer to as the Primordial Organic Soup. Next, we will move on to describe the other team that I refer to as the Super Labs.

Unfortunately, I was not able to find suitable reference material that could be quoted to you and which would paint a picture of the Super Labs. So, it will be necessary to construct the image for you, step by step. The effort of describing these labs began upon the mention of the photograph and apparatus used by Miller to synthesize amino acids. However, we need to describe the challenging team far more adequately than that.

To understand the technical sophistication and resources available to the Super Labs, let us start with the biological, life sciences, and medical research labs first. We have all likely seen these sophisticated labs either first hand through our own learning experience, through tours of facilities, or via the various media that is presented to us in terms of documentaries or news reports. You need to visualize the resources available to a well equipped lab. Resources might range from: a wide spectrum of supplies; organic and non-organic chemicals; high tech lab equipment for monitoring, controlling and analyzing experiments; and, right up to specially designed buildings and labs for controlling biological environments. The list of equipment would be almost endless and probably would be contained in other smaller labs that specialize in the various sub-fields of analysis or biology. There would be all types of specialized and costly equipment including: light microscopes, electrophoresis equipment, baths and circulators, incubators, pH equipment, fume hoods, and scanning electron microscopes - to name a few.

Biology is not the only science needed. Chemistry and biochemistry labs are just as specialized and just as technical. Who has not seen chemistry labs with all the elaborate glassware, chemical processes, heat sources, vacuum sources, cooling mechanisms and wide arrays of chemicals in liquid, powder and all forms imaginable? They are also equipped with sophisticated equipment for monitoring, controlling, and analyzing chemical and biochemical reactions. Items like centrifuges, gas and liquid chromatograph equipment, and mass spectrometers are available to determine the makeup of chemical, organic, and biological materials.

Sciences such as physics should not be ignored. This science has equally advanced apparatus such as particle accelerators, cyclotrons, and collider accelerators to study the physics of atoms. Some of these structures occupy spaces bigger than football fields. While biology may not require these labs to provide such a detail level of analysis, physics offers all types of radiation sources that include: high voltage electricity to simulate lightning, visible light sources, lasers, microwave, infrared, ultraviolet light sources, X rays, and gamma rays. Physics can also provide electrical and electronic analysis equipment, high pressures, low pressures, vacuums, temperatures, and different gas atmospheres. Who has not seen pictures of a complex physics lab that looks like a plumber's dream of exotic metals, pipes, sensors, gauges, wires, and banks of electronic instrumentation? (They might even keep an engineer handy to fix things.)

If you combine all of these visual elements in your mind, you start to get a sense of the technical horsepower that exists in the world today. However, something that is vital and extremely important from the description of the Super Lab team is missing - people. Also to be very fair and honest, we are not referring to average people, when it comes to their ability and education, who staff these labs. We are speaking about people with strong desires to learn, to find out why, to analyze, and to research. The people we would find in our Super Labs ordinarily would have an advanced education. They would include bachelor degrees, but also master and doctorate degrees would likely predominate due to the skill and advanced knowledge needed. Also, it is quite likely that people with the highest degrees and abilities would be leading the research and investigations. Humanity has great skills that exist to focus and design experiments in a systematic way to yield results and answers to problems and questions.

In summary, the Super Lab team has the best facilities, equipment and people that this world has to offer. Another important factor is that the knowledge and the results do not have to come from the Super Labs overnight. Time is allowed: it is not a race that had to be completed in one year. Instead, the knowledge and results are allowed to accumulate and build upon each other, using decades, if not centuries, of time and a network of people and facilities around the world. People are involved that may publish, share, discuss and collaborate on their findings and theories. This is the Super Lab team and you should be seriously impressed.

Now comes the challenge. The challenge that goes to both teams is to create any living organism from scratch. Are the teams fair? One person might side with the Primordial Soup and say that it does not have all that sophisticated equipment and knowledgeable people. The balancing argument might come from the Super Lab supporter. Their response might be that we need all this equipment, carefully planned and designed

experiments, and super intelligent people to balance against the millions of years of time that the other team has.

At this point, only two teams have been offered for consideration. Which team has been successful to date? Obviously, and since there were only two teams to choose from, the Primordial Soup team has been victorious. To date, the Super Lab team has only been able to genetically engineer some forms of life and there has been the report of the cloning of sheep. However, there has not been any report that a living organism has been created from non-living material. The Super Labs have not been successful.

Why is this and why is it so evasive? The living organism does not have to be complex: it could be the simplest of all possible forms. The Super Labs also have a significant advantage in that they do not have to go right back to the most basic of chemical elements to create life, the way Primordial Soup had to. They can start with complex organic compounds such as amino acids, proteins, and even strands of DNA itself - just as long as the component is not already alive. They can start with the most complex building blocks of life. Is this fair? Yes, the Super Labs need to make up for the millions of years of time and the head start that was given to the Primordial Soup.

In my opinion the profound question remains, why have the Super Labs not been able to create life and describe the process on how to do it? They know what the complex building blocks are and there has been years of refined research and analysis. Why can they not put the complex building blocks together and make them live? Experiments could focus on the primeval conditions with variable temperatures, atmospheres of different gases, conditions including lightning and all types of radiation. If trying to duplicate the ancient conditions on the Earth and the primordial soup would lead science down confusing and potentially false paths, there is no requirement to choose the identical avenue the Earth took. In other words, skip the primordial steps and use the complex compounds necessary - and just do it. Yet, there has been no success to date.

Science has a great ability to unlock mysteries of how certain things are done or created. There are fantastic analytical capabilities used by scientists and researchers to study, probe and find the key to how materials are made up and the processes necessary to create them. A popular term that we hear on occasion is reverse engineering. While reverse engineering is typically associated with inanimate materials and devices with the intent to duplicate someone else's design, these same analytical principles are used daily in the life sciences involving the study of biology, medical sciences, and pharmaceuticals. Why has a living organism not yet been created using all of these intense skills and abilities?

Also, I get quite concerned when I look at the state of the Primordial Soup team. This team had no direction, no sophisticated equipment, and worst of all - it had no plan, goals, or desires. It never had a plan to create anything living and it did not have any desire or goal to do so. It is just a planet, nature, the universe; however you would like to refer to the team, it does not have intelligence and it does not have a plan. I cannot think of a worse combination - no plan, no intelligence. Yet, it is the successful team. Its success at creating living organisms had to be totally by accident and it had be something that just happened by random acts. To be blunt, nature stumbled into life and the Super Labs cannot imitate the accomplishment even though they have the desire

and intent. To top things off, if I am even mildly correct in my belief that nature has forces that continually reduce things toward simplicity, the Primordial Soup side really had its work cut out for it. Complex gains, on the road to making living organisms, must somehow be sustained, if not shielded, from the forces of reduction and simplification, if you believe, as I do, that they exist.

Another area that especially concerns me is when I start to think about the subject of possibility and probability that was described earlier. I am not an expert at statistics or the calculations of odds or possibilities. I have what would be considered a first year introductory level on this subject from university. Statistics is a specialty field of mathematics and by no means is it simple. People spend their lives studying, teaching and working in this field. For the situation we are considering, there are so many variables, complexities and unknowns. I am not sure if a team of the best statisticians in the world could calculate or estimate the possibility for the Primordial Soup team to create life.

Even for the illustration of air migrating to the corner of the room, calculating those odds would not be a simple task. Conditions would have to be carefully considered and quantified before tackling and calculating the possibilities. Some of the factors to be considered for the air-in-a-room example might include: size of the room; number of molecules in the room; temperature and energy levels; the number of degrees of motion or movement of a molecule; and, interactions, collisions and forces between them. If it could be calculated, I feel the resulting odds would be pretty horrific. The chances when expressed in one out of so many trillion would be quite a shocking set of odds. If the interactions could be converted to some time period for a likelihood of occurrence, the number of years between likely incidents of occurrence would also be staggering.

Would the odds for life from primordial soup be similar? Higher? Lower? For myself, the higher and lower part becomes irrelevant - these are very bad odds.

The questioning does not stop easily when we return to consider our challenge on creating life and the Primordial Soup. It is like when the chemistry teacher verbally charged our class of students. Yes, anything is possible - but now you have to seriously question the hard reality of the situation, is it probable? Is something probable to occur on its own when its composition is under such close scrutiny by science and has not yet been duplicated by a mass culmination of research and knowledge? The Super Labs have not yet done it - is it probable that nature could?

When I consider something that is living, and without getting into elaborate definitions, two attributes or abilities of living organisms come to mind. The first is what I call the ability of the organism to live: survive, take in nutrients, create its own energy, and maybe move about on its own. This may not be the best definition, but you understand what is intended. We know that a cube of sugar does not fit our definition of something that is alive. Moss, mold, bacteria, viruses, microorganisms, and all the higher forms of plants or animals do fit into the simple definition.

The second attribute is the ability of the organism to reproduce or replicate itself in some way. To be fair and provide the most amount of latitude, we would not dictate harsh stipulations such as requiring the reproduction process to yield an exact duplicate of the

original living organism. We will be open minded and allow the process to even create variations or mutations. The only stipulation is that it must replicate into something living. This is only common sense, otherwise we would be dealing with a dead end process if a living organism replicated into something non-living. This is definitely not a good path to long term survival.

This approach, of defining a living organism into these two abilities, to live and to reproduce, may seem strange to you. With higher life forms, such as animals, we associate the two as being inseparable. It is fine for a species of animal to be alive, but if it cannot reproduce it will eventually become extinct. However, I am actually trying to divide the complexities of life and make it easier for our challenging teams to be successful. The ability of an organism to replicate itself using DNA is complex. If feasible, let us eliminate this requirement, make it simple, and take it a step at a time - first make something 'alive'.

Have the Super Labs been able to create an organism that is just alive? Can they create something and show it to be living, even if it only survives for a few hours or a few days without reproducing itself? Maybe I am being extremely naïve, but I believe by doing this that half of the complexity of the total problem has been eliminated. Why cannot the Super Labs just make an organism that is alive?

Unfortunately, it is my belief that for the Primordial Soup, this approach of dividing living and reproduction, makes things worse for that team. What would the possibilities and probabilities be for nature to create something that is only alive. It can now skip the added complications of deriving a scheme to replicate itself. How many millions of years of chance occurrences would it take to combine the complex amino acids and/or proteins into something living? What are the odds? They should be less, because there is not the added difficulty of reproduction.

In view of the above, I ask your indulgence on imagining the following ridiculous situation that I want to put forth. After millions of years of chance occurrences and combinations, suddenly a pool of primordial soup takes that miraculous step and becomes a pool of living organisms. What an amazing accomplishment against huge odds - but, OOPS - the added complexity of replicating into another living organism was not included. Without the function to reproduce, the pool eventually dies. What are the odds of this occurring again, but this time with the added complexity and ability to replicate? Is this example that ridiculous? Whoops, I am alive, but I forgot to include how to reproduce. Will I wait another billion years for the double combination of being alive and being able to reproduce? What are the possibilities and probabilities on this? Is it twice as difficult? More?

There is another layer of the situation which you need to consider before you believe that Primordial Soup was the way it happened. The logic I am using goes as follows. Life that was created had to have the ability to replicate itself. Science does not know if the first reproduction processes were exact in character, that is, nearly identical life forms resulted, or, if there was a great deal of variation or mutation in the life forms that resulted. Whatever path the first life forms took, they were not content to stay as simple organisms in the primordial seas. Instead, against the odds of even living, against the odds of being able to duplicate, they chanced into a scheme of reproduction that allowed

themselves a degree of variation, and not variation of the ordinary or status quo, but variation that would allow them to evolve, to continuously become more complex, so that the end result is all the species of life that exist today. To be very self virtuous about this, the end result of the reproduction scheme stumbled upon by those early organisms allowed the countless variations to create human beings, the so-called top of the evolutionary chain. Put in a sarcastic way, it is not good enough to be alive and recreate our own species, but let us create such a structure and system that we will slowly vary, evolve and continuously get more complex until we turn ourselves into human beings. This is supposed to all have happened by chance? All of these occurrences happened against my forces of randomness and simplicity? Wow, were they lucky, or what?

These are questions which you have to answer and to draw conclusions for yourself. I have answered the question for myself and I do not believe it is at all probable that these things happened by themselves. My opinion and belief would not change if tomorrow it was announced that the Super Labs have created life. For me, the shear difficulty, enormity, and complexity of the task will not have changed the odds and made it probable that these accomplishments could happen on their own. Since I believe that there is a strong force which is constantly at work breaking complex things down and driving everything to simple and random forms, my opinion against the spontaneous creation of life makes it only more improbable. As of this writing, the challenge between the teams has the following score - Super Labs, zero, and Primordial Soup, one thousand.

We have all heard the statements and phrases about how complex life and living organisms are. From the encyclopedia based reference quoted earlier in this chapter, there is one paragraph on the theory of life and the primeval Earth that causes me to be uneasy about the theories expressed. The paragraph and theory in question states that early Earth had relatively little oxygen in the atmosphere and therefore it was not available for absorption or respiration by living organisms. It goes on to conclude that the first cells used a type of light and photosynthesis to survive. As we know, plants and photosynthesis release oxygen into the atmosphere. The theory goes on to conclude that due to this, the oxygen level of the atmosphere increased and cells developed that would use this oxygen to create the energy they needed to survive.

Wow, what a fantastic leap of reasoning. I will re-summarize the above in a totally sarcastic manner. We, the first life on Earth, use light and photosynthesis to create our own energy for survival. We do not need to consume oxygen and food. (There is a lot of carbon dioxide and chlorophyll handy?) After great periods of time, and after releasing huge amounts of oxygen into the atmosphere, we decide it would be neat to create another form of life that will use the oxygen that we just made and which is now available. It is no fun being alone and living as plant-like life forms, let us accidentally create another life form that functions in a fundamentally different way to use the oxygen to survive. It is such as good idea, we will find out later that these oxygen consuming forms cannot create their own food and they will need to eat us, or each other, to survive. We are smart.

What is the probability of a second form of life creating itself to function in a totally different way? What is the incentive and what is the driving force to create a second life form? Was it to use up the oxygen because it became handy and it is there?

Since I have gotten in a foolish mood, I might as well throw in a really wild and wacky analogy that entered my mind. Analogies or comparisons are sometimes helpful because they may allow us to compare one situation to another and potentially put the whole matter into perspective. Imagine and visualize this weird scenario. Picture a huge area of land, something like the size of Texas. We will make this land totally flat and build upon it a huge flat platform that will hold loose parts. The platform is amazingly strong and is powered by a huge underground device that vibrates and shakes this incredibly expansive platform and everything on it. The platform has walls around its boundaries to keep all the parts contained so they do not vibrate and fall off. Our intent is to build something, to put it together by randomly letting the platform mix and vibrate the parts together. To be fair about the experiment, we do not want to build anything too complex. An automobile engine is too complicated, too intricate, and has too many parts. Let us build just a simple lawnmower engine, the type powered by gasoline. It does not have nearly as many parts and is nowhere as complex as an automobile engine.

Now, we load the entire massive platform with brand new parts used in one simple type of lawnmower engine. We load millions and millions of parts for potentially millions of engines. The platform is loaded randomly with these loose parts and the entire contraption is turned on and it starts to bounce, shake and vibrate the parts all around. We will be kind to the experiment and not allow the forces of simplification to act, such as rusting, breaking, or damaging of parts. We will not let any of the forces damage any of the parts. What is the possibility of a completely assembled lawnmower engine being created? How long will we have to wait? What are the chances that the engines will replicate themselves? Is any of this probable? How would the possibilities change if we let the forces of simplification act on those parts and their condition slowly deteriorates?

This is a pretty dumb analogy for comparing to the primordial soup - or is it? Compared to a modern day living cell, I feel the lawnmower engine is definitely simpler and does not have as many complex parts. There is a later chapter on biology as it is compared to the other sciences. The biology chapter will address some of the parts and complexities of a modern cell. What about comparing the lawnmower engine to a early primeval organism, maybe the lawnmower engine is too complex? I do not believe it is. A review of the second reference came up with the following list of parts for a primeval organism: organic molecules, amino acids, DNA or RNA, a membrane to surround the organism, and energy generating parts using photosynthesis or something else. None of these items sound too simple to me, maybe they are more complex than the lawnmower analogy?

The previous analogy is just what you would expect from an engineer - moving parts. Like me try a different analogy based on something I heard a long time ago, and that you may have heard as well. Picture one million monkeys and one million typewriters. The monkeys are not trained in any way and do not have any special skills. The typewriters are robust, will not breakdown and have an endless supply of paper and ribbons (i.e., no forces of simplification). How long will it take, and what are the odds that any one of them will type a properly constructed ten word sentence? The sentence must be correct with: a subject, a verb, capital letter to start, period to end, spelling of words must be

correct, spaces between words, and the sentence must make sense. All we want is a ten word sentence. Is it probable?

Is this analogy too unrealistic, too difficult? It is likely that you have heard the expression "the key to life". Keys and codes are synonymous when it comes to passwords and encrypting secret messages. Consider the keys and codes to create primordial life and replication, would this be as difficult to find as the monkeys hitting the correct code for a ten word sentence? Or, is this too simple and one of the monkeys needs to write a paragraph - or more? You decide.

While the discussion so far has considered two teams both based on Earth, I am sure that somebody out there is thinking, "What about if life came from outer space?". Later on, I will describe some things about the universe, but the matter of life needs to be addressed now. If life on Earth did originate from outer space, or, if there are other life forms out there, independently created, the whole issue is not suddenly solved. For me, the issue only becomes far more complicated and raises even more questions that I, and likely others, cannot answer.

If our life originated elsewhere and somehow wound up on our planet, all kinds of questions would be generated. Bypassing most of the questions and in keeping with the topic, once the source of that life was possibly found, I would ask the same questions as to how did that life source originate. The issue has not changed - it has only moved. If one day we discovered that there are multiple sources of life throughout the universe the issue becomes far more complex. How similar are the life forms? Are they all carbon based, that is, are carbon atoms the common ingredient in all the organic molecules? The questions would go on and on, and the discussions and arguments would rage.

Due to a deep personal faith, even if any of this were to happen, my beliefs would not substantially change. I would not ignore the facts or the information, but it would not disprove nor shake my belief in God. For such a powerful entity, who am I to presume when and where God's creations will exist. For that matter, I will not presume how God originated life - in a simply or in a complicated way.

Before we leave outer space, I came across an interesting article that appeared on June 10, 1998. The title of the newspaper article was cute and indicated that our Earth was still waiting for a call from ET. The article described that researchers from the University of California Berkeley had not found any evidence of anybody trying to contact Earth. They were using the most sensitive equipment on a search for extraterrestrial radio signals using a detector mounted on the world's largest radio telescope. This telescope, or dish, is located at Arecibo in Puerto Rico. The survey is called the Search for Extraterrestrial Radio Emissions from Nearby Developed Intelligent Populations. The researchers reported to a national meeting of the American Astronomical Society that they analyzed more than 500 trillion signals. However, they found no pattern that would suggest that the signals originated from an intelligent source. What can I say? Stay tuned.

The primeval Earth and primordial organic soups, why can we not simulate those conditions and create life? The issue is not about whether or not science may one day create life. That is not the point. I am not even challenging science to do it either, as

biological accidents do happen and they concern me. The point is that life is so complicated and areas of science would like us to believe this happened on its own. All the combined intellect and cumulated knowledge of the human race has been unable to determine the key to making something alive. Studying, probing, experimenting, and researching; all of this considerable time and effort have not yet made anything living or fully explained it. Yet we are asked to believe that nature did this by accident, by evolution.

There are times when people can become very complacent and readily accept what they are told or taught. The acceptance and complacency may be more evident when the information comes from authority figures. Some fields of science have theorized and taught that life on Earth created itself spontaneously. Part of the purpose of this chapter is to invite you not to be complacent about such things. You need review and rethink information from various sources and then draw your own conclusions and beliefs. Do not even become complacent about what I write.

Personally, I have given these matters considerable thought. I have a great deal of difficulty in accepting some scientific theories and their basic premise that early simple materials and conditions are capable of accidentally becoming so complex, becoming alive and being able to replicate - a feat that intelligent beings cannot fully explain or repeat. Two teams were described in this challenge, but I believe there is a another member to this challenge - God. My reasoning for this belief will take a while longer to explain to you.

Chapter 4 Science and Engineers: What's the Matter with Engineers Anyway?

What is the matter with engineers anyway? There is nothing really wrong with them, but it makes for a good introduction into the next bits of material. Later I will highlight a few observations about engineers based on inside sources.

The prior chapters dealt with what I feel are fairly important and fundamental concepts: forces of simplification, possibility and probability, and, primordial soup. Starting with this chapter, and several that follow, I want to touch on some of the key sciences and share some perspectives that I have on them. I believe that you will find them coming from viewpoint that is quite different and which might not often be expressed. The viewpoints are very germane to title of this book and are part of the overall rationale and explanation. There will be technical descriptions, but they will be for the purposes of giving a basic understanding of the subject and they will be intended for the lay person.

The first areas of science to receive this personal review are mathematics and physics. These are going to be combined and lumped together with courses, as well as recollections, from the four years I spent pursuing a degree in electrical engineering. By being an engineer, I feel I have a certain license to be able to make wisecracks and the odd derogatory remark about engineers. If one cannot poke some good-natured fun at themselves and their own profession, I do not know who can.

Now that you feel as though a proper introduction has been made, let us talk about something totally unrelated - English. I never developed a phobia for this subject until senior high school. What is the matter with engineers and the English language anyway? All engineers love to write (not). They are all gifted with amazing abilities to write clearly and succinctly. Spelling and grammar are second nature to an engineer. An engineer loves to receive a writing assignment and will tackle it with unbridled enthusiasm, completing it in short order. Unfortunately, if you have believed any of the previous statements you have not spent large amounts of quality time with a group of engineers. I have and I have lived to tell the tale.

As mentioned already, the subject of English started to sour with me in senior high. Using the best self-introspection that I can muster, I cannot explain why. The only thing I can possibly come up with, is that it is almost a required pre-requisite to becoming an engineer. Now, trying to put attempts at humor aside, people are born with certain natural abilities. I think that engineers tend to gravitate towards everything that is mathematical and logical. While I have nothing substantial to base this on, those same natural abilities do not seem to mix well with English and subjects of a similar genre. (no idea where that word came from)

Needless to say, while I was not a complete disaster, I did not do all that well with English and I managed to survive right through to grade 12. I may have exaggerated somewhat as there were times that the subject was entertaining. There were various books that were required to be read throughout the years and many were totally enjoyable and gratifying. It was probably the writing of essays and learning grammar that was the most difficult part. You have no idea how hard it has been for me to get

started writing this material - it is something I have literally put off for years, using one mental excuse after another.

Getting an engineer to write is like pulling teeth. My ability at English was very painfully emphasized to me when all the grade 12 classes had to take two comprehensive university entrance tests. I have forgotten the fancy acronym for this type of university test, and to be frank, I do not even care to remember them. There was a half day test on mathematics and general knowledge, if it could be called that. Then there was the half day test on nothing but pure English. I have never suffered through anything quite as agonizing. The irony of it was that I actually found certain parts of the test humorous and I recall laughing to myself.

The English half day of the test started out simply enough. I guess they had to give the slower levels, such as myself, half a chance to get calibrated. After that, the test got progressively more difficult. I remember one potion of the test where they wanted to check your retention and recall abilities by having you read a short paragraph and then answering questions about it. The test had a time limit, so you had to work fast and you could not languish re-reading everything. Of course, the paragraphs started out being short and simple. Then they progressed to the lengthy and difficult.

My all-time favorite part of this English marathon were the tests on grammar and proper sentence structure. This also started out quite simply. To make matters even easier, so I thought, it was a multiple choice test. You read four or five sentences and you had to pick the correctly structured sentence. As I said, it began simply enough so that even I could spot the obvious sentences which were bad. However, it quickly got worse - much worse. Toward the end, the sentences were so lengthy, with so many commas, arrays of punctuation, and clauses with sub-clauses - just like this one. I had no idea in the least which one was right and which was wrong. This is where it got humorous and I can remember laughing to myself. Imagine reading through five incredibly long sentences, and I could not tell which one was wrong. They all looked and sounded good to me. It became so bad, that I even tried to compare sentences to see where the differences were from one to the other. I swear that some were identical and this is where it felt so pointless that I lost it and started to laugh. Imagine, it was taking forever for me to even tell the differences between some of them, never mind which one was incorrect.

Later the teachers explained some of the rationale behind the tests and its objectives. For the English one, I recall it being mentioned that you needed a superior grasp of the language especially if you wanted to go into a field such as law. That was it for me, my mind was instantly made up, and I there was no way I was going into law - they could go into that good field uncontested by the likes of myself. Furthermore, they could have it entirely to themselves for the foreseeable future. Grade twelve was the last I ever saw of English courses.

By the way, the mathematics and general knowledge test went comparatively better - but nothing I felt overly thrilled about. I went into electrical engineering for a number of different reasons that may be disclosed as we go. What later shocked me was that no one warned me about the almost absolute requirement to have a superior ability at mathematics. It was shear good fortune and blessings that I was good at mathematics,

otherwise I am quite certain I would have been slaughtered. After I finished my fourth year in electrical, I recollect looking back and being awestruck by the amount of pure, shear, complicated math, physics and theory that was involved. Mathematics did not stop after some first year university courses. No, we continued full tilt and in-depth with subjects like: linear algebra, calculus, differential equations, applied numerical analysis, and so on. Calculus did not stop after one year. They were not happy until we had three solid years of it and that we could do complex calculus in all three dimensions simultaneously - integral calculus involving the variables of space and time, and with limits that could range from minus infinity to positive infinity.

Here is a good one. Who remembers from high school the definition of an imaginary number? Dumb one, eh? Who cares? Well there is a concept in mathematics of an imaginary number. An example is to try and take the square root of a negative number - it cannot be done and does not exist, except in theory. Well give the concept of an imaginary number to electrical engineers and watch them run with it. We have a special definition and concept of the square root of minus one, and we give it the definition “j” (the letter “i” is used in mathematics, but engineers reserve this letter to mean electrical current). You will have to take my word on it, but imaginary numbers are used beyond belief by electrical engineers. We dealt steadily with the real and imaginary components of electrical currents, voltages, and so on. Believe it or not, the imaginary components could not be ignored and are the only way to obtain a correct value.

Yes, I sure was lucky to be good at mathematics and even more fortunate to have some excellent professors on these courses for the first several years of university. There were two math professors that I will never forget and who had the ability to teach the subject so clearly that it came across like music from a conductor leading a symphony. The first professor taught linear algebra and this area of math included a number of specialty topics, but the most emphasis seemed to be placed on the fancy manipulation of complex matrices. Engineers like matrices. They look like a huge table of numbers, but may have x, y, z and other variables instead of simple numbers. There are all kinds of tricks and neat rules for adding, subtracting, multiplying and dividing a large matrix against another one.

Other than the outstanding teaching abilities of this professor, there was another unique ability he had - he could print on the blackboards faster than any human could write. We would be in the large engineering theatre, that could hold several hundred students, and the front wall was nothing but blackboard. He could print, fire up formulas and theorems, and his caulk would click and fire against that blackboard like a machine gun. If you paused a moment to daydream, think, or chat, you fell almost hopelessly behind. Students would laugh and call out, “Whoa, please slow down!”. Anyway, that professor ruined me for life. I was so inspired and impressed by his skill to print so fast and neatly, that I became determined to imitate his ability. It took awhile to shake the habit of handwriting, but I am afraid I did it. I was known amongst our section for having some of the neatest printed notes around. To this day, I can no longer do handwriting and I print absolutely everything except my signature.

The second professor to be described taught us calculus. He was truly memorable and unbelievable. Not only was he writing his own textbook on the subject, but he would come into that same huge lecture theatre without a single page of notes or reference

material. He then began to teach calculus for the entire lecture without skipping a beat. The way he taught came across as clear as a bell, the way he imparted the subject was truly unbelievable and you could not help but learn and understand. I credit these two professors for the A+ and A that I received in the courses.

The calculus professor was also unflappable. In the winter we remember him coming in and walking across the lecture floor in a full suit and knee-high rubber boots on. Engineering students have a very bad predisposition and are notorious for organizing small to hugely elaborate practical jokes. Well, some fellows decided to pull a practical joke and test the mettle of our calculus professor. As mentioned earlier, this lecture hall had a huge line of blackboards across the front wall. However, there was a unique section in the middle where you could pull up one large section of blackboard from the floor level, and raise it to write on, and then push it up so it went over your head. The professor was busy writing and deriving calculus formulas. All kinds of figures totally filled the center blackboard. Well, he pulled up the floor level blackboard so he could use it next. It is hidden behind a pocket wall and you cannot see what is on it.

When he pulled up the blackboard - there in full view of the entire class was a naked centerfold from a magazine taped to it. The class gave a short gasp and then everyone burst into laughter. To show you how quick and intelligent that professor was, he paused for an instant, reflected pensively, and said, “We will raise this figure for future reference.” He calmly raised the board to the overhead position and carried on writing and teaching like absolutely nothing happened. There was stunned silence and we laughed because of his witty and quick comeback. Many students, including myself, expected him to get angry and rip the centerfold down. He would not give us the satisfaction of seeing his temper flare and he outwitted everyone. We sat in awe and amazement. The professor was never the subject of a practical joke from our class again.

For first year chemistry, we had to walk over from the engineering buildings to the science buildings and yet a different lecture theatre. Chemistry and its professor were not nearly in the same league. Students can sometimes be merciless. In terms of practical jokes and rude behavior, it was endless for the poor chemistry professor and I cannot explain exactly why this was so.

Before I get on with the intended message of this chapter, there are a few more items that need to be explained about engineering and some of my past memories. The first has to do with the definition of engineering. Although I had a great interest in electronics, and this was my primary reason for going into the field, I had no idea what the definition of engineering really was. Finally, and maybe in my second year, there was a kindly professor who asked the class if we knew and there were no intelligent responses. While I cannot remember the words exactly, the professor stated the definition of engineering was the practical application of science and mathematics to the safety and to the betterment of the human race. The dictionary has a much more refined definition than this, but that definition is the one which stayed with me. I recall his further explanations on how science works on the raw frontiers, doing pure research, and seeking new discoveries. Sometimes they are not content to put them into use and want to move on to the next discovery. Other times, the time may just not be right or even possible to put the discovery into practical use.

He said it was the job of engineers to fully understand the discoveries of science and know all the laws and theories. Then, it was their responsibility to put them safely into practical processes, devices, structures, machines, and the like. The safety portion of the message was quite heavily emphasized. He said that many people would be dependent for their safety upon the thoroughness of the designs created by engineers.

In Canada, there is an engineering ceremony in your fourth and final year that occurs shortly before the graduation ceremonies. It is called the iron ring ceremony. The actual ceremony is not to be disclosed in detail to others and we are also asked to take an oath. The remembrance from this ceremony is that a Canadian engineer wears an iron ring on the little finger of their working hand. The ring is supposed to contain a portion of iron from an old bridge that failed due to poor design. We are presented with a written certificate of the ritual and words of the oath we must sign. I just re-read that oath, which you can tell was composed in early English, and the words are very sensitive to the care and safety in an engineer's work, respect for others and fellow engineers, fair earning of wages, regard to reputation, and more than one religious reference that included God.

There are many engineering disciplines in which undergraduate degrees may be obtained. The common degrees are: aerospace, agricultural, biomedical, chemical, civil, computer, electrical, geological, and mechanical, to name a few.

The previous descriptions and reminiscing may be good background, but we need to progress toward the intent and purpose of this chapter. The specific purpose of the chapter is to consider some unique and powerful laws and theories of sciences such as physics and mathematics. Several of the next chapters will be contrasted and compared against them in an unusual way.

Engineering is being as part of my explanations for two reasons. First, it is something in which I have been trained, that I have specific knowledge and experience in, and, it is something in which I have confidence about my ability to explain correctly. The second reason is that Engineering can be considered the vehicle by which some of sciences take their established laws and theories and put them into actuality.

There are laws and theories of science that cannot be put into practical reality and everyday use for human beings. While it may appear strange to use, some such examples might be those involved in astrophysics. Theories on black holes in space would not be a good assignment for a recent graduate engineer to reduce into practice within one year. On the other hand, there are many laws and theories that are totally proven and put into everyday use. For instance, all of Isaac Newton's physical laws on gravitational forces are fully understood and very repeatable. That is why they are sometimes referred to as laws as opposed to theories. Gravity, velocity, acceleration, and planetary orbits are all fully understood because of Newton. If you do not believe this, you likely do not like to ride in elevators, airplanes, and do not believe a spacecraft can be launched to another planet, its trajectory fully planned, and its arrival timed within hours.

As an aside, many people do not realize that Newton was a mathematician as well as a physicist and that in the seventeenth century he was a co-discoverer of calculus as a

new field of mathematics. He formulated the three laws of motion and from them he derived the universal law of gravitation.

To summarize, engineering is a good litmus test. If engineers cannot take a law, or theory, and make it function in a practical, consistent and reliable way, there is something seriously missing. There may be an important or critical material that is not yet developed or available to enable the theory, there could be a subtle flaw within the theory, or, worse yet, they may be something fundamentally wrong with the theory.

We are going to start with physics and the fundamental forces in the universe. Do not panic and do not let your palms get sweaty. We are going to start real slow and easy, so stick close with me on this one and it will not get so complicated that you cannot fully understand the topic. Out of the fundamental forces in the universe, there is one set that I know the best and they are the forces of electromagnetism. You would be hard-pressed to find electrical engineers who would state that they do not understand electromagnetism. Those forces are what its all about and form the underpinnings for their entire field of studies.

I decided to take electrical engineering because of my fascination with electronics. I wanted to know how each and every component involved in an electronic circuit worked and I wanted to be able to design the circuits myself. As my studies were in the early 1970's, the University of Manitoba at that time had many courses and options that you could elect in your third and also your final fourth year. Due to industry in the Province, there appeared to be two paths of electives you could take. Courses in electrical machines, energy conversion, and various 'higher voltage' options seemed to target a person towards the hydro-electric industry. In Manitoba, this is a very significant industry, with sophisticated transmission lines from northern dams and generation facilities. The major rivers flowing into Hudson Bay provide power for the entire province and more than enough surplus for export to neighboring provinces and north central states in the US.

The path that interested me the most included the electives on electronics, digital theory, signal analysis, and communication theory. This path, if one could call it that, was geared towards the telecommunications industry, also a major employer in the province. In addition to all of the math courses, there were plenty of others that were compulsory and these included: chemistry, physics, thermodynamics, and mechanics (to do with forces, not car parts).

In the first several years, it seemed to me that it was possible to study and understand how everything worked. This coincided with the deep down desire that I had to fully understand everything from the 'ground up'. In the later years, the professors explained that this becomes impossible for one person to comprehend it all. You had to start treating devices, or entire areas, as 'black boxes'. You had to be satisfied to learn around the black box. The inputs and outputs interfacing to the black box were learned as well as the basic process the black box performed. To learn the internal details of exactly how the black box functioned and operated would be too much. You would get bogged down in the details and fail at the big picture, so to say.

The reality and immensity of science finally set in on me. It was continually amazing, in that the more you knew, the smarter you become, and the more complicated it seemed to become. This appeared to be the reality of science. Young people have a phrase today that can sum it up pretty well when you are not happy with the reality of a situation - reality bites.

In terms of the courses I was taking, a strange and unexpected set of circumstances happened to me at university. Electrical engineers had to take courses in electric fields and then general field theory, as these were part of the underpinnings I spoke of. Coupled with the calculus that you needed to understand it, these courses eventually got you into compulsory electromagnetic theory in your third year. This is as mathematical as it gets. It was not for the faint of heart and some students could pass out at the mere mention of the subject. Other than being really good in math, I cannot explain why I excelled and actually became interested in this area of engineering. I had gone for the interest in electronics. Even my engineering friends looked at me strangely and said, "How can you like that stuff? Your taking 'what' in fourth year!". Instead of avoiding it like the plague, I found myself taking wave propagation (nothing to do with water) along with microwave circuits and devices. I even did my fourth year thesis on the design equations and the actual build of a microwave transistor oscillator. Resistors, capacitors, and inductors are common components that you would physically find in a radio or television. At microwave frequencies these components 'disappeared' and instead became different circuit line widths, lengths and other geometries around the transistor.

So what is all this electromagnetic radiation stuff about? Why is it important? You will be surprised at how pervasive and important it is in your life. If you live in any type of modern community you cannot avoid electromagnetic forces. In order to avoid them you would need to be alone in a remote uninhabited part of the world with just the clothing on your back. Even then, you are not truly avoiding them, only the devices would be missing. Electromagnetic radiation is constantly bombarding you anyway and you would have a hard time avoiding it anywhere in the universe. What is it exactly and why would I find this subject so incredibly remarkable?

Let us start with simple examples and explanations. If you live in a modern community, your home is serviced by electrical transmission lines bringing power to your home. Even if you use solar or wind power you are not avoiding the conversion and transmission of this energy. If you have any form of telecommunications coming into your home, electromagnetic radiation theory is involved. Any electrical motor, any generator, and any device that you touch or use that is powered by a battery, or by electricity, operates totally under the control of electromagnetic theory: from your CD player, to your toaster, and to your high tech multimedia center. Everything designed by an electrical, electronic, or computer engineer functions and behaves totally under the description and control of the laws and forces of electromagnetism. So what is it?

We have all heard of electrical terms such as voltages and currents. To keep focused and simple, I will talk about electrical currents. The simplest definition I can provide you with is that an electrical current is the flow of electrons through a wire. It can be as simple and as weak as a current that flows from a battery and powers a radio or a small bulb. The current and flow of electrons can be as large and as dangerous as that which

enters your stove and is converted into huge amounts of heat energy. What is interesting is that the current and flow of any electrons in a wire generates an electromagnetic field. In its most raw and observable form, this is principle that makes electrical motors, generators, electro-magnets, and the speakers in your sound system work. When an electrical current flows through a conductor there are electric and magnetic fields generated around that current that you cannot see. Even a bolt of lightening generates a huge electromagnetic field capable of disturbing all the fields around it. This is what causes interference to your television and radio signals, or causes the hair on your neck to rise. Maybe you have experienced the circumstance when you are in an automobile approaching electrical transmission lines and towers that are carrying very high voltages and currents. These lines are also generating substantial electromagnetic fields. You may have your car radio on and the automobile may pass a certain position and you notice a disturbance in the broadcast. This is another example of the force of electromagnetism.

Electromagnetic fields may be very weak and not extend far into the space surrounding the conductor, or, they may be very strong and extend great distances. There are electromagnetic door locks and plates so strong that you cannot humanly open the door. Unfortunately, it is very hard to visualize these fields. There are cases where there is a very plain electrical field and it operates with lines of force that are straight and simple. More complex fields need to be visualized as waves and radiating curved lines. You have likely seen pictures of iron filings aligning themselves in arcs connecting around the poles of a magnet. Cathode ray tubes used in computer monitors and televisions have more complex fields as well. They are a good example of how well engineers can design and control the fields to write the electron beam(s) from the back neck of the tube onto the front face of the screen. So, this is the simple story about electrical currents and electromagnetic fields. What is the big deal?

The deal gets bigger when we talk about frequency. The meaning of the word frequency should be easy to explain. The simplest picture I can portray is an oscillating set of waves. One example of a higher frequency would be the tight and rapid rippling waves on the surface of a pond. Compare this to the lower frequency and widely spaced waves on an ocean. The other very common example is sound waves and their associated frequencies. The common frequency range that the human ear can hear is vibrations of sound waves from 15 to 20,000 hertz. Hertz is not a complicated term and is also abbreviated as Hz. It is the unit of measure for frequency and is simply the number of complete cycles of a wave (wave top to wave top) that occur in one second of time. The term hertz and the phrase ‘cycles per second’ are interchangeable. Very low rumbling sounds would be in the 15 hertz range and high pitched shrill sounds would be at the 20,000 hertz range. This is nice, so what?

Well, electrical current can oscillate in cycles and can vary in frequency according to the above definition as well. The varying currents flowing in a wire generate varying electric and magnetic fields. Believe it not, this is where frequencies, electrical currents, and electromagnetic waves will become incredibly interesting. Direct current, or DC, has a frequency of zero and this is the type of current a battery provides. Typical household current, however, is referred to as alternating current, or AC. In North America for instance, the AC that is provided by the utility companies flows at 60 hertz, quite a low frequency.

Very strange and unusual things happen when you increase the frequency of the currents and the resulting electromagnetic fields. At low power levels and low frequencies, the fields and forces are very content to stay close to the wires and are almost non-existent. The power wires in your home, say at 60 hertz, do not radiate great distances. Engineers work with much higher frequencies for a lot of the devices you commonly use. In North America, an example is the AM and FM radio frequency bands that you may commonly listen to. The AM frequency band is approximately centered around 1000 kilohertz (abbreviated 1000 KHz). A kilohertz is one thousand hertz (a kilo equals one thousand). So to fully write out that AM frequency in long hand it would be 1,000,000 hertz. The FM band is centered around 100 Megahertz (abbreviated 100 MHz). Mega equals one million, so to write this FM frequency in longhand it would be 100,000,000 hertz. This frequency, at 100 million cycles per second, is a lot of oscillations, or vibrations, in one second of time.

This is not the amazing part though. Large numbers such as this are impressive, but what is incredible is the changing properties of the electromagnetic radiation as you increase the frequency. At the radio frequencies just described, the electromagnetic fields are no longer content to stay close to the wires. By applying higher power levels and using a simple wire antenna, the electromagnetic fields, which are sometimes referred to as waves, radiate great distances into the surrounding space. Who has not seen a simple diagram of a tower antenna and emitted radio signals pictured as circular waves radiating out from the antenna. Different frequencies radiate and behave in different manners. Some radiate outwards and literally are reflected and bounce back off of upper layers of the atmosphere. Under unique atmospheric conditions, they are sometimes capable of skipping and covering great distances across the Earth. Shortwave (high frequency) radio signals are capable of being transmitted continent to continent.

The rough frequency range we discussed covers everything from AM and FM radio, to television signals, and to the cellular telephone that broadcasts to the closest cell receiver which retransmits and connects you into the complete telecommunications network. What happens when you go higher in frequency?

Well, the electromagnetic radiation starts to behave differently and the next major level in the electromagnetic spectrum, is called microwaves. (spectrum refers to a range of frequencies) Microwaves typically start in the gigahertz (GHz) range and a giga equates to one billion. One billion oscillations, or cycles per second, is really a lot. Microwaves propagate differently and in a more narrow or ‘focused’ manner. It is no longer efficient to use a simple wire as an antenna. Instead, the antenna becomes a parabolic dish, with different diameters being more efficient at different microwave frequencies. The dishes must be aimed and positioned for the best reception and transmission of signals. Line-of-sight is a term that is used and explains why the dishes are placed as high as possible to get over the curvature of the Earth and why there are relay dishes pointing to each other on hills and mountain tops. Microwaves must be used with caution because at high power they are capable of passing through organic matter, vibrating water molecules, and, due to the increased vibrations, heat is generated.

Even though I have had all this high-tech education, my family constantly jokes that I am the very last in the neighborhood to adopt and buy any of it. My claim is this lack is mainly due to financial reasons. I also use another excuse in that I know what the best specifications would be, which equates to buying better equipment, and even greater difficulties in terms of affordability. However, the family ridicule continues to be directed towards me unabated. We are the last to get cable TV, a VCR, a microwave oven, a good stereo system, and so on. We still do not have a cellular telephone. There are lots of personal reasons for myself not having one. Cost is one, purpose to remain continuously 'connected' is another, and the frequencies right next to my head is yet another. I would not mind the receive mode, as I know these power levels are already very low by the time they reach me. It is the transmit mode being next to my head that I wonder about.

Going higher up in frequency takes us into infrared radiation. Higher yet, and the electric and magnetic fields decide to propagate in the form of visible light. That is correct - visible light. The same radiation, with only its frequency changing, goes from radio waves, to microwaves, right into light waves. Lasers and light are harnessed by electrical engineers for fiber optic communications, to optical recorders, and compact disk players using laser diodes. The radiation is no longer loosely 'focused' like microwaves but they are traveling in a totally straight line. The frequency of visible light is extremely high. The number of zeros gets to cumbersome and engineers have long run out of the kilo's, mega's, and giga's. To make it simple, a microwave frequency of 1 gigahertz is a 1 followed by 9 zeros. The frequency of visible light is in the range of a 1 followed by 15 zeros.

The electromagnetic spectrum does not stop here and increases in frequency from visible light to ultraviolet, X rays, and to gamma rays. Gamma rays have a frequency of a 1 followed by 22 zeros. Now, this is what I call vibrating.

This is what fascinates me every time I give it some serious thought and what I find amazing about electromagnetism. All of these forces from DC, radio waves, microwaves, infrared, visible, ultraviolet, X rays, and gamma rays are all the same type of force. The only thing that makes them different, so to say, is their frequency. That is what is amazing for me - they are all the same form of electromagnetic energy, just in a different frequency and displaying wildly different properties. One type is used to listen to music signals broadcast through the atmosphere, another is used to light your room, and yet another will pass through your body to display the pattern of your bones on photographic film.

Another surprising feature of all these electromagnetic waves is that it does not matter what the frequency or wavelength is, or what method of propagation is used, the waves all travel at exactly the same speed. In a vacuum, that speed is about 186,000 miles per second and is commonly known as the speed of light. Light or radio signals traveling from a spacecraft heading to Mars all get back to Earth at the same time and are going the same speed.

By the way, it is a good thing that our eyes are only equipped with the capability of detecting the visible light spectrum. If we could 'see' the entire spectrum of electromagnetic radiation we might have trouble seeing the proverbial 'hand in front of

our face'. There are so many radio frequency and numerous other fields around us that you would be completely overwhelmed if you were able to see them all.

Believe it or not, we are actually getting close to the point of this chapter. So, electrical engineers learn all about electromagnetic theory. In my third year university course on this subject, I had a German professor who taught the course with dedication and at times with extreme enthusiasm. After the early years of calculus and introductory courses on electric and magnetic fields, we were ready for the big time theory.

In 1873, James Clerk Maxwell published years of his work that unified all the knowledge of electricity and magnetism through a group of relatively simple equations. In our third year course, we referred to them in short form as Maxwell's four wave equations. I can still remember the professor excitedly pacing back and forth in front of the class. With a German accent, his total manner stressed the amazing importance of these four wave equations. These four wave equations, he implored, described all of electrical engineering, the entire electromagnetic spectrum, from frequencies of simple direct current right up to light, and beyond. Understanding the equations, with the proper knowledge, use of assumptions, and derivations would allow us to determine any of equations we would ever need: period, full stop. Even the simplest formula could be derived from Maxwell's wave equations. One simple example he showed us was Ohm's law. This is the simplest of electrical formulas which describes that the voltage across a circuit is equal to the product of the current and the resistance in that circuit. The professor went on to explain that the millions of electrical, electronic, and electro-optical devices that span our globe are all explained by Maxwell's laws of electromagnetism. Now, I was impressed.

To impress you, and these will be the only equations to appear in this book, the following are the integral form of Maxwell's four electromagnetic field equations.

$$\oint_C \mathbf{E} \cdot d\mathbf{l} = -\frac{d}{dt}\int_S \mathbf{B} \cdot \mathbf{n}\, da$$

$$\oint_C \mathbf{H} \cdot d\mathbf{l} = \int_S \mathbf{J} \cdot \mathbf{n}\, da + \frac{d}{dt}\int_S \mathbf{D} \cdot \mathbf{n}\, da$$

$$\oint_\Sigma \mathbf{B} \cdot \mathbf{n}\, da = 0$$

$$\oint_\Sigma \mathbf{D} \cdot \mathbf{n}\, da = \int_V \rho\, dv$$

These equations are complex in that they involve: integrals of calculus in three dimensions; vectors manipulations, also in three dimensions; and, some involve functions as rates of change of time (*dt*). However, you need to forget all of this and just focus on the four lines of squiggles. These short four lines are amazingly elegant and incredibly powerful. You are looking at four equations that completely define all the laws of electromagnetism throughout the entire universe, not just on Earth. The use and control of all those frequencies we just went through are totally described by these four equations.

Furthermore, there is another super fact I have for you that is not commonly thought about. Science currently has no way to fully explore the universe other than through the use of electromagnetism. Visible light telescopes, radio telescopes, X rays, and gamma ray detectors are the only eyes and ears that let us currently explore the universe - there is no other non-physical way to do it, and all defined by Maxwell's four wave equations. For engineers, every electrical or electronic device that exists or that may be invented in the future, will operate under the laws of these equations. If you are young and have managed to become awed by the previous descriptions, the only phrase that would sum it up for you, would be - way cool.

Now then, all of the this was not so bad, was it? You may relax now, as that is as complicated as this chapter gets. Armed with those equations and explanations, I hereby charge you to go forth and peacefully practice the discipline of electrical engineering. Enjoy.

Scientists, and especially physicists, have searched for and have recognized that there are substantial forces at work in the universe. Since history started, it is as though they have sought them out and have needed to understand these forces. Over the past four hundred years, continuous progress has been made by science in identifying and quantifying these forces. They have categorized that there are four main forces in the universe. Of the four, we have already reviewed one of them and it is Maxwell's genius and elegant mathematical description on the forces of electromagnetism.

Before Maxwell, there was the discovery and definition, by another genius, Sir Isaac Newton, of the universal law of gravitation. Of the four fundamental forces, gravitation was the easiest and earliest to be observed. Newton also described gravitation with a complete mathematical theory. Before he could derive the laws of the gravitational forces, Newton developed the science of motion and forces that is called mechanics (I told you it had very little to do with car parts). A more accurate theory was later developed by another genius - Albert Einstein, who derived the theory of general relativity in the early 1900's. Einstein's theories were different than Newton's and reconciled some observable problems in very unique circumstances. Einstein's theory of general relativity was also fundamentally different in that it described gravitation as a curvature of space and time. If you thought Maxwell's four wave equations were complex, do not rush out and get a complete copy of Einstein's works on general and special relativity.

Gravitation is the force of attraction that exists between all objects with the tendency to pull them towards each other. It exists between the smallest and largest of all objects and it includes all types of matter and energy. Gravitation plays a critical role on all the processes on our Earth, from controlling the tides of the oceans to affecting weather patterns. It includes the very stars themselves and the collapsing of a star when its fuel becomes depleted. Gravity specifically refers to the pull of the Earth's gravitational force. Gravitation refers to the force in general and is observed throughout the universe and which affects all astronomical bodies. From the mathematical theories, one can calculate the motions and forces within the solar system, the planets, our moon, and the Earth. Orbits and calculations are so precisely calculated and understood that you may determine the time of the next sunrise, within a minute, for 200 or 2000 years from now.

The two other fundamental forces of the universe are called the strong and weak interactive forces among subnuclear particles. I will not pretend that I can explain them properly without much effort. Plus, there would not be much added benefit as I believe the point of this chapter is finally and sufficiently ready to be made.

Physicists have a passion and an amazing desire to seek out the most complex forces in the universe and then determine the most elegant, profound, and shortest mathematical equations that will most completely describe all the complex behaviors and variations in that force. It is extraordinary to have a simple set of mathematical equations that totally describe a governing force in the universe. Four of them have been described in this way: gravitation, electromagnetism, and the strong and weak nuclear forces. Since the time of Einstein, and currently with reiterations of the British astrophysicist, Stephen Hawking, physicists have been seeking what they call the Holy Grail of Physics. The holy grail is a single set of equations that would define all four of the forces. It is also referred to as seeking the unified theory of physics.

They have good reason to believe such a unified theory exists and is within reach. This is because of past history and successes on smaller 'unifications'. In history, many components of various forces were first observed individually and described by simple and separate equations. Then, due to the circumstance of there being enough equations, observations, or just pure genius: someone comes along to totally unify one of the forces under a master set of equations. This is an example of exactly what Maxwell accomplished for electromagnetism and then Einstein with general relativity. For now, the four forces are described masterfully, but separately. Possibly based on the shear elegance and the simplicity of the universe, physicists feel that there is a key out there to unite all the forces. There is beauty and elegance in simplicity, so to say. Maybe there is a tie-in and connection to my first chapter and the force of simplification?

Time, space, and the universe are very hard concepts for me to get my head around. Theories like the 'big bang' I am sure have an incredible foundation in theoretical physics. However, I have such difficulty with the concept. All matter, time, and energy concentrated into a single point and then exploding to create the universe. What was before that point? What caused the point to trigger and explode? Why and what was the trigger mechanism? Are there cycles of expanding and contracting universes, with repeating big bangs? The universe, space, and time are said to curve on themselves and that there is no end to the universe. That is nice, but my mind is too practical and so I ask myself the question - well, there must be something holding all of it and it must be contained inside something? Then my mind goes totally silly and I imagine a universe within a universe. Maybe our universe is in an atomic particle that makes up matter in another universe and so on forever. I am not sure which is the worse dilemma.

It is kind of ironical that it should be called the Holy Grail of Physics. It has almost a religious context and maybe that describes the fervor in which it is being sought. Yet, even if it is not found, the theories and mathematical descriptions that exist today are already so brilliant in their ability to so concisely describe the most significant of the physical forces in the universe. That is the point - concise mathematical descriptions that totally describe powerful and observable forces in the universe. This will be compared in the next several chapters to other areas of science and their vastly

contrasting differences in terms of concise mathematical, or any other type of description and definition.

Chapter 5 Chemistry - Go Figure!

My first serious interest in the science of chemistry started in junior high school. Going to junior high is a very memorable event for most children, one of the major transitions of youth, and in my case it certainly was not the exception. All types of changes were experienced that ranged from no longer having recess breaks, all the way up to being with those senior high students who were so much older and towered over you. Going to a high school was just one of the many phases in life and it was like a rite of passage. For me, it was extremely exciting: new books, more difficult and interesting subjects, and getting back together with friends I knew and others that I was yet to meet.

I was not disappointed on the first day and in fact it was just the opposite. My home room was up on the second floor and I would be based in a no less than a science lab. It was as if I had been sent to heaven. For myself, all this excitement and entering into grade seven commenced in the fall of 1965.

Our homeroom teacher was male and he gave the immediate impression of being strict and totally in charge. He wore a dark suit, white shirt, and a dark tie. The first day instructions on home room procedures were sharp, clear, to the point and had no latitude. Minor doubts began to set in that this might not be all that much fun. I was wrong. In elementary school I had one teacher I would never forget. For junior high, this would be my most memorable teacher and his appearance of being harsh was a cover. He was the nicest and most helpful person you would want to know.

The classroom was completely tailored to teaching science subjects. Large blackboards covered the front wall and the other ones were plastered with large charts on the sciences. The most dominant feature in the room was the raised black lab bench that stretched the entire front length of the class. From it's built in sink, to it’s gas outlets, and it's Bunsen burners: it dominated and was there to be watched.

It was from behind this lab bench that the teacher wove his descriptions of science, demonstrated experiments, and held my mind totally mesmerized. He refused to let go and over the next several years, whether it was physical science, biology or chemistry, I was glued.

It was the demonstrations in chemistry that captured my attention and which drew me into my next hobby at home. My mother will well remember the Christmas when my requests for a chemistry set were as the pursuit of a dog for a bone. I would not let go, I had the clippings from the catalogue, and I had the features of what came with each set memorized. I was not to be deterred. My parents both worked long and hard hours to provide for our family so getting the chemistry set, the easy way, was not to happen. Children are so resilient and since I was typical, the disappointment wore off pretty quickly.

I would just save up my money from a paper route and I set out to put my own chemistry set together, piece by piece. It is amazing what childhood determination and imagination can do. I bought an alcohol burner, test tubes, clamps and a stand, and scoured the local drugstore for chemicals in bottles and little cans. I remembered my little mind becoming frustrated though. Why did these drugstores have all kinds of

medicinal names on everything? I wanted the raw chemical elements such as sulfur, carbon and iodine. I did not want mercurochrome.

The other fascinating feature of my science home room was the long and narrow supply room attached to it. The keen interest from my friends, Bruce and Dennis, and I must have been apparent to the teacher. When I think back, it must have been obvious because we just hung around that teacher so much that he had to either send us away or remind us about going to our next class. Since the enthusiasm showed, he was thoughtful enough to give us a limited and private tour of the supply room. This room was lined to ceiling with numerous glass-doored cupboards and shelves.

The room had chemistry apparatus that made us drool with desire. It had test tubes, beakers, flasks, glass tubing for forming into shapes, rubber tubing and stoppers. Everything was stocked in all sizes, shapes, and in quantities by the drawer-full. The chemicals being stocked were equally impressive and seemed to include every type possible. He showed us containers of concentrated hydrochloric and sulfuric acid while cautioning us and giving examples of how dangerous and how powerful they were.

Somehow, without being certain, I doubt that those types of classrooms exist today for our average young people. I sense that the reasons for any limitations will be due to financial constraints, elaborate safety concerns, and topped off with threats of legal action for so much as a nosebleed. It is good for parents to be involved. However, I am glad my parents were old fashioned. They did not get together with other parents to review, petition and protest on the every move a teacher made. Although never stated, I gathered my parents felt that teachers were trained professionals and knew what they were doing. Teachers did not need to be second guessed, scrutinized, and challenged. Looking back, I saw nothing wrong and I was never hurt in any way.

My interest in chemistry was only heightened by the various demonstrations the teacher performed up at that lab bench. He mixed two dry chemical powders in a test tube, stoppered it with a tube leading to a inverted water filled flask in a large water laden beaker, and heated the test tube with a Bunsen burner. A gas was produced and displaced the water in the flask. He proved to us that he created pure oxygen by lighting a wooden stick, blowing out the flame, and inserting just the smoldering end into the flask. Seeing it burst into flames again was magical to me. Next he produced carbon dioxide and reversed the experiment by inserting a flaming stick into the flask only to have it immediately extinguish and fill the flask with smoke.

Now filled with a new desire, I had to get those chemicals and demonstrate that experiment at home to my brother, Arthur, and my sister, Linda. Although successful, they did not seem impressed with the creation of pure oxygen … maybe I needed that lab bench for effect.

The next experiments were performed by just my friends and I. Although it was a little dangerous and frightening for us, we were always safe and never got hurt. We secretly ascertained the ingredients to make gunpowder used inside fireworks. There we were, two or three boys, busy mixing the powders, filling short pipes planted in the ground, using wicks from firecrackers, lighting the wick, running back, and watching our handiwork. It was not always impressive. Sometimes we achieved a one or two inch

flame and other times just a lot of smoke and bubbling molten goo. We wanted colored flame effects but had no knowledge on how to achieve that.

We were very fortunate that we never mixed a batch that was truly explosive. Some may call it luck or good fortune but I think God was watching over us, keeping the excitement kindled, and without the harm.

In all of our attempts and efforts, it was nothing like the Chinese fireworks that we sometimes lucky enough to watch with their impressive roman candles. I remember being told that the Chinese were the first to invent gunpowder way back in 1492. Or do I have that date confused with when Columbus sailed the ocean blue? The humor can be poor at times and by the way, there is a point to this chapter. However, you have to be patient while I reminisce.

What is it about chemistry? I remember taking grade eleven and twelve university entrance chemistry, as they used to call it. It was not an easy subject for me. The hobby and excitement from junior high had by then unfortunately worn off like old paint. When I went into first year engineering a lot of the courses were in common with science and this included first year chemistry. It did not get any better for me in university and as my lowest mark, I only managed to get a C.

There were so many different rules to learn and strange rules on handling what was referred to as chemical equations. Taking molecules and compounds on one side having some type of energy or reaction take place that converts them into chemicals and compounds on the other side of the equation. There were rules for doing all of this, but more importantly, there constantly seemed to be the exceptions.

I am probably exaggerating this, and it may be a deep seated psychological problem because I got poor marks, but there seemed to be more exceptions than rules. Also, it seemed the exceptions were what invariably appeared on all the exams. To me, there seemed to be no rhyme or reason to chemistry. It was not at all like mathematics or physics I was taking. These subjects had laws and logical deductions could be made. You learned a particular law and you could solve numerous problems in a consistent manner based on that law. You started the equations and it seemed to flow without all that memorizing by heart. For me, mathematical and physical equations were real equations. Chemical equations may indeed explain what happened in a given reaction, but there was no master law that could predict and control them. It was observations, experiments, and discovery: sometimes, by accident.

If we took the subject, a specific area of chemistry we all remember going through was studying the periodic table. If you did not take chemistry do not panic at this juncture: this will not get too boring, there will be a point to all of this, and possibly a test.

You may need a little refresher on all of the basics. An atom is the smallest unit of any element that occurs in nature. Using the simplest of descriptions, you will remember that an atom consists of protons at the core and electrons whizzing about in various electron shells. A more complex description would include neutrons and all those elusive subnuclear particles that physicists stumble upon when they split atoms. To stay balanced, each atom must have a matching number of protons and electrons. It starts

with one proton and one electron that form the element we call hydrogen. Therefore, the element hydrogen is assigned the atomic number 1 and the elements go up in atomic number from there. When you add an electron and a proton to hydrogen it becomes helium, number 2, and another gas at room temperature. The elements fill the periodic table in rows according to some prescribed rules. As you already guessed, I cannot remember a single one of those rules. I certainly would not refer to them as laws, but someone might.

An element is defined as a substance that cannot be broken down into any other substance. The best example is water. Water is not an element as it can be broken down into two other substances, hydrogen and oxygen. Two atoms of hydrogen and one atom of oxygen make up the chemical formula that is repeated constantly: H_2O . Water is therefore called a compound. Not a complex compound … but, we like to drink it anyway.

By the way, adding electrons and protons to atoms or anything else is not a trivial thing done in your backyard. Enormous quantities of energy can be either required or released as witnessed by the lack of people playing with nuclear energy in their backyards. Also, if it was so easy to add electrons and protons, criminals would no longer need to focus their attention on counterfeiting money and get legitimate jobs converting other elements into gold instead.

When I went to school we were taught that there were 92 naturally occurring elements. Atomic number 92 was uranium with 92 protons and electrons. By the time I got to university the periodic table had increased and now showed 103. Evidently, period 7 includes the actinide series, which has been filled in by the synthesis of radioactive nuclei and goes up to element 103, lawrencium. Well, that is how my textbook describes the rule. I am not impressed.

What does impress and fascinate me is looking at the individual characteristics of some of these elements. Some of the low elements like hydrogen and helium, 1 and 2 respectively, are gases at normal room temperatures. This makes sense I guess because they are light in their atomic weight. As you move up the table to 6 you reach carbon. At room temperature this is a solid black material with great importance to life. Carbon combines very readily with other elements to form molecules. These complex molecules, and the chains they create, are found in all life-forms on Earth.

When you move up to number 10 you find that this element is neon. This is strange for me because neon is a gas. Engineers love laws and set patterns. Let me see, a couple of gases, then some solids, then a gas again … I will never remember all of this for the exam. When there is no rhyme and reason, when the logic is missing, it causes me grief. Still, what is so fascinating for me is the changing characteristics of all the elements. You move up to element number 16 and you find this to be sulfur. This is a yellow colored material, can be easily powdered, and does not smell to good when burnt.

Before sulfur is element 14, Silicon. This is classified as a semi-metallic element and is the second most common element found on the Earth. Curious is it not? Not only is it very common on Earth, but engineers managed to make it pretty common in every

device that you use which employs electronics. I challenge you to find a modern electronic device today that does not have silicon in it. What a coincidence.

Element 26 is iron and it is silvery white metal that has magnetic properties. Copper is a brownish-red metal with element number 29 and is one of the most widely used metals and dates back to early prehistoric use. Moving up to 53 is iodine that is not classed as a metal but is a halogen. It is blue-black in color and is a solid a room temperature. Well, let us add one more proton and electron, going to element 54. Maybe we have another solid or maybe another metal? If you agreed you are incorrect. Element 54 is xenon and it is gas at room temperature and is almost totally inert. Inert means that it is extremely difficult to get this element to combine chemically with any other. Xenon is a gas that is used in flash tubes and is present in very minute percentages in the Earth's atmosphere.

What law describes how these elements decide that they will change colors, change significant properties, and go from a gas to a solid or back to a gas? Go figure. It is akin to playing with a child's set of plastic building blocks. You add another white block and another white wheel. Instead of looking like you thought it would: the whole structure suddenly turns green and floats into the air.

Going to element 79, we now strike gold. Gold is characterized as a bright yellow metal that is soft and one of the most malleable. It is an excellent conductor of electricity and heat. Yet, it is extremely inactive in that it is not affected by solvents, air, moisture and heat. These are some of the properties that make it so popular for jewelry: it will not tarnish.

Now, I would like you to consider an amazing step. Gold is 79. Add just one electron and one proton and you reach element 80. What do you have? You have mercury. Mercury is a metallic element that is a free-flowing liquid at room temperature. It is a liquid. For myself, this transformation is almost miraculous. We just added one electron and one proton. What possibly could explain all the sudden and drastic changes in characteristics between these two neighboring elements? What could possess mercury that it thinks it can do all these things? A liquid metal.

Mercury is silver in color and, as we know, is used in some types of thermometers. Mercury is also likely to be found in the thermostat that controls your home furnace or air conditioner. It is used as an electrical switch and is contained in a small glass bulb. Also, mercury is acutely hazardous as a vapor and in combination with other compounds. We have all heard of mercury poisoning and its accumulation in living organisms.

As a short digression, I attended Robertson Elementary School where I met my first of a series of extraordinary teachers. One of my classmates had somehow managed to get their hands on a vial of mercury. We let it roll around in our hands and played with it for hours. If you dropped it on the floor, it would 'shatter' into hundreds of smaller liquid balls. Then you played by reassembling them … just by rolling them back into each other and reforming your original ball. Dust and dirt would stick to the outside of the ball. This was no problem for us as we would 'squeeze' the mercury through a piece of facial tissue. Minuscule balls squirted forth into your hand and reformed into a main ball.

When you opened the tissue you saw all the dust and dirt left behind. The mercury was shiny and clean as new. Mercury has a great affinity to silver and back in the 'old days' ten cent pieces were made of silver. It was fun to mercury coat a dime, see the change in color to a super silver, and notice how slippery the dime now felt.

Now, finally and at long last, I will attempt to make the point of this chapter. Unless there has been some recent fantastic discovery, or, there is something they neglected to mention to me while going through school and university: there are no laws of physics or chemistry that explain or predict these substantial changes in characteristics of the elements. There are changes in color; changes in form as a gas, liquid, or solid at room temperature; and, changes in other properties that would be far too numerous to list. No two elements are identical in their characteristics and everything changes by adding or subtracting these common building blocks called electrons and protons.

It is not as though I object to the changes … it is the lack of laws, the lack of mathematics, and the lack of equations that describe or predict these changes. Where is the math and where is the explanation? Relatively speaking, there is none.

Chemistry is more complicated than working with the base elements. Elements can be combined to create compounds and these in turn can be linked to form chains and extremely complex arrangements. If you cannot predict changes between elements: imagine how difficult it must be to predict changes between compounds of elements. That is why there are so many rules and exceptions to the rules. The factors of complexity must multiply and I am sure this is witnessed in the specialty fields of organic and biochemistry.

Where is the math or another key that unlocks and explains these phenomena?

It is documented that a lot of important chemicals and processes were discovered inadvertently. Chemistry is a lot of discoveries and experiments. My fervent hope and desire is that these written comments are not misinterpreted as my ridiculing this area of science. Nothing could be further from the truth, as it would be difficult, if not painful, for us to regress back to a time where we did not enjoy the benefits of such superb materials that make our lives so much easier. These materials are all results of advancements in the chemical sciences.

Yet, I must continue and compare the fundamental laws in physics and the universe to what does not seem to exist in chemistry. Previously, I described the scientist James Maxwell who is famous for his single theory that is described by four elegant wave equations. His theory is by no means insignificant as it completely explains the relationship between electricity and magnetism. Put another way, his theory describes electromagnetic radiation. The theory describes every electrical, electronic, optical, and electromagnetic principle used in millions of devices that span our globe. Electromagnetic radiation, and the full electromagnetic spectrum, is the means by which we study the entire universe. The electromagnetic spectrum covers everything from: radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, X-rays, and gamma rays.

In 1860, Maxwell predicted that visible light was an electromagnetic phenomenon by mathematically analyzing his theory of electromagnetic fields. Scientists recognize and have categorized the main Forces of Nature. There are four of them and Maxwell's is included as one of four.

Another example of laws and predictability is provided by no less than Albert Einstein. Einstein published his general theory of relativity in 1916. Reportedly at that time, there were only 10 or so people in the whole world who were capable of understanding the mathematics involved. Among other things, his theory included a fundamentally new description of gravity that included the 'bending of starlight'. His theory was not confirmed by measurements until a 1919 eclipse. Now that is an example of predictability and the power of a governing law in science.

So, what are the elements that make up the majority of matter in the universe. I did a quick search in some current reference materials and I was unable to find a simple answer. However, you can rest assured that from what I did gather it is definitely not the complex and higher atomic elements. They do not appear to account for any significant percentage of the universe. You may safely count out and exclude that dominant quantities of complex compounds exist.

Here is some data on our Sun. The Sun has enough volume to hold 130 million Earths. In terms of the total number of atoms in the Sun, it is composed of approximately 92 percent hydrogen, 7.8 percent helium, with only the remaining 0.2 percent including elements that we have on Earth (oxygen, carbon, nitrogen, etc.). Using the Sun's atmosphere and spectra for analysis, more than 60 elements have been identified that we have on Earth. Some of those elements are detected and believed to be in the 'cooler' reaches of the Sun's atmosphere. These 60 elements would be distributed according to the previous percentages. Stated another way, 58 of the elements appear to be restricted to 0.2 percent of the Sun's total count for atoms.

If 60 elements have been found, what about the others? The answer is that they either do not produce lines in the observable part of the spectrum, or that they are so rare in the universe that they may not generate lines that are strong enough to measure.

As science has described it, the Sun is one constant nuclear fusion reaction converting hydrogen to helium with energy as a left over by-product. You must excuse my flippant attitude and humor at calling this immense amount of energy a 'left over by-product'. The energy is extremely powerful and radiates into space from the Sun in all directions. You could picture it moving out from the Sun in spherical waves like that of an expanding balloon. Yet only a slim fraction of that energy falls onto the relatively tiny Earth's surface which is 93 million miles away. Yes, it is just a small fraction of the total energy and light emitted by the Sun, but it has sufficient strength to totally bake a person lying in a desert.

What about the rest of the universe? This is were it gets fuzzy and I was unable to get clear answers for you. For scientists there are two items in the universe to observe: matter and energy. For the matter that scientists are able to observe it must emit electromagnetic radiation. Examples of observable radiation, and hence matter, is: light from stars, types of radiation from quasars, and radiation from 'around' black holes.

Since our Sun is an average star, we can assume that the elements found in all the observable matter in the universe will be similar: a majority of hydrogen and helium. The point to be made is that this ties in with the concept of the first chapter of this book. The universe is 'following' the forces of simplicity: it consists of the simple elements of hydrogen and helium.

The item making the subject fuzzy is that somehow scientists are able to estimate the total matter of the universe. (I never checked into how this is estimated … I only have so much time you know.) When they take into account all of the previous radiating matter, such as the stars, they have determined that a lot of matter is missing. Scientists speculate that there is something called dark matter and since it does not radiate, they cannot detect the missing, or 'dark' matter. Furthermore, it is believed at that this dark matter makes up at least 90 percent of all the matter in the universe. Now, before you get over excited, this dark matter is not all of the other missing and "complex' elements that we have on Earth. Unfortunately, the possibilities being considered by science only grow more complex.

In a June 1998 news article, it was reported that after decades of research a team of physicists stated that they have determined that neutrinos, a subnuclear particle, may be carrying this 'missing matter'. Neutrinos have such high energy and are so small that they are capable of zipping through the Earth unscathed and undetected. How was a neutrino detected? By watching and waiting years in the Kamioka zinc mine northwest of Tokyo, in a vast detection chamber located a mile deep, filled with over 12 tons of highly purified water and surrounded by 13,000 photomultiplier detection tubes. One physicist and member of the research team is quoted as saying, "In this business you only get great data like this once in a lifetime - if ever".

While the explanations may be complex, is the particle itself complex? The answer is no. A huge amount of the mass of the entire universe is not even as complex as the hydrogen atom. If fact, the neutrino is far simpler and only carries the rank of subatomic particle.

To try to summarize and conclude this chapter on chemistry, it is only on planets, and on the Earth that we observe an apparent abundance of the higher elements and complex compounds. This apparent abundance is only due to our observation point being on the Earth itself. If we move our observation point to study the rest the universe, our answers change drastically to forces of simplicity and randomness. We are 'misled' by the complexity around us. We take for granted that the rest of the universe is like us. It is the other way around. We are in the minority and the universe is far 'simpler'. Star are formed and stars die with the vast ebb and flow between the elements of hydrogen and helium.

What are the laws of chemistry, and, what predicts and causes the surprising changes in characteristics of the elements just by the addition of a proton and an electron? The evolutionary science taught in biology describes a principle whereby living matter becomes more complex and 'evolves' merely by interacting with nature and other living matter. It seems to gloss over the complexity of the first life and what would cause its creation. Did it just want to get complex and live? Was the first life an accident and a random act of nature? Why a complex random act and not one towards simplicity?

On our planet, why does non-living matter only become more complex, and 'evolve', because of the sophisticated direction and searching of chemists? Why do we not find complex materials creating themselves by accident and by fluke events of nature? It supposedly happened for living matter. What are the odds of seeing something like plastic or nylon occurring naturally within the Earth and a geologist reporting the miracle find anywhere on our planet? The headline could read: 'Miracle Vein of Dynamite Found - Mining to be Done Carefully'. Yes, this is a ridiculous thought and so might be the scenario that I describe next, but the point being made is why do complex compounds not appear by random acts and yet even more complex living structures can?

Another illustration of complexity is as follows. Imagine that the planet Earth is in the exact form that it is today except that it is totally devoid of all life. There is not a single living organism in the land, sea or air: there is not one microbe, no plants, no animals, and no human beings. You, as the solitary living creature, are put on a nice and habitable place on the Earth. "Great!" you say to yourself, "I have been dying to get away for some peace and quiet". Is it so great though, and how long would you last? Unfortunately reality sets in pretty fast and you get thirsty. This turns out not to be a serious problem because with a little looking around you find a stream of clear fresh water flowing nearby. One important need is satisfied.

Next, you become hungry and this is unfortunately where the serious problems set in. Unlike a plant, you cannot create your own food by using the Sun and photosynthesis. You must eat complex proteins, carbohydrates, or sugars to possibly survive. Can you find any of these on a barren Earth, stripped of life, but allowed chemically to 'evolve' for billions of years? The answer is a flat and simple no. No complex proteins, no carbohydrates, not even 'simple' sugar is occurring 'naturally' for you to eat. You can find salt, sodium chloride - a compound of the two elements sodium and chlorine, as this is a naturally occurring substance. However, while your body needs salt, it does nothing to sustain you. Can you find sugar? Unfortunately sugar is not found naturally and is not so simple a compound. Plants and animals make sugar. The majority of all the world supplies of sugar come from the processing of two plants: the sugarcane and the roots of the sugar beet. Have you heard of any sugar mines? Pretty ridiculous is the answer. What do you think your chances are of finding complex proteins that your body truly needs to survive? As the sole living creature on Earth, without complex assistance or supplies of nourishment, your demise is inevitable as you have no food.

Do not forget, that just like for life, there were billions of Earth years for these chemical miracles to occur and random 'evolutionary' acts to happen. What are the odds of any chemical evolution without human intervention? A chemist … if we were still on speaking terms, might give the likely answer … "Be reasonable, think about it, the chances are zero". Is it possible: yes. Is it probable: no. The law of simplicity and randomness kicks in. You just need to observe the universe and the non-life forces that drive it.

Without intending any ridicule to people and to their accomplishments, but concerned only with some of the basic concepts of a given science, that is why this chapter is called 'Chemistry - Go Figure'. Is our universe filled with complex chemical elements and

compounds? No is the resounding reply that comes back. Evidently, the matter of the universe consists of vastly dominating portions of hydrogen, helium, and possibly neutrinos: two of them being the most simple of all possible elements. Quantities of hydrogen and helium, that so fill the stars and universe, that our minds cannot fathom their shear mass and magnitude. They are a domination of simplicity.

Chapter 6 Biology: 'Zero' Equations ?

Biology is the science that studies all living forms which include plants, animals, cells and microorganisms. As a senior high student, I did not formally start taking the subject until grade ten. However, as everyone else has experienced, we all grow up being taught general science and of course this covers many aspects of biology. Who cannot remember studying plants and photosynthesis, or, planting seeds in the classroom and observing the stages of germination right up to the growth of a young seedling.

I remember a grade three project where each student had to collect as many different types of weeds as they could, press them into a scrapbook, and label them. Classrooms scoured the fields and yards looking for different weeds. We even traded them. The general dandelion population was not frightened for an instant. Then there was the leaf collection and the flower collection. Who has not colored and labeled the parts of a flower? Pistil, stamen, petals, sepals: we have all made hundreds of labels and connected them with lines to the multitude of biology diagrams that we have done.

Like other science subjects, I took an interest in biology, but for me it never turned into any kind of a passion or hobby. As a youngster, the closest I got to biology as a 'hobby' was being very fortunate to receive as a present a small microscope set that included a kit of prepared slides and a kit of blanks for making your own. It was fun examining the prepared slides and studying the fascinating types of cells that were supplied in the kit. After interest in the prepared slides wore thin, I moved on to try preparing my own slides. You do all the simple things such as examining your own hair and trying to peel off a thin layer of your own skin. The toughest personal examination was pricking my finger to make a slide of my own blood and view blood cells.

After this self study, the next phase was to examine other objects. I recall getting a razor blade, trying to get thin enough slices of an onion, then using the supplied types of dyes, and finally examining the onion cells. What impressed me most about the whole process was how difficult it was to get a thin enough slice of anything so that light could pass through it and you could examine it under the microscope. It is no small feat when done totally by hand and without the use of automated and elegant slicing mechanisms.

For grade ten, my homeroom was in the newest section of St. John's High and on the third and highest floor. Senior high, I had truly hit the big time and now I had to gaze down at those short, pesky, and exuberant junior high kids coming into grade seven. Not only was my room on the third floor but so was the biology lab. Yes, this was most definitely the big time. For in that biology class, not only did the teacher have her own dominating lab bench, but I too had a mini bench that was shared with another student. Issued with an impressive thick text book on biology, I was on my way and look out world.

Biology, in the senior years, was fun and I did not find it too difficult. I managed to probably keep a B average throughout grades ten to twelve. As I was not certain yet what I wanted to go into at university and I wanted to keep my options open, like many others I loaded up those years with the options of biology, chemistry and physics. Mathematics was a mandatory subject and this was fine with me. English was also mandatory and this was not quite so fine.

Biology throughout those years was always interesting. The woman teacher always showed excitement in her specialty and gave clear and very understandable explanations on the subject matter. The lecture portions were spiced with neat experiments or investigations that we got to perform at our private lab benches. These ranged from studying the anatomy and systems of animals and then dissecting frogs; to learning about the structures of the eye and dissecting a cow's eye. We also learned about bacteria and how prevalent they were by doing experiments with petri dishes and a special growth culture media.

Like all science experiments, we had to formally plan what we were to do, execute the experiment, collect data, study the results and complete the report with conclusions. The bacteria experiment had all the fun in the execution phase. The petri dishes and culture media was sterile. According to your plan, you took cotton swabs and sampled objects of your choice by rubbing them and transferring the 'rubbings' by rolling the swab onto the sterile growth media. The media was on the bottom of the petri dish in a thin layer and had the consistency of gelatin. The media was all marked off in sections and labeled for record keeping. Once our preparations were completed, we scampered about the lab and the entire school like children in a candy store with a mission to get all we can. I remember sampling the bottom of my shoe, the floor, the tip of a classmate's nose, and the hallway water fountain. The petri dish had its cover put back on and the whole thing was put in a special incubation chamber for a week to allow the cultures to grow. The incubation chamber was just another impressive feature that filled that biology lab. After the week was up, we analyzed the results and oooed and ahhed at all the strangely colored and spotted growths or hairy mold like patches. By the way, the answer is yes if you were wondering if something resulted from the nose tip swab.

The other areas of biology that I recall studying were heredity, the structure of a single cell, amino acids, DNA, chromosomes, and cell division. I will touch on a few of these a little later as part of the emphasis of this chapter. Grade twelve was the last of my continuous classes and studies on the subject of biology. As I went into electrical engineering, I did not take any university courses pertaining to biology until a fourth year elective when I selected biomedical engineering. The biology we took here was very focused on understanding human biological processes so that they could be measured and/or mimicked to assist in the field of medicine. Measuring lung capacity; studying electrical signals associated with the heart beat, electrocardiograms, and the detailed anatomy of motor nerves were some of the areas we delved into. We seemed to spend a lot of time on nerve structure including how synapses (connections between nerves) worked and signals were transmitted. This led to studying myoelectric signals that are generated by the muscles so that they could be used to control artificial limbs and prostheses that were motorized.

St. John's High School was full of fond memories for me after spending six formative years there. It all started in September 1965 and finished in June 1971. I mentioned that the Biology lab was on the third floor of the newest section of the school. However, St. John's had a much older and original section that faced onto Salter Street. It remained standing for only the first year or two that I attended the school. My recollections are fairly vague, but I remember it being an extremely impressive stone structure. It was multi-storied and had many stone steps that led up to an imposing front

entrance. The wide hallways and classroom floors were all old hardwood. Those floors were well worn with history and notorious for creaking when the art teacher wanted absolute silence, which was every class.

I do not recall taking many classes in that old section other than art and shops. In case 'shops' is a foreign word to you, the proper terminology used today is industrial arts. Not only is the word dated, but back then the concepts were dated as well about who took what. Boys took shops and girls took home economics. As we know, times have changed significantly. With four daughters and a son, I am pretty impressed when my daughters bring back their woodworking projects that look so intricate and well done.

However, the shops in the basement of old St. John's were not your routine run of the mill shops. These were ancient. The memorable one was metal class because, not only did we make things with sheet metal, but this shop was equipped with old forges. Yes, the shop had forges just as those that blacksmiths would use; and no, we did not have to take turns pumping air bellows. These were 'modern' forges that were powered by electric blowers. We had to learn about the proper use of coal and coke to get the right heat levels as well as starting the fire properly. Little boys were holding tongs with red hot metal, wielding hammers and clanking on anvils. What more could one ask? A silver painted tent peg, you say? A iron rod was cut to about ten inches in length with a carefully crafted point and a meticulously formed circular eye at the other end. Rushing your work was not wise as every project went under the careful eye of the instructor for final grading. That circular eye had to be as perfect as could be.

Halfway through metal shop, the class sections switched and we moved into sheet metal work. It was time to fashion something from tin, but like all shop classes you were held back from doing anything with your hands until the appropriate amount of theory, notes, and drawings were completed. For sheet metal, we had to chose the pattern we desired, spray paint one side of the tin sheet with blue for tracing, and carefully scribe the pattern and fold lines through the paint onto the tin. Prudent use of the tin snips and skilled manipulation of a metal folding brake would yield a cookie cutter that was a work of art. There may have been soldering of the tin parts, but I cannot remember this clearly. The final step is to get the projects home, deliver the solitary 'useful' tent peg to your Father, and the cookie cutter to your Mother. Beaming and grinning ear-to-ear with pride, the unspoken phrase to your parents is "look what I can do".

The other class I remember in that old section of St. John's was taking electrical shop. I was excited about taking this class and thought we would get right into some interesting electronics. However, this was not to be as we started first with the very basics. We studied types and sizes of electrical wire and the only practical work I recall doing was making splices. Splices, now that was not my idea of excitement. However, we learned and practiced on how to perform four or five ways that two wires could be joined together to form a good electrical and strong mechanical connection. This was just the way the telephone or electrical companies would have them spliced. The twisting and overlaps of the wires had to be just right and there was a specific hand technique on how to accomplish this correctly.

We learned about insulators and conductors, but overall that first year was not highly memorable. Yet, the glimmer of my interest in electronics started and when I was to

take this shop in subsequent years the interest continued to grow. It may have been the second or third cycle through electronics before we built an amplifier from all the component parts. Powered by an old fashioned vacuum tube, we had to follow a schematic to make the right connections and use the correct color coding for the wire to indicate power or signals. You were graded on how neatly and squarely the wires were routed and how good your solder joints looked.

My hobby with electronics was also driven by my interests at home. This included getting my first small transistor radio and not being able to leave it alone long enough until it was completely taken apart to see what it looked like inside. Tape recorders were next, the old reel to reel kind, and then came building speaker boxes. With more money saved from a paper route, it was back to buying another larger transistor radio that in addition to the regular AM/FM tuning had shortwave bands as well. This led to listening to short wave stations from distant countries and patiently waiting for them to say something in English, and with an address, so that I knew which country the broadcast was from. Then I would take note of the time, frequency and program content to send the information to the address. With luck, and months of waiting, I would receive a colorful confirming postcard in the mail. The idea being to collect as many countries as possible and cover another wall in my bedroom. There was a kind of mystic listening late at night to faint signals that were being broadcast from so far away. Tuning across the band, I was listening to Morse code, then loud gibberish tones or squeals as though from outer space, and back to strange voices or music.

The pull up whip antenna was not good enough to pick up those faint signals I knew must be there. So that led to the absolute necessity of stringing an antenna wire from the end of the garage to the top of the house with a signal wire coming down to my bedroom window. My parents had a lot of patience to let a youngster scamper all over the place making modifications to the home and not knowing if he fully understood about installing a lightening arrestor properly. All these interests in electronics, coupled with a fascination on how things worked and modifying them, contributed to my embarking into electrical engineering at university.

The old St. John's building and the shops in the basement disappeared pretty quickly and are still hard for me to recall. Living six long city blocks away, this was not an area that I frequented during the summer holidays. So upon returning to school one fall, the old section had totally vanished to be replaced by grass and a large sports field. It was as though the old building was never there, it disappeared like it had been vacuumed up into space.

That episode being dispensed with; it is back to biology.

My problem with biology is what I consider the total absence of mathematics. This is an oversimplification of what I consider the difficulty to be as it is hard for me to put it concisely into words. I realize that mathematics does not have to be a central part of everything to make it legitimate. This would be arrogant. What I am looking for in biology is more than mathematics. It is laws and basic guiding theories that I am looking for. As a comparison, scientists and engineers are able to understand and describe so many physical principles and theories through the use of mathematics and physics. It is as though the universe has dared all of civilization to understand its basic laws.

Understand my laws of gravity, understand my laws of electromagnetism, understand the strong and weak nuclear forces, it seems to taunt us. Fail to understand and you will not invent the wheel or even the simple principle of a lever. Yet, we have learned those basic laws and broken them down into numerous principles and sub-principles. If you need evidence, look back several hundred years and consider all the incredible devices, machines and principles that are at our disposal today. The growth and sophistication is outstanding and continues to progress.

In contrast, our living 'universe' is very restricted in comparison to the physical universe. Currently the existence of life is only known to us on this tiny planet called Earth. If we had a similar call from the living universe it might go like this, "Understand the laws of life and the keys will allow you to create life, to properly comprehend and wisely repair and replace all imperfections". Does biology have a unifying theory of life, basic laws, or a 'mathematics' of biology that allows a description of the laws and any systematic advancements? Or, is the science of biology a constant studying, learning, memorizing, and analyzing of an end result? It is my opinion that biology is only at the latter stage and that is why I have a problem in what is missing.

By way of example, I will try to explain the difference and the importance of the point I am seeking to put across. Let us consider a somewhat simple concept such as fire. If a person understands the laws of combustion and what causes a fire they can use the principles totally to their advantage, easily and at any time: to cook food for example. A person will understand that for combustion to occur they need oxygen, a source of fuel, and a source of heat. Knowing these things will allow them to create a fire readily and using several different methods when needed. One time they may use friction by rubbing two sticks to create the heat source, another time a flint or rock to cause sparks for an ignition source. They may aid combustion by gently blowing air to add more oxygen and move away the smothering smoke. For fuel, they may use dry grass or dry crushed leaves and they would not even remotely consider using wet soil as something possible to burn. From the knowledge and understanding of combustion you progress and are able to create devices like matches and lighters. Further knowledge leads to many imaginable possible uses including all types of internal combustion engines and jet engines for transportation on the Earth and ultimately even getting into space. This is my analogy for our understanding of the physical universe. If you know the laws you can do things.

Now consider the case where people know absolutely nothing about the principle of combustion. For some reason, they cannot figure it out and it is a secret that they have not unlocked. They have no idea how fires start and what makes them 'tick'. They find existing fires started maybe by lightening, use them and keep them burning. They seriously study fires and know its effects and uses. They know how to put a fire out. They can keep a fire going and make it get larger. They can take a part of one fire and start another fire elsewhere for a different purpose or need. However, no matter how long they peer into the fire, study and examine it, memorize features about it; they do not know how to create one from scratch. Unfortunately, they are missing the fundamental laws of combustion and they are doomed to be able to use fires they find, but never be able to create a fire by themselves. This is my analogy for our understanding of life.

Just as for chemistry, the biological and life sciences have made tremendous strides in their advancements and understanding of life. One only needs to have a modern medical procedure performed or to receive a critical medicine to be appreciative of this fact. Again, I need to point out that my beliefs and statements have nothing to do with ridiculing or belittling accomplishments in biology and the life sciences.

The underlying certainty remains however, the life sciences have not yet been able to create any living organism from a scratch mix, as I foolishly refer to it. It is not because the people involved in this area of science are not intelligent or ingenious as just the opposite is true. Some of the brightest minds on Earth go into these fields. It is my belief that the laws and principles involved with the creation of life are far too complex for ready comprehension and imitation.

We keep coming back to that word: complex. The creation of life is so complex, a feat not yet duplicated, and yet some would like us to believe that this happened spontaneously or by accident, on its own so to say, and then continuously evolved into even more complex life forms. Due to the lack of understanding of the basic laws and theories is why I refer to biology as: zero equations. I find it such an incredible contrast. On one hand you consider everything in the universe that is non-living and it is so completely described using mathematics. Then on the other hand you examine the living things and relatively there is a total absence of mathematics. Why is this? Is this contrast deliberate?

Even if science were to create a living microorganism tomorrow, the underlying reasoning I am using would still not be altered substantially. How could something so difficult and complex to achieve after sustained, intense scrutiny and research, happen randomly and spontaneously by itself?

You only need to look a little more at the subject matter of biology to gain a little more insight into the complexity to which I refer. I promise to keep this light and superficial, but factual, while not getting too boring or overly scientific. We will start with some basic definitions and terms that make up living matter. To see my point, watch for the increasing levels of complexity as we go.

There is an important class of organic compounds called amino acids. Amino Acids are made up of amino and carboxyl groups. The chemical formulas are not straightforward. The significance of amino acids is that there are about 20 of them that serve as the building blocks of proteins. Next, let us look at some facts about proteins.

Protein comes from a Greek word meaning ‘primary’. Molecules of protein range in size from long and insoluble fibers that we find in hair and our connective tissues, to smaller and soluble molecules that are capable of passing through cell membranes. It is estimated that a human being has 30,000 different proteins and only 2 percent of these have been fully characterized. There are unique proteins for each species and for each organ within each species. Proteins are used in the diet of living organisms to build and maintain cells. Also, the chemical breakdown of proteins yields energy that sustains and ‘feeds’ the cell. Here is a short list of interesting items that are proteins: insulin and most hormones, digestive enzymes, hemoglobin, and the antibodies of the immune

system. However, here is a key fact leading us to the next level of complication: proteins in the form of genes transmit all the hereditary information of a living organism.

The texts define a gene as a 'unit of inheritance'. For human beings, all our thousands of characteristics, eye and hair color to name just two, are determined by our genetic makeup. Genes are found in the nucleus of cells and are carried by chromosomes. Each gene is located on a particular spot, or locus, of a chromosome. Genes have been shown to be made of sections of strands of DNA, deoxyribonucleic acid. The study and identification of genes is of major interest to biology and medicine. As we have likely read, seen, or, heard in news reports; the study and identification of particular genes are important especially when they are involved with diseases. An undertaking was started in 1990 called the Human Genome Project with the intent to characterize the entire human genome. The estimates for the human genome are put between 50,000 to 100,000 genes. Notice that this continues to get more complicated. I wonder if science can claim that it has made a gene from scratch? Genes are complicated, but it does not stop here.

What about chromosomes? Chromosomes are found in living cells and are small threadlike structures that contain DNA and genes. For the higher plants and animals, chromosomes are found in pairs with humans having 23 pairs. I wonder if science has created a chromosome from scratch?

DNA is even more complex to describe. A DNA molecule is made up of two strands twisted about each other in the form of a double helix. DNA is referred to as forming the backbone of the chromosome. I will not even attempt to try and describe DNA, RNA (ribonucleic acid), and the ability of self-duplication of DNA. I can only offer my congratulations to Watson and Crick, who in 1953, the year I was born, managed to explain the model for the structure of DNA. If you want to get a sense of how complicated the self-duplication of DNA is, please open a text book on the subject and put aside plenty of time to read, and re-read, how this works. If you can, find a picture of a model of the DNA molecule in its double helix form. It is impressive and all of the biochemistry is complicated to the extreme. I wonder how much DNA has been built from scratch?

Where is this leading? It is leading to the reproduction of the cell and involves the replication of all the chromosomes to carry forward hereditary information in a controlled manner. The outcome is that you now can have two identical living cells. Here again, I will defer you to a text so that you may look up cell division, mitosis, or meiosis which is the sexual reproduction of cells to form a new combination of genes. It would be even better to see the process visually, which is actually not that difficult. If you have access to a multimedia computer and a computer-based encyclopedia, look up cells, cell division, mitosis, or meiosis. If you are fortunate, the CDROM will have a film clip with an audio description of the sequence. Is it straightforward? No, is my answer and who is the genius who dreamed this up?

When you look back and consider the material we just covered, you cannot but admit that it is not straightforward and simple. Yet, a part of science would like us to believe that under some ideal conditions this act of life, act of cell reproduction, evolved and

happened on its own. Is this possible and, more importantly, is it probable in a universe that otherwise seems to drive everything to a state of simplicity?

Science will probably argue back that the first life forms were likely not this complicated. That is fine and my challenge goes back to science to create that simpler living organism from non-living material. Why has science not been able to make even the simplest of life forms? It is just too complex is my belief.

Maybe a virus would be simpler to make from scratch? Researching the topic of viruses leads you right back to complexity but only in the most minuscule of all forms. Viruses are still made up of DNA and have a coating of protein. What I found amazing is their size. Unlike bacteria, or single cells, they cannot be seen with a regular light microscope: you need an electron microscope. Compared to bacteria, viruses are 20 to 100 times smaller. Furthermore, viruses are not considered to be free-living. What this means is that they are not able to reproduce outside of a living cell. Why is this? I did not bother to search for an answer, for instead of looking simpler, viruses started to appear just as complicated to me.

Imagine, in the previous descriptions that the most complicated structure we covered was the chromosome. Yet, the chromosome is only a part of a cell. The living cell consists of a multitude of parts and the chromosome is just one of them. Here is a listing of some other parts of a cell: plasma membrane, cell wall, cytoplasm, nucleus, ribosomes, endoplasmic reticulum, golgi apparatus, lysosomes, and mitochondria. If you want to build a living cell, at the very least, you will need to get yourself a kit of these parts. Also, get yourself a diagram of a typical cell so you will know how to arrange the parts. The diagram I found filled two-thirds of a page. By the way, the parts are quite small, so you should prepare for a high degree of eye strain.

So how big is the cell you have to make, anyway? Cells have an amazing range in size from 0.1 micrometer (one tenth of one millionth of a meter), for the smallest bacteria like organism, right up to the size of the largest animal egg.

If you have the inclination, you should read some references on the components of the cell that were listed previously. You will be surprised to find out how complex and different their functions are. The mitochondria is termed as the powerhouse of the animal cell. It is here that nutrients like glucose (a type of sugar) are broken down by enzymes and turned into energy. The energy is in the form of the ATP (adenosine triphosphate) molecule. The breakdown processes require oxygen and is called aerobic respiration. Finally, now I understand why I need to breathe and my body likes oxygen.

How about one other component, the plasma membrane, is it complicated? The plasma membrane is 75 to 100 angstroms thick. (An angstrom is actually a unit of measurement used for wavelengths of radiation, such as light: the length of an angstrom is one ten-billionth of a meter) The definition and function of the plasma membrane continues to get more complex as it is a continuous double layer of phospholipid molecules. The membrane is selectively permeable. This means that it allows one way flows and exchanges of water, mineral ions, and selected molecules that the interior of the cell needs to survive. If the plasma membrane were not selective a cell could ‘drain’ itself and let the nutrients and fluids it needs to stay alive escape back outside the cell. There

are plasma membrane proteins that act as pumps, carriers, and channels. Nerve and hormone signals are selectively received by receptors that are contained within the plasma membrane. These signals are transmitted to the interior of the cell. Considering the size, do you find these characteristics totally amazing?

I wonder if science or engineering has yet created a plasma membrane with the above dimensions, characteristics, and in the form of a continuous enclosed sack the size of a cell? I do not believe it has and I will eagerly await the written report if it has been done. Now, I humbly submit, what is the probability of making a complete cell, with the needed complex component parts, and energizing it with life? Even if your challenge was to make a super simple stripped down version, what are the odds of this happening on its own?

So far in our exploration of biology, we have focused on the small items. We should spend some time looking at the other extreme of the biological spectrum. Let us look at the top of the biological marvels and study the human brain. I sense the excitement already … but I feel a nap coming on first.

Upon checking reference information on the human brain, I am surprised to find that an adult brain consists of approximately 100 billion nerve cells, also called neurons. That is a lot of brain cells and now I am so disappointed with that new hard drive I purchased for my computer. It has 3.2 gigabytes of memory storage: one giga equals one billion. Do you think this means I have 31 equivalent hard drives in my head? Seriously though, you cannot compare the two and only the numbers are similar. Stacking up 31 hard drives does not suddenly turn it into a processor with the power of the human brain.

Brain cells are fairly impressive themselves when you read about them. I was aware that nerves transmit all the ‘electrical’ signaling information throughout our bodies, but I was still mildly shocked to learn that some brain cells have nerve fibers that are over three feet long.

Being an engineer, I next scanned the reference material to find a good explanation on how memory in the brain works. I was disappointed. Memory in the brain was defined as a diffusely stored associative process. This means that it puts together information from many different sources. Unfortunately, the reference goes on to state that research has failed to identify sites in the brain as locations of individual memories. Neurons may communicate with thousands of other neurons. The simplest of behaviors may utilize many thousands of neurons. Scientists believe that the connections and their efficiency are capable of being modified, or changed, by human experience. Being an engineer, and unless I am missing some major pieces of information, these loose descriptions are a good way of saying that science does not exactly know how the brain is capable of memory storage or thinking. Oh well, at least I understand the principles of how my hard drive works.

It is curious though, scientists and engineers are claiming to be working on neural computers. I find this curious, because I could not find a good explanation on how memory and thinking in the brain occurs, so how can anyone be working on neural computers without understanding how the brain works? I will just guess that neural computers are using a diffusely stored associative process.

Putting all wise cracks aside, the functioning of the brain, including the feature of memory, has been the subject of research by scientists for some time. All kinds of sophisticated technologies are employed in the research and range from using X rays, positron emission tomography (PET), to magnetic resonance imaging (MRI) to map and understand the brain.

Engineers totally understand how memory in computers work. Computers can even be used to process and store information from sensors. Some simple examples of sensors that you can connect to a computer are: temperature sensors, pressure sensors, audio types(microphone), visual (CCD camera), and, many other exotic signal sensors. There are even very specialized electronic devices used in computer systems called signal processors to share the computing burden. Engineers and avid computer users have an appreciation for how much computer memory is needed to store, and even display, complex 'sensor' information such as a graphics, digital pictures or a digital movie. As you might imagine, the amount of memory to store these examples is the highest with the pictures and movies.

What about the human brain. You and I are capable of recognizing and 'memorizing' numerous sensory inputs such as: smells, tastes, sounds, visual inputs, and touch. For scientists and engineers, it may be easier for them to relate to the level of sophistication that the sensors of the human body have already achieved. You may appreciate the difficulty involved in their trying to duplicate them as well as the body does. What about the amount of unique memory needed to identify and recall all these senses? Consider the sense of taste. I have no idea if engineers somewhere have developed sensors that are capable of tasting like the tongue and never mind if they have memory schemes to store, analyze, and identify them. What about the sense of smell? How sensitive is the human nose and how many different odors can it identify?

The accomplishment of the human body to have developed and then manage all these senses with the brain is really nothing short of incredible. However, there are portions of science that would like us to believe that these amazing complexities were needed and therefore managed to evolve accordingly.

The human mind is so extraordinary and it is capable of thought, creativity, and we each have a unique and independent conscious. Is this our soul? What about creativity? How easy is this to duplicate in a computer? Unfortunately, mine is definitely not creative as I would have given it assignments long ago. How did nature stumble into this complexity of being creative or having a conscious? It evolved and decided to get severely complex on its own. Computers are super complex. Just examine that Kizentium VIII computer running at 6,500 gigahertz that you have. Does it have a secret conscious? Will science one day be able to give it one?

Let us compare the mind to a modern day computer. You may be aware that to save energy, computers are capable of going into a suspend mode. Just the bare amount of power is used to keep the memory refreshed and other circuitry active. All the other peripherals such as the monitor and hard drives can be put into a sleep mode. Do you think when it is in this suspend mode that there is some quiet 'thought' going on in a computer?

You may have already tried this, but I would like you to do a little experiment for me. I want you to deliberately shut your brain down and stop thinking. This is serious, not at all dangerous, if you do it in a safe place, and you maybe surprised and somewhat curious at the results if you to try it sometime. Go into a quiet room all by yourself. Close your eyes and make an effort at shutting down absolutely all your senses. Sit down or lie down. There must be no movements, no sounds, and no light. There should be no sensory input whatsoever and this is when you mentally tell yourself to stop thinking. Make a concerted effort not to think about anything at all. You will be surprised at how difficult this is and your mind will wander from one subject to the next. Two things might happen. One is that you will find that your conscious will not go away and you will be unable to stop thinking … your inner being, all the collective thoughts and memories you have, refuse to be switched off. Do not quit trying to stop thinking and give up after a just a minute. It is as though it gets a little more strange and profound when you push the effort longer. You might find yourself wondering, "Why can I not shut this thing off?". When I have done this it has mildly fascinated me. All my thoughts, memories, this is what defines who I am and it is up there, rattling around, thinking to itself.

The second thing that might happen is somewhat humorous and is not totally fair to the simple experiment. If you over relax yourself and you are tired, you will fall asleep. Do you think that computers have a secret conscious and that engineers do not know about it? Whatever you do, do not stay up late nights worrying about this, or waiting for the answer. They are dumber than a post (for further attempts at humor, you may choose which 'they' I am referring to).

Before we leave the topic of the human brain and the capabilities of the mind, there is another area to consider that is almost opposite to the example above. The previous examination was focused on looking at our conscious as a totally separate and independent entity that is not connected to anything or anyone else. How many times have you heard it said or seen it written that the human mind has incredible untapped potential. Do our minds and brains have capabilities that we do not we know how to use or that are not yet developed? How about the other questions or statements that you may have heard, which believe that we are somehow connected to each other, that we may indeed be connected to all living things? Who has not experienced those feelings when you are alone in a room and yet you sense the presence that someone is there? Sometimes you are surprised and turn around to find that someone is indeed there. Other times, I have looked around feeling someone is present but no one is visible to me. What are those feelings all about? What triggers them and why does the mind make them happen?

Biology, there is no math, no master laws or theories, and no known key that unlocks the secrets to life. There is no way to *calculate* life. One day maybe science will find it. Yet, how did something so elusive create itself accidentally? Maybe life is like finding a super sophisticated key and God is telling us that compared to the physical laws of the universe this is the most complex and it will be kept a secret from you for some time … your mathematics and logic will not easily unravel it. Meanwhile, the closest we have gotten is experimenting with genes, cloning, and genetically 'engineering' life. The truly

ironic part about the latter is that in actuality you will not find an abundance of any 'engineers' in that field. (There is not enough math to interest them. Good joke, eh?)

Does the universe like all those complex organic molecules and proteins that are the basis of life? My belief is that it does not and it drives towards the simplest structures such as atoms of hydrogen and helium. You will remember my explanation from the first chapter on the forces of simplification and how they constantly break things down. Look at what happens to living matter when it dies. What will happen to the complex proteins and biochemicals that exist in the human body and that most of us will never even be able to pronounce, never mind understand? After our deaths, the forces of simplification take over and the most complex of structures are broken down to dust on the wind. The universe wants it simple. When the life force goes, the forces of simplification again prevail.

You will recall the descriptions from the first chapter and the forces of simplification. These forces were associated with non-living matter that is random, unorganized and simple. While it was difficult and we did not specifically identify the exact forces involved, we sometimes refer to them as the forces of nature. As we know, nature can be very destructive sometimes and is capable of breaking down the complex to the simple. The natural forces that occur throughout the universe are also the most well understood in terms of their description by the sciences of physics and mathematics. It is my belief that the forces of simplification are associated with the four fundamental forces in the universe: gravitation, electromagnetism, the strong, and the weak interactive forces among nuclear particles. If correct, you could say that the forces of simplification are all elegantly described by mathematics, formulas and equations.

What about the forces of complexity? This force is in sharp contrast and is associated with all living matter. The force of complexity and all life forms are best described by the biological and life sciences. Comparatively, there is a total lack of mathematics, formulas and equations with this force. This may sound strange, but it is as though the *force* does not want anything to be *calculated*. Do you think there is a lack of knowledge and that biology does not have an equivalent to 'mathematics, formulas, equations, theories and laws' which leads to a sound understanding of the principles of life? Is this why, that to date, human beings have been unable to create life?

Well, that is enough questioning and controversy for now. We need to move onto something else that is less provocative and more straightforward: something interesting - like ants.

Chapter 7 The Ant and the Universe

We all recall certain events from our childhood. Some memories always stay with us for reasons that we may not quite be certain of. Some are happy, some are sad, and some are just there because they may have struck us as being special or maybe even wondrous. The following is one of the recollections that I have and for me it falls into the later category of just being somewhat wondrous. It is not about anything spectacular: it is just about some ants.

I grew up in an area of Winnipeg termed the Northend, on Cathedral Avenue to be specific, and just several blocks from the Red River. The Red, as locals refer to it, is infamous for its springtime flooding after the melts of all those winter snowfall accumulations. There was a great flood throughout the city of Winnipeg in 1950. This was something I did not experience; since, not only was I not born yet, but my parents both came to Canada and met each other after that destructive flood. Today, the city is protected by an incredible floodway that bypasses a major portion of the river around one side of the city during flood seasons.

I remember a very particular day in the summer while growing up on Cathedral Avenue. It was one of those great summer days. I was probably in grade five or six with an entire two months of summer holidays. At that age, and if you wanted to, you could just make time seem to drag on forever. This is a great ability and advantage of youth: something I am now unable to recreate as effectively. It was on just one of those days that I was stretching time.

Summertime in Winnipeg is incredibly beautiful with totally blue skies as far as the eye can see. Dry air was something I grew accustomed to and this is the only way that I can take the heat. Heat and constant high humidity are not something you find in this city. Winnipeg is an ideal summer location as it is within one hours drive of the most fantastic fresh water lakes and beaches to be found anywhere. This is cottage country. There were many weekends when my parents would take my sister, brother and I to one of the many beaches that dot both sides of massive Lake Winnipeg. Beaches such as: Gimli, Winnipeg Beach, Patricia, Grand Beach, and Victoria. On a beautiful summer day at Grand Beach, with white sand dunes as high as a single story house, extensive and flat powdery sand beaches, blue fresh water with gentle waves, with a matching expansive blue sky, you would gaze across the lake and you could not see any land on the other side. There was just water and sky. Without being told, you could imagine yourself anywhere in the world at the most famous beach resort, and it would not be any better. As youngsters, Linda, Arthur, and I would play in the warm and shallow waters for hours on end - no other entertainment needed.

It was on just such a day, a gorgeous day with a breath taking blue sky, a few white fluffy clouds, and me alone in my backyard lying on the soft grass. I was just gazing up and wondering, with nothing to do and in no rush to do it. I remember looking down and observing little hills of dirt scattered amongst the grass and watching the ants at work. They were tiny black ants hard at their efforts. Some ants may have been carrying items and others just moving hurriedly between point A and point B. Of course, I had no idea what those points might be.

I decided I was going to distract them and I proceeded to do so either with a small twig or my finger. I wanted to see if I could distract them off their chosen path - to confuse them. I even wanted to see if I could frighten them and set them off in another direction. Nothing really seemed to matter to them. When I put something in their way, they just went around it. They proceeded at the same steady pace. It was as though I was not even there. I would pick up an ant, let it wander around my hand, relocate it to a different spot and look for a change of behavior. The ant merely carried on or, so it appeared to me.

That is when I started to think about it. 'It' being the point of this chapter and a message that I will likely repeat, if I can hopefully describe my point clearly. The ants did not seem to realize that I was even there. It dawned on me that I was not sure if they could even see me. If they could, they did not seem to display any fear whatsoever and they certainly did not run off in another direction. If I was an ant and saw something thousands of times my size and moving about me, I know what I would be doing. Either those ants did not see me, or if they did, they did not seem to care in the least; no panic, no mass hysteria, and no scattering to the corners of the yard.

I kept thinking about this, wondering, and looking up at that beautiful sky. I did not have feelings of superiority: instead I felt somewhat sad for them. The ants had such short lives compared to mine and I wondered if their lifespan would allow them to even survive the summer. Then thoughts and questions just seemed to pour in on me, like sudden and repeating blows from a hammer. Did these ants even know where they were? Did they know that they were in a backyard? Were they aware that there was a house and human beings close by? Did they even know they were in a city with streets, cars, huge buildings, and sophisticated technology all around? Did they know that they could all be crushed instantaneously by some simple construction activity? No, these ants were totally oblivious to it all. Totally oblivious to how vulnerable they were and I had not even the remotest of possibility of any communication with them. No explanations could be made to them - it would be laughable. I kept thinking: they actually might not even know I was there. Since I was lying on my side, my face was just inches away from them. It was both amazing and bizarre. We were so close physically but nothing could be further apart.

I was an elementary school student and even I knew we were on the planet Earth, within a solar system, and part of a galaxy. Never mind about the entire universe. These ants had no idea … just no idea where they were and what could happen to them. They had no comprehension of their situation. I could only gaze up at that blue sky and slowly shake my head.

Those are the thoughts and the questions that made me remember that time and that day. As for the rest of the days of that summer, nothing seems to stand out, and I am sure there are other recollections. They would only need jogging and a linkage to that same time period.

Human beings: we are the top of all the species and life forms on Earth. Science tells us we are the king of the evolutionary chain and we certainly are: for we have observed nothing else. We have conquered Earth and we rule it. Those are thoughts of superiority, smug thoughts, thoughts of arrogance and being all powerful.

I know those are very harsh statements and that it does not apply individually to so many people that are gentle and kind. However, we have governments, corporations, and powerful individuals who might just collectively display those traits. Do you think that is how we might appear to totally independent observers watching the human race? Our science, our technological prowess, our capabilities, we can do anything we set our minds to. We can travel to the moon, send satellites throughout the solar system, yes: we sure can be full of ourselves. What this collectively does though, is that it puts us in a mindset of not being open to other ideas, not believing, and locking us inside the box.

Can the human race really do anything it sets its collective will to? I have doubts and I have constant amazement at certain events that I learn of throughout my life. It is incredible how human beings are tripped up or overtaken by the simplest events. We hear news reports about medical studies and concerns. We are confounded by the simplest of diseases and antibiotic-resistant superbugs as they get 'smarter' than our medicines. Yet, on the other extreme, we are sometimes humbled by medical miracles that cannot be explained. Someone recovers from an illness when they had absolutely no hope.

The next part of this chapter is referred to as my 'test questions'. These are a series of questions that I really love to ask people because I personally find the answers so absolutely astounding. However, these are questions that I rarely get to ask as they are not something you can easily work into an everyday conversation. In fact, just the opposite is true and I have had numerous polite stares at the end of the conversation. You know the type, it is a very sympathetic, understanding and yet quizzical stare: so what was your point? My most interesting experience was asking a group of students in a grade five class and I did not get any of the considerate stares at the end of it all.

Here are the questions I would like to ask you, as strange as they may seem. The first question is: how fast are you moving right now? It is realized that this is a pretty incredulous question and it is the one the draws the quickest and blankest of stares. Although no one has said it, I am sure some of the thoughts have included: "I am not moving at all, you big dummy". Others are probably realizing that there is some kind of trick to all of this, so they are patient and just smile at me, hoping I do not say something even more irrational. So … how fast are you moving? Some of you are sitting or relaxing while reading and your answer may be "I am not moving at all". People may read this while a passenger in some type of vehicle such as an airplane or a train and will try to estimate their speed in that vehicle.

Before the blank stare has totally worn off and I have not received an answer, I quickly follow it up with another question which at least gets people talking. The second question is: how fast has a human being ever traveled? As you might imagine the typical responses range from the speeds attained in a passenger jet to those obtained by a pilot in the latest fighter aircraft. Typical passenger jets may range from 500 to 600 miles per hour and combat jets have speeds over 2,000 miles per hour.

Well, the answers I give to the above questions came in waves. We humans become caught up in our own little narrow perspectives. It is just like that business phrase I keep hearing and that we are all probably becoming bored with: "You have to think outside of

the box". In this case, the phrase does apply. You have to think outside of the box and in this case it is outside of the Earth.

Those speeds mentioned previously are not the fastest that a human has traveled. The fastest speed attained by human beings was achieved on one of the Apollo missions to the moon. It happened on May 26, 1969, on its return from the moon, by the people in the command module of the Apollo 10. The speed they attained was 24,791 miles per hour. This is a pretty fantastic speed and something not likely, if impossible, to achieve in Earth's atmosphere. In our atmosphere and the heat of friction that can be created, you would have to be very careful in the type of craft you flew. At those speeds it would not take much for the newspaper headlines to read: "First Human Attains Status as a Meteor - Sparks Seen".

However, as I stated, the answers to my questions come in waves. The previous information does not answer the first question: how fast are you traveling right now? For the speed, or velocity as we engineers like to call it, you need to start with the Earth. The greatest circumference of the Earth is 24,901 miles. If you were standing on any given point on that circumference, we all know that after one day (24 hours) the Earth would have gone through one full rotation. So you divide the distance by the time and that gives you just a little over 1,000 miles per hour that you would be traveling. This is not bad for so little expenditure of energy and effort on your part. That velocity is just under half the speed of a good used combat aircraft.

Well, as you can imagine I do not intend to stop there and as you may be predicting, your velocity is only going to increase.

As we know, the Earth rotates around the Sun on an orbit that takes us once a year to complete. The Earth is just slightly under 93 million miles away from the Sun. Engineers really love to calculate things, as it gives them such a sense of accomplishment. That distance is the radius of the orbit (not truly a circular orbit but an elliptical one). The circumference of that orbit, or the distance traveled by the Earth once a year, is a formula we all love: 2 times pi times the radius. All we have to do now is divide that distance by the time. Isn't this fun! For the time required, we just calculate the number of hours in a year. This is not so hard, is it? I hated to hear that as a child and there is no need to impress you with the arithmetic. The answer works out to the Earth whirling around the Sun at approximately 66,000 miles per hour. Do you feel like you are moving yet? This velocity easily beats the human record of 24,791 miles per hour.

This is not a bad velocity for such a large round rock. I wanted to impress those grade five students with how much mass the earth represents and what it would take to get such a mass moving at that kind of speed. So I started out in a silly and simple way. I asked them to imagine a huge rock, say the size of a car, sitting on their toe. Wow, that would really hurt. Then they were to imagine not a rock, but a huge mountain. To get things really in perspective, I asked them what a range of mountains might look from outer space. I received very good answers, including that those mountain ranges might just look like a series of bumps. "Excellent answer", I replied: "Just like the bumps on an orange". The Earth is a pretty massive ball to be moving at 66,000 miles per hour

and this velocity is faster than any humans have managed to travel on their 'own': under all of our collective genius and technology.

By the way, I looked up the mass of the Earth and it is approximated at 5.974 tons times 10 to the power of 21. For engineers, we especially love using our powers of 10 and as a bonus, it saves us writing down all those zeros. To fully write down the mass of the Earth in tons, round the previous number to a 6, and follow it by 21 zeros. Although I never had a chance to tell those students, this is not the kind of weight you want resting on any part of your anatomy.

The saga does not end here. The answers are still coming in waves because we still need to keep thinking outside the box. We finished discussing the velocity of the Earth, but how about the Sun and our whole Solar System of planets? Our Solar System is orbiting in the outer reaches of our galaxy that is called the Milky Way. (What a silly name for something as important as a galaxy of stars! It is like a street name.) To impress you with the total mass and 'space' that is moving, our Solar System consists of: the Sun at the center, the Earth, all the other planets, numerous moons and satellites, asteroids, comets, and all orbiting the Sun. All of these objects are under tow by the Sun's huge force of gravity. Astronomers have estimated that the present orbital velocity of the Sun and a large number of nearby stars averages 492,000 miles per hour. This is very incredible: we are now moving at just under half a million miles an hour.

As you guessed, we cannot stop there. Our galaxy of stars, the Milky Way, is moving as well and it is part of what astronomers call the Local Group of galaxies. This Local Group is moving in the general direction of a dense concentration of galaxy clusters known as the 'Great Attraction'. The speed of our Galaxy is estimated at 1,332,000 miles per hour. Now that is a speed I would definitely put in the classification of being mind boggling for moving objects. When you take some time to pause and truly reflect on the distances, size and scale of the objects being considered, and the speeds involved, it is truly inspiring. Think about it: 1.3 million miles every hour … hour after hour. Countless millions of miles covered by our galaxy in the silent, dark, cold, blackness of space over billions of years of time.

When you go to sleep tonight, let us assume you get a good night's rest and that this equates to eight hours of sleep. You will wake up tomorrow and the first person you speak with you can say: "That was a really good night, I put on over 10 million miles. I wonder if I voided my car warranty?". Trust me, you will get that familiar blank stare.

My questions and answers stop here. Do we even want to consider if the universe is moving? Does science have the answer to this question? Do we want the answer? Personally speaking, taking these concepts too far tend to cause me headaches.

For the interest of all the engineers and technocrats, what has been described is an oversimplification of the 'speed' that we are actually moving at. Engineers use a concept called vectors that is not all that difficult to understand but that takes a special kind of mathematics to add, subtract, and apply calculus to. The calculus part takes some mental horsepower especially when you do calculations in three dimensions and include the variables of time. Graphically, vectors are represented by arrows. The length of the arrow represents the size, or magnitude, of the velocity or acceleration to be

characterized. The direction of the arrow is described by coordinates in the x, y and z axes that represent the three dimensions of space.

So, to be absolutely proper for the previous discussion, you would add the velocity vectors of the Earth going around the Sun, add the vector of the Sun spiraling through the galaxy, and then the vector of the galaxy moving through the universe. These additions result in a new vector, where the length of the new 'arrow' now represents your true net velocity and the arrow points in the direction you are truly moving towards. Depending upon the exact three dimensional directions, one vector may actually be subtracting or adding to the size of another vector.

The vectors are relative in size anyway, with the velocity of our galaxy being proportionately the largest. By the time you bothered to consider your velocity and direction, say in an airplane moving over the Earth's surface, this tiny vector would become totally insignificant.

Consequently, I think you are fairly safe to walk around telling all of your friends, and even innocent bystanders, that you are moving over a million miles an hour. Unless you are prepared to, do not let them trick you into discussions about Einstein's theories on relativity and what the observation points are, etc. If you run into someone who still believes the Earth is flat … pack a lunch.

Putting all attempts at humor aside, these are really quite sobering thoughts. As individual humans, we are so small in this universe that calculating all those velocities accurately becomes a matter of relevance. At those fantastic speeds, do we know where we are headed, do we know when we will get there, what would we see, and would we live long enough to see it? We would become dwarfed by the magnitude of the answers and that is assuming we even have the current ability to comprehend them. Maybe we get to comprehend them later?

I used to have astronomy as a hobby and enjoyed building reflecting telescopes with my best friends, getting outdoors in the freezing winter, and gazing up at the dark black sky. My friends, Bruce and John and I, used to jump from hobby to hobby, always getting totally absorbed and dedicated to the one at hand. I remember exactly how this particular interest in astronomy started. It was our making the transition from elementary to junior high school and hitting grade seven.

St. John's High School is located in the infamous Northend of Winnipeg and we first moved to this area while I was in the middle of grade three. Years later, I still recall the look of concern and amazement from my friend, Don, who lived in the Grant Park area that I had moved away from. The Northend has a reputation as being a very rough and tough area. Upon meeting me again after many years, he was somewhat surprised to see I was still alive and unscathed. "Are you okay?", he asked, while checking me over to see if I had any missing body parts. In grade three and being so young, I was oblivious to the tough reputation of the Northend, but I must admit there were situations where my running abilities came in super handy.

Going from a small single story elementary school to the multi-story structure of St. John's High had me mesmerized. I loved school and kept this fact to myself to avoid

getting killed by friends and only confided the fact to my Mother. When I was really young I said something unbelievable to her like I wanted to go to school until grade 100.

Going to St. John's was like going to an educational heaven. Grade seven science was unbelievably exciting for me and this is where I was introduced to astronomy by a fantastic teacher that I will never forget. His joy and excitement about the subjects he taught were simply contagious. When he showed us the six inch reflecting telescope he was making with a more senior class: we were hooked. We mailed away for a mirror grinding kit and spent many nights in my basement grinding and polishing a parabolic mirror. This is done while walking in circles around a stationary glass 'tool' and moving the glass mirror over the tool in prescribed patterns. I am sure we spent up to 100 hours doing this. Sounds exciting, does it not?

Next, we fabricated a large sturdy wooden tripod and it was a great advantage that my Father was an expert carpenter and we had a corner of the basement as a wood working shop. All the miscellaneous hardware came from a small but fabulous hardware store located on Main Street. We went to a sheetmetal shop, on the same thoroughfare, and ordered a six foot metal stove pipe tube to house the optics, eyepiece and starfinder. It was great fun making the telescope but we really could not wait to start looking at the stars.

We were young, our equipment unsophisticated, and we could not 'dial in' the location of heavenly objects that we wished to observe. It was easy for us to find the moon of course, but a little more challenging to get the right time of year and sky location to observe planets like Mars, Jupiter and Saturn, or, the great nebula in Orion. I did not keep astronomy as a hobby for all that long and my most significant accomplishment was to find a faint object, our closest neighboring spiral galaxy, Andromeda. It was an exciting moment, squinting through a high power eyepiece, at a tiny fuzzy elliptical blob. To think, instead of looking a someone else's professional and magnificent photograph, I was looking in real-life at another galaxy consisting of a million stars.

When you gaze up at night with the unaided eye all the stars that you can see are contained in our Milky Way galaxy. It is very difficult to see Andromeda with the unaided eye and … you cannot see the other 50 billion galaxies that astronomers estimate are in the universe - 50 billion galaxies. Do not bother to estimate how many stars that may be or before you know it, you will be an engineer using powers of ten.

Years later, while in university and totally absorbed in electrical engineering, I remember going to the campus bookstore and taking a few minutes off the endless studying to examine the astronomy textbooks. I recall thinking: what would it be like, what kind of career could I expect, if I had pursued astronomy as my studies. Over twenty years have past after that bookstore visit, my amazement comes full circle when my oldest daughter, Stephanie, takes astronomy in her first year of university. This is her single science elective. Why did she choose astronomy as there was absolutely no prompting on my part. Just amazing … or is it?

To myself, all of these questions, answers, facts and experiences are personally very impressive and extremely humbling: especially the particulars of our universe. When I take the time to think about this, as strange as it may seem, it helps put the stress and

anxiety that I experience back into perspective, back into check. It helps me take my thoughts off that frantic gerbil wheel of life.

All of these incredible velocities, time spans, and distances surround us. They surround us while we are scurrying about on our Earth, in our countries, in our cities, seeking out our goals and destinies with varying degrees of fervor and passion. Now … who is the ant? Are we watching, are we listening, are we trying to sense, to feel something that may be there? Or do we refuse, close our hearts and minds so that we just focus on getting to point B uninterrupted.

Chapter 8 The Theory of Evolution: What's Wrong With This Picture?

The forces of simplification were described at the outset and we have since worked through some concepts and important sciences which are related to those forces. Concepts included possibility and probability, while the sciences covered topics in mathematics, physics, engineering, and even a little astronomy. As you will recall, I believe the force of simplification relates to all the non-living matter in the universe.

For all living forms, I indicated that there was a different force which I referred to as the force of complexity. The areas reviewed that pertain to this force and every living thing included my views on the primordial organic soup and biology. To complete the picture of this force, there is one final area to examine and that is the theory of evolution. By completing the picture, we will have looked at how science explains all the complexity of life by answering three questions. How did this complexity first get started and create itself? The answer is the primordial organic soup. How complex are the various life forms and structures that make them up? Here, the replies are furnished by the biological and the life sciences. The third and last question is: once life first got started, how did it get so much more complicated that there are the very sophisticated life forms which exist today? The answer that science provided is referred to as the theory of evolution and which is our next topic of review.

Ever since the theories of Darwin first proposed the concept of evolution there has been great controversy over the subject. When I studied biology in senior high school there was an interesting reference that was given to us. It stated that the theory of evolution is to biology as the atomic theory is to chemistry and physics. For science, a very basic definition of evolution is that living things change. Species of plants and animals change. Some species die out and some become more predominant. Since Charles Darwin first published his book, *The Origin of the Species*, on November 24, 1859, more than a century has passed accounting for the existing body of data and testing the evidence against the theory of evolution. Not only does the body of data include the study of the existing species on our planet, but great effort has gone into studying the data provided by the fossil record of plants and animals. It is by charting the passage of time and linking the supporting fossil records for a given species, that over time, the changes and evolution of a species can be verified. However, there are gaps and there are problems with the completeness of this record. The trail has been cold for some time and all of the evidence cannot be found. There are unsolved puzzles.

Darwin put forward many important concepts such as natural selection. Here, Darwin felt that there was a struggle for survival and a competition among members of a species. This struggle for survival between 'winners' and 'losers' also became apparent in different rates of reproduction between them. Viewed together, the struggle and the different rates of reproduction were called natural selection by Darwin. Through natural selection, Darwin also proposed another concept called adaptation. By natural selection, a species of living things could adapt to its environment. Darwin is very famous for his journey in the H.M.S. Beagle to the Galapagos Islands. These islands are about 600 miles off the west coast of South America. It is here that Darwin accidentally discovered a living laboratory of evolution - living examples that supported the concepts of natural selection and adaptation.

The next statements which I am going to make may be surprising for some. There are major parts of the theory of evolution that I really have no problem accepting. It is very hard to totally ignore the existence of all the fossil records. It is also totally hard to ignore all the painstaking linkages that have been charted over time showing how one fossil species may have changed and evolved to another. What I do have a problem with, is the explanation for the force that is driving this change.

Strong believers of pure evolution theory, and those without a belief in religion, will likely put great stock into Darwin's theories. They are likely to return the challenge back to me and state that I am making too big a commotion over the idea that there is a *force* behind all of this change. They will argue and put forth that evolution is not that elaborate and that it is a straightforward process. Instead, it is just as Darwin theorized and that species slowly evolve over time and this is based on natural selection and adaptation. The end result, after millions and millions of year, are the sophisticated living species that inhabit the Earth today.

To me, this is lulling us into a false sense of security and a false sense of acceptance of these explanations. It is all so simple and gradual that things make themselves complex? There is more to it than what can be observed and described by the theory of evolution. It is almost as though the word *evolution* is a trick word and is somewhat deceptive. I am going to propose a different definition, a very stark and harsh definition, for the meaning of evolution. On its own, from its first spontaneous creation in the primordial organic soup, living organisms have become more complex and continue to do so in an almost systematic and unending manner. This last sentence may be very cold and callous. Yet, is it not an accurate statement, of what some people in science, would like us to believe explains how human beings came about on this planet?

Against the forces of simplification and against incredible possibilities, life spontaneously created itself on Earth. Although a sufficient enough 'miracle' against anyone's standards or odds, to remain as a mere simple life form was not to be part of the random act. Instead, the life form that had been created arrived on the scene with the innate *ability* to continuously become more and more complex - to evolve. Is this not incredible? That is why I find the word evolution deceptive - it is too plain and simple to describe such an incredible sequence of events. Start with a little micro-organism squiggling in the water, wait two billion years, and you will have a species of human beings. All it takes is for those little micro-organisms to accidentally become created and to have a built-in option called natural selection and adaptation. *Cool!*

The balance of this chapter will be a series of expressed difficulties, situations and questions that I have with the concept of evolution. While it may seem contradictory that I accept 'portions' of evolution and the 'fossil record', the contradiction is due to the lack of a comprehensive enough and plausible explanation.

As you recall from science's explanation of the primordial soup, the first micro-organisms were likely plant-like and used a type of photosynthesis to be self-sufficient in terms of food energy. While the description was extremely vague, these plant-like forms evolved into animal-like forms. These are a fundamentally different form of life that need oxygen to survive and which consume other living things to supply themselves with the complex

proteins and nutrients needed to live. Think about it. These are two vastly different forms of life. They are almost like night and day. One consumes carbon dioxide and gives out oxygen, while the other consumes oxygen and gives out carbon dioxide. The first life, plants, use a form of readily available energy on the planet, light from our Sun, to create its *own food* and its *own energy* to feed the entire planet. Animals are the opposite and cannot create their own food, but must consume plants or other animals. What a neat scheme and evolution came up with this? Once we can get past this incredible accomplishment in itself, we now have the start of the two basic, and very different, types of life that populate our globe - plants and animals.

So the first life was believed to be created in the seas and oceans. Here is a fundamental question. Why did life evolve out of the sea? Did life evolve out of the oceans just because land was there? Were the seas and oceans so teaming and full of life that they could not hold it all. The land would have been totally barren, without any food, consisting of irregular and random land masses. All the land surfaces would have been devoid of life. Life in the oceans 'decides' this look good - "Let's accidentally evolve and turn this into home. Let's populate it.". What would drive life out of the vast oceans where it knows how to live? In place of these flippant comments, I should look at the situation more fairly and consider it.

Although I am by no means an expert in the details of Darwin's theories and the intricacies of evolution, the following series of problems exists in the evolution of life from the oceans to the land. The drive for a species to become more complex does not exist on its own. There is no master plan or intelligence that is capable of making this happen. Instead, it is Darwin's concepts such as the struggle for survival and natural selection that enable a species to adapt to its environment. Adapting from an environment within the oceans to an environment on dry land is far from being a simple accomplishment.

Take the case of early animal life which would have resided in the oceans. Early animal life in the oceans needed oxygen to survive and developed unique biological structures to accomplish this. Oxygen was removed from the water. Fishes today have complex gill structures to obtain the oxygen they require. Sharks, which as a species closely resemble their prehistoric ancestors from millions of years ago, have gills to breathe. It is not a simple matter to adapt from an environment of removing oxygen from water to an environment of removing it from air. Human lungs are miraculous in their functionality, but are suited very uniquely for one environment. There are even restrictions on that environment in terms of the altitude and the cleanliness of the air.

For the higher species of animals, coupled with the ability to breathe is the need to be highly mobile. Mobility is extremely important to gather and obtain food as well as to avoid becoming food for others. This is true in the two environments of land and water. However, the modes and methods of being mobile in the two types of surroundings is vastly different. Aquatic life is uniquely adapted for speed and agility in a fluid environment where the affects of gravity are secondary. Fishes have a major portion of their body mass devoted to the tail structure which is used for strong forward propulsion. For agility, control of direction, and stability; fishes have evolved fins that satisfy these requirements for their impressive mobility in a fluid. In contrast, life on land is focused towards a mobility where the affect of gravity and the handling of the terrain in their

habitat is paramount. Being streamlined for movement in a fluid, such as air, is apparent only for the fastest of land creatures.

We addressed two significant differences: breathing and mobility. There must be other important distinctions between animals in these two environments that would be vital to their survival. One other critical function comes to mind and that is the ability to reproduce. Survival for a species will not be long term without a successful method of reproduction that is adapted for the environment. Reproductive methods for animals on land is quite different than for animals in water. While I have given it some thought, these three attributes seem to be the major drivers for survival amongst animals. In summary they are: the ability to take in oxygen, mobility to gather food and avoid becoming someone else's food, and, the capability to reproduce effectively and promote the species. There are hundreds of other differences between animal species, but when you think of the important and central features for survival these three seem to be at the base of importance.

According to Darwin's theory and to the primordial organic soup, animal life may have existed for tens, if not hundreds of millions of years in the oceans before they evolved onto the land. The word evolved is still troublesome for me in that it makes the prior statement sound so natural, so easy, and so likely to happen. The reality for me though, is to examine the three basic functions that those animals had to change in their complexity. They had to change their complicated and adapted breathing process in water to now extract oxygen from dry air; they had to change their complex and adapted mobility in a fluid environment to accommodate a new force, gravity, and create different methods of propulsion and stability; and, they had to adapt their complete reproductive cycles to safe and reliable methods that would work on land. They had three concerted fronts where adaptations had to be made. Success has to be simultaneous. Failing in one is doom. Evolution coordinated this on three fronts concurrently? Why? Because creatures without intelligence wanted to explore the unknown and go somewhere that they did not even realize existed?

What would drive these complex changes to occur and to occur together? Adaptation to a new environment, according to Darwin, would be based on natural selection and a struggle for survival. There must have been a really powerful struggle. Natural selection on its own does not seem to make the muster by itself. It is almost impossible to imagine natural selection as an agent for change when the changes are so complex, so different, that it requires new ways to breathe, move, and reproduce. So we accept that there was a struggle for survival which became the catalyst to drive a change from one complexity to another. Was life too populous in the early oceans? Was there not enough ocean? In today's ratios, there is more water covering the Earth's surface than land. Maybe this was different millions and millions of years ago?

Was life in the oceans such a struggle for survival that species adapted to land for safety from predators or was there an abundance of food on the land? Was there so much plant life there? But why did plants go there? I would love to hear the answer for that one. To escape the animals eating them? (They wanted to put down roots?) Logically for animals, the food would have to be plant life as animals are not there yet. If it was purely for safety, the animals would have to come back to the water to forage. Maybe the struggle was a combination of both safety and the abundance of food. With my

limitations, and possibly the limitations of science itself, it is not possible for me to answer these questions with any degree of certainty. Due to my beliefs, it only adds to the sense of wonder, amazement, and appreciation for the life that is here. Yet, my queries do not stop here for those that believe only in science.

If animal life first started in the oceans and had tens or hundreds of millions of years in a 'head start' compared to animal life on land; why is life in the oceans not smarter than life which developed on land, or, at least of comparable intelligence? Since life in the oceans had all those millions of additional years to evolve, should there not be species that are at least as smart as us? If this is too much to ask, why are there not species that are half as intelligent as human beings? By the way, it is not fair to include whales and dolphins. These are mammals and science will tell you that they may once have been land dwellers like all other mammals and they went *back* to the water. They have lungs, breathe air, and give live birth.

So, why are the species of animal life in the ocean not as intelligent? It was all right to stop developing intelligence to struggle to survive? "Life in the ocean was not all that hard after all, and we do not need to be smart." Maybe some of Darwin's theories need to have a factor of arrogance included. The arrogance factor would be described as follows. Due to the more intense struggle to survive, animal species adapted and evolved from the oceans to dry land. Due to this extraordinary struggle they also evolved *superior* levels of intelligence and that is why mammals are smarter than fishes. There, that does not sound too arrogant and it even has a sense of credibility.

But is it credible? The ocean must be a fearsome place for creatures to survive and surely there has been an ongoing struggle to exist. We know that the struggle goes on today. If the struggle did not exist, why then were some creatures so driven that they changed their complexity to adapt to the land environment. To say that the ones that were left behind were destined to be lower in intelligence due to this reason is pretty arrogant. Is there something about breathing air or the land environment that promoted increased evolution and intelligence? Did the struggle on land turn out to be greater than in the oceans? What irony, they try to get away from the rat race of survival in the water and end up in a tougher struggle on land? Does the increased visibility on land versus under the sea, in terms of distances and objects that can be seen, play an important role in developing intelligence? Is it due to the mobility factor and the difference in appendages that evolved? Different appendages combined with the dilemma of 'constructing' things in liquid surroundings, did this slow the development of intelligence compared to that on land? What accounts for the different potentials in intelligence that have occurred?

I feel the saddest for the plants. The primordial soup had plant-like organisms created first and look at their intelligence. Here they were there at the start, involved closely with evolution for the duration, maybe far longer than animal life, and yet they have no form of intelligence to show for it. They made the struggle from the oceans to the land and might have been the first to do it. Why did plants not evolve any form of intelligence that we can discern? Is this where the arrogance factor kicks in? Intelligence does not evolve unless required. Plants did not have to struggle to survive as they just reproduced so abundantly that they were eaten, at leisure, by animals and insects. Plants, therefore, have had no need to evolve and develop intelligence as there was no

struggle. Lower reproduction rates and greater struggle breeds intelligence? Do not tell this to the Dodo birds. How else would science explain the development of intelligence? Billions of years of evolution and plants have no intelligence that is perceptible to us.

In terms of abundance and sheer numbers on our planet, the race for number one must be between plants and insects. The quantities of both have got to be simply shocking. Plants do not score well for intelligence. How smart are insects? Try avoiding or eliminating mosquitoes. You have to be smart enough to build a structure around yourself to keep them out, or, wait for evolution to evolve some other defense for you.

What happened to smart plants? These are the parts that make me feel sad for the plants. The most abundant, the most used, and the most needed. How many humans have used plant materials for both shelter and for food. How many animals use trees and forests for shelter and survival. We need to be the most thankful, even for those life forms without apparent intelligence, especially when they yield our daily bread. Maybe plants have more sense then we realize.

Next, why did life evolve from the land to the air? Was this the final frontier? Was the ocean and land not good enough? Because it is there and no one is using it? Whether it was flying insects or birds who were the first to become airborne, this is truly a most outstanding triumph. Since people first 'gained' their superior intellect and gazed up at the skies, there has been a strong and unending desire by some to attain flight. Since early myths from ancient civilizations, there have always been dreams by a part of humanity which longed for flight. Was it the freedom of movement, the allure of the clouds, the vistas of views, and the expanse of clear unencumbered space that have instilled an almost seductive draw within people longing to fly? Flight even drew the attention of the creative genius, Leonardo da Vinci, as evidenced through his drawings and inventions on the subject.

What kind of intelligence, technology, and dedication to effort did it take for the human race to match this accomplishment of mastering the skies? The first successful flight for people was by the use of hot air balloons. This is so ingenious that I cannot think of a single species of insect or animal which uses that principle to gain to the skies. However, with the limitations of flight control and the dependency on great amounts of energy for the hot air, early animals and insects must have reviewed this method and abandoned it as impractical.

Flight controls and propulsion methods that allowed total mastery over the heavens came later and after considerable trial and error. The fundamentals of how wings function and the principles of lift were not simple discoveries. The development and use of engines with the correct power to weight ratio were also a critical step towards success. Look how long it took an intelligent species such as humans to develop the ability of flight. The ability is far from straightforward. Animals and insects stumbled into this without intelligence? What was their pressing desire? As an animal or insect crawling on the ground, they look up and set themselves a goal that over millions of years they will master the air? They are thinking, "There has to be a way to get up there. Let's evolve these appendages slowly."

It is almost as though evolution of life is coupled with a dogged desire. There was no intelligence and no way that the first insects or animals even knew that flight was possible. There was nothing up in the air as a food source. No living creature was already flying to model themselves after, or to pursue. How could they even know flight was achievable? How much longer would it have taken humans to achieve flight if we did not see it demonstrated by birds as being possible? Yet, science and evolutionists seem to take this in stride. Creatures which do not know that flight is possible, yet through small steps of trial and error that require a permanent adaptation of their bodies, involving millions of years of subtle changes to appendages, obtain and reach the tremendous goal of flight. They do not know that it is there to be achieved, yet the complex steps are put together: from jumping, to gliding, to real sustained flight. These creatures did not have a plan. There was not a complex flow chart of steps which they could follow that systematically laid out how to mutate and adapt themselves into a flying creature.

Can you imagine if the entire human race set itself a goal to adapt to the air and gain flight. It would take constant will power with reminders of the goal and objective. There would have to be generation upon generation of selective and dictated breeding to obtain the right features. At least we would have the intelligence to know what features were needed. Imagine for the first animals or insects that went down the wrong path, "Whoops … I don't need these. Sorry about that. Something must have went wrong … it worked at home! Never mind, let's try this for the next million years" It is preposterous! Humans could spend a million years on this focused experiment and the best we would end up with is nice downy feathers, if we were lucky!

Birds and insects had no idea that flight was possible and yet they became deft at the art of aerodynamics.

With this as a model, I guess the human race has hope. We should put our hopes on evolution to get us into new environments and accomplish what we know may not be possible. When I tried to think of some examples; I came up with going to the stars and traveling at the speed of light. Do you think evolution will do this for our bodies? Will we have to use our minds and create devices to achieve these goals? Is this anymore unrealistic than looking at an animal that walks today and one day in the future it has obtained the ability to fly? When people have their final struggle on our home planet Earth, will we evolve to travel at the speed of light and journey to another environment? Maybe that ability is already built in to us and it has nothing to do with evolution.

Look at birds as an example of an 'end product' that is capable of flying. Unique features called feathers with hollow quills for light weight, wing structures, and special metabolisms geared towards the energy requirements of flight. These are some of their special 'adaptations'. Feathers and hollow light weight structures, is this not ingenious? How did they come up with that? I am fortunate to have my home situated on a small constructed lake. The lake is populated by a few ducks and Canada Geese. During the return migration south, the lake is very heavily populated in the Fall. While a bird is flying, with wings flapping, it may be high or moving too quickly to get a good sense of its aerodynamic structure. With the migration south and the high populations on the small lake, there is an apparent lack of fear among the birds and how close they will come to people. I have seen flocks of Canada Geese come in for tight landings on this tiny lake

which is already literally filled with birds. The geese 'freeze' their wings, bank, brake and adjust their glide path for a landing. To see the heads, necks, and the arc of the wing spans on these geese as they stop flapping and glide in for a landing, is like watching the most modern fighter jet. This is not bad for evolution.

Insects do not thrill the average person or interest them greatly. The opposite it quite true and people are typically afraid of insects that are usually harmless and a mere fraction of their size. It is the mindset and doubt within people as to insects being 'harmless' that likely strikes fear in people of all ages and genders.

What about flying insects? Have you ever watched a dragonfly in flight? I just took a walk this evening at our summer cottage. The cottage is at Black's Point which is near Hecla Island on Lake Winnipeg. It has rained a lot this summer and when that happens you have to be well prepared for mosquitoes. With the mosquitoes, there are large numbers of dragonflies. My children ask me if dragonflies bite people and I emphatically state that they do not. I encourage my children not to be afraid of them. If fact, I tell them they should appreciate dragonflies as they are mosquito eating machines. Well, I watched some dragonflies for awhile and they have an incredible ability to fly. They seem to have the combined command of a helicopter and a jet aircraft. They hover, dart backwards, side to side, up, down, change direction on a dime, and move forward at lightning speed. With four long wings, two on each side; with super high speed wing movements; no tail wings or 'rotor'; and, complex joints which are probably independent for each wing: I am sure these structures are a marvel to aerospace engineers and impossible for them to put into current economical production as a type of aircraft. Evolution is to be congratulated again. How could this complex flight be attained, never mind imagined?

To accommodate the pure science, we keep going back to the answers that the theory or evolution gives - natural selection, adaptation, and the struggle for survival. After evolving from the water, certain creatures were again under a continuing struggle and pressure for survival. They evolved into their third environment - the air. The creatures that evolved from the water onto land had a greater struggle and that may be why some are more intelligent than those that remained in the water. Or are there other reasons to explain why creatures who had millions of years of additional time are less intelligent? This logic starts to break down with creatures that had a second great struggle and moved to the air as their third environment. Why did not greater levels of intelligence evolve among birds? The species had as much time as the land creatures and even endured an extra struggle. What is the reason?

We have reviewed three environments on Earth: water, land, and air. As a bit of a divergence, consider a radically different environment and one that is not even on this planet. Why is there no life on Neptune? What is it with this business of carbon based life forms? Why not another chemical element for the basis of a totally different form of life? There are dominant conditions on the planet Neptune. There are billions of years for the combination of the conditions and elements to come together to create a unique form of life. Why has there not been life on another planet that advanced due to evolution and is observable to us on Earth? Why do we not have intelligent neighbors on Neptune? Does a planet have to be in a unique orbit from its source of light and heat energy? Must it have the right makeup of chemical elements as well?

Although I am certain that evolution has the scientific answers for all my questions, why do the species seem so complete and at a final stage? To explain what is being asked by this question, consider the following unique animals: giraffes, elephants, zebras, tigers, and ostriches. Are there animals that stopped 'halfway' in their evolutionary path because they ended up in an environment where their adaptation to the struggle was satisfied? Why are there no halfway giraffes, elephants or zebras? Instead, you have a beautiful animal such as a giraffe that seems so complete, unique and final. Why is there not a species that satisfied its struggle and has a different coloration and a neck that is half as long? Why is it all or nothing?

If humans started to evolve millions of years ago, why did they all evolve together? Could not some have stayed behind and evolved later when their environment changes? Why is it that an entire species seems to move forward together? What will the different members of the ape family evolve into?

Dealing strictly based on fact, human beings are the most intelligent and 'evolved' life form on the planet. Using history to study ourselves as a race, we have been responsible for doing incredibly stupid acts, but that does not change the reality of our position, dominance, and intelligence amongst life forms on Earth. When you examine in detail how advanced some of our features are, you also come to appreciate just how miraculous our forms are. What stands out the most for me as examples of this, are our senses.

Our senses of sight, hearing, taste, smell, and touch are truly fantastic. What makes them extraordinary for me, is that they are so refined and humans have such a complete and combined package of senses. There are animals that may have better abilities to see, or to hear, but these are likely to be individual senses that are more acute to a specific animal. An eagle or owl may have better vision, but what about its sense of touch? I doubt that their sense of touch is nearly as refined as what can be experienced by the human hand. The lightest of pressures and subtlest of changes in temperature, these sensations are most developed in our finger tips as the sense of touch. On individual senses, animals may superior, but based on the greatest number and most well rounded, I believe human beings win the race in regard to the senses.

Just watch a baby exploring its universe. The baby reaches and must touch the object. They must handle it, drop it, and continuously explore it with their hands and fingers. All the while, the child's sense of sight is coordinating the activity and relating the visual input to the texture, weight and feel of the item. The sense of taste is brought into play fairly quickly to add to the description of what this item is about. It does not take too long before the object is brought to the mouth. It is hard to see if the sense of smell is active, but we can be assured this is also in full gear at the moment of tasting. What about sound? If the object emits gentle sounds it is all the more fascinating for a baby. While not based on any in-depth analysis, I am sure that the attention span and re-exploration of an object is greater for those objects that engage the most senses and do so in a challenging way. The mother is the first to be explored by a child.

Now, let us go back to the subject of evolution. The first micro-organisms used light as a source of energy via a process somewhat akin to photosynthesis. In terms of

developing the sense of vision, light is involved at the onset and at least this is a starting point. Yet, is it not surprising to realize that the first organisms that actually needed light to create their own food never developed vision? Animals needed to see, I guess. Plants do not. How do evolving living creatures realize and literally stumble into the fact that light, as electromagnetic radiation, can be harnessed, focused, and turned into a visual image of their surroundings? The first light images that would have been obtained would have been blobs and all blurry. Do not give up, you know that it is possible to focus them and there will be a way for you to evolve and invent mechanisms to do this.

It is a good thing that evolution only decided to equip our eyes with the capability of detecting the visible light spectrum. If we could 'see' the entire spectrum of electromagnetic radiation we might have trouble seeing our proverbial hand-in-front-of-our-face. There are so many electromagnetic fields around us due to broadcasts of all types, that you would be flabbergasted to 'see' them all. I wonder why 'evolution' did not decide to equip us with senses to pick up heat and infrared radiation and just chose visible light? Think of all the prey we could catch at night. Oh well, evolution is so smart and intelligent, what can I say.

What about evolution and the creation of the other senses? How did the faculty of detecting sound come about? Early organisms feel the pressure of sound waves? Then the system engineer within them says, "Pursue this avenue of development and adaptation, this will be useful in the future and we will be able to mentally process those pressure waves. It is sound!". I do not think sound was involved in the creation of the first organisms so there would be no inherent link to this phenomena as there was for light. Do you know how weak sound waves are? When was the last time you sensed sound in your finger tips by holding them up to the air? Was 'sound' pressure first evolved in the oceans? When was the last time you felt underwater sounds or pressures with your hands? Living things evolved and then once the mere inkling that sound exists it doggedly pursues and continuously evolves to detect sound? Consider a fictitious situation where all human beings suddenly found themselves in a new reality where the sense of hearing never existed. How long would it take us intelligent beings to discover that sound waves exist and then invent methods to detect and use them?

Both light and sound are very prevalent in our environment as real forces. Light, and a sensitivity to it, was involved in the first plant-like life forms. So, giving evolution the benefit of the doubt, this electromagnetic force would be hard to ignore. Sound also exerts a force in terms of pressure waves. Normal sounds in our environment would exert very weak forces and their detection would be an extreme challenge for simple organisms. However, the force would be there and extremely loud sounds, such as thunder, would have stronger pressure waves. What about the sense of smell and taste? I do not believe there are any physical forces whatsoever involved with the sense of smell or taste. If we lived in a different reality were there was no sense of smell, how long would it take us as intelligent beings to discover that such as sense even existed. How would we ever 'learn' that there was a property, especially of living materials, that they emitted different odors?

Taste as a sense is also strange. Was it necessary for animals to taste what they were eating? How many poisonous plants and animals were there in primordial times? Did

animals need taste so they did not die from eating non-foods like mud and sand? Did taste evolve first and then smell evolved from it to detect airborne chemical odors?

How well developed and refined are our senses? We described this area earlier when discussing biology and the sophistication of human features. As you will recall, I tried to impress the point that engineers would be hard pressed to duplicate the different senses to the levels achieved by the human body. Some of the senses are understood very well and those would include capturing visual images and sounds. For the other senses such as smell, taste, and touch, I would classify our abilities at duplicating these senses as being very weak.

The point I am trying to put across is only partially formed. What puts the senses into the realm of being fantastic? Ask a team of scientists and engineers to create a camera with the following requirements: auto focus features from several inches to infinity; an undistorted angle of observation of at least 180 degrees, side-to-side and up and down; extreme sensitivity to all colors of the visible light spectrum; ultra high resolution and acuity for the finest detail; and, auto adjustment to light levels from bright sunlight to less than candlelight. Also, you would like two of these cameras connected side-by-side so that accurate depth perception is possible with three dimensional objects. They may answer, “No problem!”, but then state that the requirement is to create each of the cameras no bigger than one and a half inches in diameter. The control wires coming from each camera and that also bring out all the optical information are to be no thicker than a single strand of dry uncooked spaghetti. Remind them to keep the cost down. We do not have a moon launch budget!

This is not half the challenge though. Ask the same group that you also want an array of sensors developed to cover sound, smell, taste, and touch, to the same detection levels that are present in the human body. Do not forget to include the size constraints of the ear, nose, mouth, and fingertips. By the way for the sound sensors, remind them that you want two of them so that stereo capabilities are possible and that you want the computer to be able to use direction finding and locating abilities based on the source of a single sound and multiple sounds. Now ask them to design a computer to handle all these sensor inputs, to process them and for the computer to able to think independently and creatively to solve an immense array of problems as well as deal with routine everyday tactile situations. Total size of the complete package is to be no bigger than a basketball. For this achievement, cost is no object. Open your wallet wide, very wide.

In case there is any doubt whatsoever, all of the very best that humankind has to offer cannot currently solve the above problem. The latest breakthroughs and achievements in the cold sciences of physics and engineering cannot accomplish the above on any size scale, never mind fitting within the size constraints given. None of the latest microcircuits or solid state devices can be wired, connected and then packaged with the best software to meet the above requirements. What about the warm sciences? Sorry to be so blunt, but unless there is an imminent and dramatic breakthrough, they are the absolute furthest away from solving any of the above requests. Biology is still using evolution as one of its major founding theories. To use the best skills in chemistry, biochemistry, and biology would not result in the creation of any of these sensory organs from scratch. In fact, it takes the present accumulation of knowledge in the life sciences to merely be able to transplant living organs from one person to the next. Unfortunately,

the code has not been cracked on regenerating nerves or 're-connecting' them. All of the sensory organs involve nerve connections to the brain, so today those transplants are not even feasible.

Evolution has done marvelously well as an 'intelligent force' and has managed to take simple living organisms and systematically guide them to become the ultimate in complexity that we can observe. The most complex structure that we can observe in the entire universe is ourselves. Evolution has harnessed two forces of physics. To enable the sense of sight, it has created a sensor for electromagnetic radiation in the visible light spectrum. For hearing and touch, it has created two different sensors to detect pressure. One sensor is specialized to detect the finest of sound pressures and the other to detect physical pressures on the skin. Evolution has also created two sophisticated sensors based on chemical processes. Unique chemical sensors have been developed to detect liquid chemicals to enable the sense of taste. For the sense of smell, extremely sensitive detectors have been created that are capable of catching and identifying airborne chemicals that are measured in parts per million and parts per billion.

Is all this possible to happen on its own? Some chemicals get together in a primordial soup and then head off propelled in this direction of continuous complexity?

Again, I apologize for being forceful, blunt and using slang expressions. However, if you believe that above happened totally on its own and spontaneously without intelligent direction - get real, wake up and smell the coffee. Nothing in your life gets complicated - without you, or others around you, making it so. Just stop doing *everything*, and I mean anything, and watch how your life will go the way of the force of simplification. Do not go too far, or you may find yourself walking in the forest everyday eating berries for survival. Things that are complex just do not happen by themselves -period, full stop.

The theory of evolution - maybe it should be called the theory of complexity as it describes how living creatures changed and became more complex. Congratulations to the primordial organic soup and to evolution. Against the forces of simplification and incredible mathematical possibilities the highly improbable has been accomplished. Life was created spontaneously and could not stay as simple life forms. Instead it became increasingly complex and discovered senses and physical abilities that are super impressive. So impressive are these accomplishments that intelligent beings cannot create the simplest living thing and are hard-pressed to duplicate the senses within the same size scales. All of this is based on a random act? Bravo!

Obviously by my tone and direction of writing, you know that I do not accept any of this for an instant. While there is a degree of acceptance for certain things, it is because all things are not as they seem, I do not put my ultimate faith, and I do not put total trust on just my understanding. Instead, I have a firm belief and faith that all of this creation is part of a master plan, and that it is directed by a master intelligence, and for me and many other people, all of this is attributed to God.

This is a turning point in the book. Up until this juncture, I have dealt with the sciences, the technical, as well as the how's and why's of life. It has not been totally impartial and hopefully a number of very sound and rationale reasons have been put forward. The explanations and reasoning are intended to persuade you that not all things are as they

seem or as would be easily explained by observable forces. It is at this point that I break clean and state my position as believing in a force and a Being that we cannot observe, God. The following chapters will not be so impartial as I try to put forth my closing rationale to explain why I believe in God. Yet, I still will not be afraid to ask what I think are difficult questions.

Chapter 9 If There is a God, Why is God Punishing Us All?

The title for this chapter includes a very tough and hard nosed question, but it is sometimes best to be blunt and face the most difficult questions head on. Although it is phrased is a particular way, similar questions may take many different forms. A related query is; if God is so loving and caring, why does God let such terrible things happen? While the phrasing, wording, and style of the question may vary, the underlying point of these types of questions is the object of this chapter.

These questions are probably easier to ask by those who do not have strong religious convictions or beliefs in God. They do not hesitate to raise a challenge and are not afraid of offending a religion or a God in which they do not believe. Even for those with very deep faiths and beliefs, these same types of questions may still be asked in distinctly different ways. It may be an unspoken question to one's self. It may be spoken aloud in a disguised or subtle way, "I can't believe this is happening to me", or, "Why me?". Other times, when the incident is more significant or tense, God's name is referenced directly and called upon to either explain or to provide help in the situation. These are reactions to matters that immediately and personally affect us. However, there are times when we are not directly affected and we learn about some terrible incident or difficulty. When there are disasters of epic proportion, even the most fervent of believers may on occasion quietly ask themselves how could God let such things happen to innocent people.

There are many severe trials and tribulations that happen to humankind. They happen on an individual basis and there are times when large multitudes of people are affected. The types of occurrences may range from human diseases to natural disasters. Some of the worst tragedies are those inflicted by one person onto another, or one group of people onto another. Drastic changes in climate can leave people unable to feed themselves and lead to situations of mass starvation. Quite often it is incredulous to find that food supplies are stopped from getting to the needy due to greed, internal politics, and strife within the area. Or, people are stopped from reaching safer havens due to different tribal, cultural, religious, or political backgrounds.

The questions as to God's mercy appear to flow easier when the disaster is of 'natural' causes. It seems appropriate to some that God should be blamed for not regulating and controlling the forces of nature. The same questions do not seem to flow when the disaster is inflicted by one group of humanity onto another. When there is war or civil strife, the blame does not flow quite so readily. It is though an exemption is issued because everyone is suddenly understanding. It is somehow excused as being human nature, even though the act was evil or the aggression was ill directed. While one is not condoning the actions, it is being overlooked as the free will of one people to take up arms against another. Yet, the free will of nature, with forces that can humble the most powerful of civilizations, is expected to be moderated or regulated by God.

Without a doubt, the hardest questions to answer are those that involve children. Due to youth, purity and innocence, these are the hardest questions to answer and are never rationalized. Circumstances with children that involve suffering and death are untenable. They cannot be explained away. There are no simple answers to explain why a child,

who is innocent to the ways of the world, and who has barely had much time to experience life, should suffer due to illness or die. This is when it must be the most painful, especially for parents, to try to understand these situations and the resulting questions, whether they are stated aloud or not.

So, is God punishing us when some type of tribulation befalls us? Punishment is a very extreme outcome, especially when it includes the totally innocent. Are there writings about disasters and the punishment of the wicked? Biblical writings in Genesis 19 describe the complete destruction of Sodom and Gomorrah and all of its inhabitants. The story of Noah and the great flood is another account that involves punishment by God due to the evil of humankind. This is the only account where, except for Noah and his family, all the inhabitants of the Earth were destroyed. Yet, after the flood, Genesis 8 - 21 tells us that God said, "I will never do it again - I will never again curse the Earth, destroying all living things … ".

Severe trials and tribulations, young or old, singly or affecting multitudes; does God let these happen? How could it be part of a master plan? Is this a test of some sort? All of these are incredibly perplexing questions that are puzzling and for which no one on Earth can attest that they have the answers for. I do not pretend to have the answers and can only offer, like others, my thoughts and feelings on these matters.

Is life some kind of test or learning experience for us? I think it is more complicated that that and I do not believe we could fully fathom the complete explanation if it was offered to us. Is this part of our journey through fate, or, is it our growth and journey through faith? More will be said on both fate and faith at the end of this book.

Thoughts on severe trials and tribulations are not new. People have been thinking and wondering about these matters for thousands of years. There is an interesting writing in a letter from Paul to the Romans that goes back nearly two thousand years. In Romans 5 - 3, Paul writes, "And not only that, but we also boast in our sufferings, knowing that suffering produces endurance, and endurance produces character, and character produces hope, and hope does not disappoint us, … ". These are very wise and philosophical words from so long ago. In a way, they describe a path of growth.

Do we grow from experiencing good times and bad times? I believe we do. There are age old comparisons where all the contrasts in life are listed. How can we understand pleasure if we do not know what pain is; love compared to hate; good and evil; truth and falsehood; forgiveness and revenge; hope and despair; happiness and sadness; faith and unbelief; and, birth and death. We will experience all these things. There are both positive and negative energies in the universe. It is what we do with them, which side we choose to emphasize, that detracts or contributes to our account for life on this Earth. Love is the greatest contributor to all things - love of God, love of yourself, and love for all who are around you.

In her book, *Embraced by the Light*, Betty J. Eadie writes about her near-death experience. There is a fascinating explanation that she offers in regard to our experiences on Earth. This is described in a chapter about how spirits are involved in 'Selecting a Body'. She offers that as spirits, we all desired to come to Earth and that we

were actually involved in the selection of the weaknesses and difficult situations that we would experience. The reason for this was so that through our lives we would *grow*.

Betty Eadie explains in one passage how a spirit who was especially dynamic and exceptionally brilliant chose to come into this world mentally handicapped. Both he and his parents had planned and made arrangements for this far in advance. There was great excitement due to this opportunity and the growth that it was going to provide to both himself, his parents, and the love they would feel. There is another passage, which is quite sad, yet illustrates the purpose of a deliberately chosen and short life of a baby. The death was to provide a challenge for the parents to grow. Betty goes on to beautifully describe that the pain and grief is intense, but relatively short. "After we are united again, all pain is washed away, and only the joy of our growth and togetherness is felt." The destinies of all people have great purpose, whether young or old, leader or follower, rich or poor. All of these conditions, and many others, contribute to our growth and our learning to love. Her accounts and writings are truly fascinating.

Although I have stated it several times, it bares repeating and it should not be underestimated: *all things are not as they seem*.

While my descriptions for the trials and tribulation we experience may not be as compelling or as exciting as Betty Eadie's, there are other avenues we should consider. The human spirit is about growth, development and love. How can we grow and develop if we are not challenged? Each life and every amount of challenge is different from one person to the next. However, there must be challenge and growth. Even if we witness a situation where the challenge was so great that it resulted in failure. Who are we to feel that we have a right to judge that failure? So many people attest to failure as having been their greatest learning experience. We cannot judge failure, just as we cannot question the challenges that come into our lives.

Do we expect that God's power should shield us and protect us? Maybe everything should be moderated and regulated so that there is no hardship whatsoever? What type of existence would this be and would we grow from it? The reply I would provide is that I think it would be a pretty bland existence and due to the shelter, there would also be little growth.

Even parents do not provide such shelter and moderation. As a parent, would you totally shield your child from all hardships and from all challenges? If you could, would you totally wrap your child in protective layers so that absolutely nothing even remotely harmful could happen to them? Would you try to protect them so that not a hair on their head was hurt? What would this do to their growth and experience? As a parent, when I consider these as options they are not something I would select. We all what the best that is possible for our children, but we know that putting them in a cocoon and giving them everything their heart desires is not the answer. In fact, it is conceivable that by taking this approach more harm is done than good. There are times during the development of our children that we must let them be independent to grow, to learn, and to acquire intelligence. We let them experience some hardship and try something that is just beyond their abilities.

How many parents have watched as their child learns to ride a two-wheeler for the first time. There is a time for guiding and holding on, and there is a time for letting go. Almost like it was yesterday, I remember the time my Father bought me my first bicycle. It was so long ago that training wheels were not invented yet! He set me off in the quiet back lane behind our home to practice and learn. I remember the first time I was completely on my own and peddling in a straight line. I was so excited and totally thrilled with the sense of accomplishment and speed. I was peddling and still managed to keep my side to side balance. However, I was concentrating so hard on my sense of balance that I was afraid, if not cautious to change the steering, and I drove straight into a telephone pole. There was no damage except for a very momentary one to my pride. I never had an opportunity to see the look on my Father's face as he watched me head into that pole, but I am sure there was some wincing and minor anguish involved. However, I do remember that there was no rush in his being over-protective and just a quick check to see that I was all right. Even without coaxing, I just wanted to get up and try again. It was still exciting and I was learning something new.

The progress was quick after that and the next several attempts put the necessary skills together to make riding a success. I grew, I learned, and I recognized that telephone poles are solid objects that should be avoided.

Seriously though, are there not a continuous set of examples we could list where we let our children grow through their experiences: walking to school on their own, a first date, and their first time to borrow the car and drive on their own. The list could go on and on. Without being malicious or intending anything hurtful to happen, there are also situations that we know will not work out properly. However, at the consistent or unceasing requests of our children, we may let them try something which we know will not work out and yet they are insistent upon trying. We evaluate the outcomes. If no severe harm is involved if the outcome is negative, we may let them have their way as a learning experience. How many times have you heard the phrase 'experience is the best teacher'. As good parents we want our children to learn and to grow by positive experiences. When there are negative ones, we hope they are only minor and that they learn from these as well. We do shield them, but with the intent of making the growth and allowing the challenges to be more progressive. We know that there will be a time when they will be on their own. They will be classed as adults and we want them to be equipped with the skills to succeed at trials and tribulations on their own. Success and failure is inevitable for all of us. You cannot even emphasize that success is *all* that a person should hope for. Some people are very strong advocates that they learned far more from their failures than from their successes.

If this approach of obtaining personal growth through minor trials and tribulations is achievable for parents with their children, maybe this is the process that God intends for us. Or, if we relate to Betty Eadie's experience, it is actually the result of our own planning for growth and development. Either way, there is a complex plan which is at work and that we do not fully understand.

We have heard these words before: plan, master plan, divine mystery, and blueprint. Does God have a plan for us? If we are on Earth to grow and develop, what is the purpose behind this? Is there something we are being prepared to do or to undertake? If we are growing, what is the next step and what are we growing into? Why cannot God

just explain the purpose of this growth to us? Please explain the need for the hardship, trials and tribulations? I am a smart human being and I need to know the reasons why. Slowly explain it and I will understand. What is so difficult about describing the reasoning behind it all? Is there a fear that some secret will be given away? What is all the mystery?

I do not think we are as smart and intelligent as we would like to greatly credit ourselves with. God is of course quite capable of providing us with the most complete of explanations, but I do not think we could totally comprehend all of it. Why is this? Even though we feel we may be gifted with what we think are great communication skills, both written and oral, I believe these are very insufficient for us to consider communicating with God. There would be such a vast difference in our abilities and powers when compared to God's which created everything that is around us. I believe there are concepts and thoughts that God could put into words, but which we could not fathom. There are words, thoughts and understandings that God would use which might take a human lifetime of learning for us to grasp.

Imagine that Albert Einstein was alive today. His task would be to patiently sit with you and thoroughly explain his theories on General and Special Relativity so that you would be conversant in the subject. Time would not be a barrier. The mathematical concepts would be explained to you, not in detail, but in a cursory manner. How long would this take for the average person to absorb? Remember, this is a human being teaching a human being. With an average person from a typical walk of life, I would guess that it would still be a lengthy and significant undertaking. Unless you grow up on a block where everyone is an Einstein, the communication is not easy. How would God's communications be relative to ours?

Remember the earlier chapter on the ant the universe. Here I was a child and I was contemplating trying to communicate to another living life form, an ant. I was considering trying to explain to the ant that it was in my backyard, part of a large city, in a great country, and on a huge planet. Yet, it scurried about its business totally ignoring my presence … the nerve. The mission it was on was far greater that giving me a moment of its time. I was quite willing to be patient. If it was willing, I would explain the *big picture* to the ant. Sure, I may have been only nine or ten years old, but I had a grasp at least of what was going on around me. Communication was going to be a massive problem though. I could speak, but I had no idea that the ant was listening. What was it actually hearing? Does an ant hear? I could shout, not knowing if this was necessary or helpful, and the reactions from the ant did not change anyway. How on Earth would I go about teaching even a single word to an ant? If I could get past a few words, how would I explain a more complex concept to it? How would I explain the concept that it was living in a city full of people, roads, and buildings? Impossible! There was no point in trying. Communication was impossible. When I began to think about the intelligence level of the ant, the hopelessness and chasm between us became even more unbridgeable.

Is this the way it would be for God to try to communicate with us? Are we mere ants compared to the incalculable power and intelligence of God? I do not think so. Maybe the comparisons in terms of power and abilities are not that far off, but I feel there is something drastically missing in this analogy which makes it an extremely poor one.

The analogy of a person compared to an ant has a very major element missing. I thought about this for a while and what is missing might be quite a shock to you. What is missing is that there is no love. There is no love in this example.

An ant is not a good example and some people may even take insult in that we should be compared to a mere insect. It is not a good analogy for us to relate to. It is missing love and the element of caring. We need a better example, one that is more human, and one that involves love. I have five children, so I tried to think of some comparison that would relate to the loving and caring that is involved between parent and child. Most people would agree that the bond between parent and child is about as close as it can get. The bond is especially close when the child is just a baby and I cannot think of a tighter bond than that between a newborn infant and its mother. When I started to think along these lines, the better analogy came to me. How do you communicate to a baby?

How would you communicate trials and tribulations to a baby? Well, it does not make sense in the first place, does it? Who needs to communicate such serious things and adult concepts to a tiny infant anyway? This is silly, or is it?

I recalled having to take my young children to their pediatrician for various checkups and immunizations. Thankfully, none of the visits were of a serious nature. Some of the more serious trips involved going to the hospital emergency ward for falls, breaks, and stitches. I remember four stitches which were particularly excruciating for me, and I was not even the recipient. My young son, Ben, had fallen and split open the underside of his chin. We knew stitches were required, so off I drove to Children's Hospital. My son was maybe six or seven years old and although we tried to explain the procedure and that the needle was required to administer the freezing, it was to no avail. When the needle was inserted into the open wound, he screamed with pain, raised his arm and bent the needle the doctor was holding. It took a nurse and myself to restrain his arms for the next needle. The loud crying was heart wrenching and I am sure that the entire ward heard his crying pleas to his dad for everything to be stopped. His face was partially covered in sterile gowns which I am sure added to his apprehension. However, my head was right next to his and I did my best to offer reassuring words and try to calm him down. I am not sure he even heard me. Due to the prior pain and fear, I was not successful even though I could communicate with him.

It was while thinking along these lines that a better example came to me. Picture a mother and father that must take their infant to the doctor for a minor procedure. The simple operation only requires a local anesthetic, but the infant needs to have the procedure done now and it cannot wait until the child is older. The infant is very apprehensive and does not want to be separated from the parents and is holding tightly onto its mother. The doctor and nurse appreciate the assistance of the mother in trying to calm the infant. The mother is not all squeamish and instead projects a cheery and brave demeanor so that no fear is inadvertently projected onto the infant.

The minor procedure is absolutely necessary, involves some discomfort and pain, and while it is a short procedure, it is not completed in a matter of minutes. The infant is less than a year old and is more cognitive than a newborn, but there are still no meaningful verbal communication skills. While the infant appears to listen, there is no true

understanding, and other forms of communication seem to be through eye contact and the sense of touch and holding.

As soon as the apprehensive infant is taken into the treatment room it senses the foreign surroundings. Anxiety and fear immediately grow when the infant must be separated from its mother. The arms reach out towards its mother and the tears begin to well - together with gentle sobbing and crying. The doctor moves confidently and swiftly to minimize the time required. During the painful portions of procedure, the crying is quite intense and the infant child is looking longingly towards its mother. The infant is sobbing bitterly and the look of despair is quite pitiful and heart wrenching. The look from the infant to its parents is as if to say, “Why are you letting this happen to me. Please take me from here.”. The longing looks, tears, and reaching arms continue. It does not matter how much the parents try to console and reassure the infant, nothing works. Finally, to the relief of all involved, the procedure is completed successfully, the pain ends, the sobbing subsides, and everything returns to as it was before.

Why could the parents not communicate to the infant? It merely needed to be told that the procedure, while it was painful, would only be for a short while, and was absolutely necessary. It was in the best interests of the infant and was required for its future health and well being. Why could the parents not explain that they loved their child? Although it appeared they were letting pain and hurt overwhelm their infant, they had not abandoned the child, they stayed right there, and were letting the procedure happen because they loved the child so much. Why not just calmly sit down and explain it?

Of course we know that the parents cannot explain anything to the infant. The child is too young and has not learned the spoken language and there are some more sophisticated concepts involved that even a five year old might not fully understand. It was simply impossible for the parents to communicate effectively.

We now need to step back and consider the reality of this analogy and the situation which was contrived. An infant was going through its own personal time of trials and tribulation. To be in that infant’s mind during those moments would have been agonizing. There would have been an onslaught of anxiety, fear, and pain. There would have been a lack of understanding, almost denial, as it saw its parents within reach and yet it seemed as if it were being abandoned. Make this stop. Take away the pain. Why are you letting this happen to me. Please, please make this go away. With so small an infant no one truly knows what the thoughts are, but you would expect these types of feelings and senses might be present, even in so young a mind.

Trials and tribulations of an infant, a child that will grow up to be just as intelligent as their parents. It will completely understand at that point. Yet, here is the irony. The infant is of the same makeup as its parents, it is of the same species, there is only eight to ten years of growth and education that is lacking and the child would have been able to understand better. A time span of a mere eight to ten years is missing - and we are unable to communicate, to our same kind, why the trials and tribulations are necessary. We want God to explain to us why we are experiencing challenges in our lives; why there is pain and pleasure; why we must grow and develop experience; and, why there is birth and death? Are you still sure you would understand?

Chapter 10 Why Doesn't God Just Give Me a Sign?

For people that have doubts about the existence of God, the following is a popular question: "Why doesn't God just give me a sign? Then I will believe.". We have become so accustomed to issuing challenges to others when we have questions on the credibility of a matter. We do not hesitate to issue requests by asking that something be proven to us. Our doubts are often satisfied by physical demonstrations that we need to witness with our own senses. There are times when someone tells us of an incredible event. If it is past our threshold for being readily accepted, how often do we find ourselves saying, "I've got to see this for myself.". This may be a gentle way of telling the person delivering the message that we do not totally accept what they are telling us as being factual. Instead, the non-acceptance is disguised under the vale that the event is of such great interest we want to see it for ourselves. This may be true, but a hidden reason is that we have doubts and find the verbal proof too unbelievable.

Are there any references which might promote our belief in God by accounting for past physical observations? In the bible, there have been selective narratives which describe God's appearance to the ancient prophets. Probably the most widely known example of a person being in the physical presence of God might be that of Moses during the time of the ten commandments. These accounts require us to have faith and to rely on the witnessing of others. For some, this evidence is not sufficient enough and they will not place their trust and faith on records which are several thousand years old. Maybe they have doubts in the ability of the witnesses who are not as discerning as people of today might be. Also, they may have distrust in the written accounts and records which have been handed down generation after generation as well as being translated from one language to another.

Why do we not receive some type of sign that gives us reassurance and confidence in the existence of God? If we have chosen to believe, why must we rely on others to be our first hand witnesses? Previously, we discussed the growth and development that we undergo while we are on the Earth. It is quite possible that our growth and development experiences would be curtailed if we became too overconfident. It may be that the growth of our faith experience is important for us to nurture and advance. Also, the testing of our faith may be an area that is important for us to develop. Imagine if we all walked around with absolute certainty and knowledge that God existed. Might we not become overconfident in our actions and start to act reckless and arrogant. We could potentially use this knowledge to lull us into a false sense of security. How many people have known someone in a position of great power and authority and fallen into the trap where they felt they could do anything and were immune to any repercussions?

One night, while I laid awake in bed for hours unable to sleep, I thought heavily about this topic. I put forward this same question to myself and wondered what would be required to satisfy my doubts. What kind of sign would I need? Various scenarios were considered. Maybe God could allow some miracle to happen that I would be witness to. Would that be sufficient? The more I thought about it, I realized that this would not work. What if someone who is far more skeptical than myself were to be involved instead? This would not satisfy their doubts. They would witness the miracle, but afterwards, when questioned about it, they would state that something indeed incredible happened.

However when asked if God performed the miracle, they would coldly, but correctly, state that the event occurred just as described, but they did not see anyone else and they could not attribute the cause the events to God.

I thought about supernatural events that might happen. These too fell into a category which yielded the same net result. Although they might be wonderfully spectacular and cause for great mystery, there would be a faction of people who would focus on trying to find explainable and understandable causes for the events. Picture the biblical description on the parting of the Red Sea. If that were to happen today, how many people would be studying and seeking to describe the rare occurrence through natural or scientific means.

This led me to the determination that the most irrefutable evidence that people would accept would require a personal appearance by God. The doubt would vaporize quicker if the appearance was more spectacular and larger than life, as the expression goes. I started to think of the best circumstances for this to happen. It would be better if there were several witnesses to avoid the burden of proof falling onto a solitary person. Yet, as I attempted to mentally walk the example through, the whole process struck me as having an underlying current of futility. Knowing human nature to be what it is, the benefit of this doubt-breaking event did not seem destined to succeed. However, let us try and the example is set up as follows.

Say that you and twenty of your friends were to stand in a secluded area and God was to appear to the group. Furthermore, God would to speak to the group and briefly demonstrate the impressive powers that were at God's command. Both the miraculous appearance and the demonstration left you and the entire group without any doubts whatsoever that God did indeed exist. Everyone was so pleased and overjoyed because now their doubts were totally overcome and satisfied. Any burdens or the weight of nagging questions were now completely lifted. There was a combined feeling of relief and joy at this event.

However, the difficulties have only begun. As a group, your skepticism has been totally overcome and you are all overjoyed. The task that lies ahead of you all is to now pass on the wonderful news to others. How do you undertake this? Maybe the first and obvious step is to tell the friends and family members of the group. It would be such a fantastic experience and the group would want to pass along the extraordinary knowledge to the next circle of friends outside the group so that they too could benefit. How would this go over? Quite well is the likely response. Since it is such a rare and incredible event, there would be serious first doubts as the explanation is initially told. However, these doubts would quickly evaporate once the realization of the circumstances and the people involved fully set in. The sincerity and credibility of the people involved in the event would be known and mentally evaluated by their friends. The credibility of the people, combined with the fact that they have a first hand report from the actual participants, would more than likely lead the first circle of friends to conclude the event was quite real. It may even lead to a change in their outlook on believing in the existence of God.

What happens though, when the original group tries to spread the knowledge of the event outside a close circle of acquaintances? For example, let us consider what would

happen if the various types of news media were contacted. We will assume that due to the number of people involved, the news media will at least find the report worthwhile and send someone to investigate. Reporters would get dispatched and commence by conducting interviews with all of the first hand witnesses. Always concerned about hoaxes, they would have to determine the credibility of the witnesses and would likely find some ways to perform character checks. Another certain step they would take would be to ask if there was any more evidence of the event. Was there any physical evidence which was left behind and that could be shown. Since there is such an preponderance of news outlets that use visual media, inquiries would be made to see if there were any photographs taken, or, if anything was captured on a video camera. Without hard evidence of some type or any photographic record, the news event would certainly be characterized differently and would even affect the priority and coverage it was given.

How would this news event play around the world? Would it make the headlines and the front page, or, would it be an obscure curiosity article? This is impossible to predict and there are many factors that might affect the outcome. What affect would it have on people who heard the news? One could speculate that there would be a lot of pessimistic people and a many of them would not change their beliefs based on this report. They would continue to doubt as they did not see it themselves firsthand. It is also hard to predict how many different countries around the world would even pick up on the event and communicate it to their people. There are nearly five billion people in the world. How many would actually hear of this within a reasonable period of time?

If you were personally involved in the group that actually saw God and suddenly found the news media decided to go against the group, you would find the whole scenario somewhat disconcerting to think about. You might be hesitant to even be identified with the group for fear of all the attention and potential negative repercussions. If public opinion did not take a positive swing on the matter, there could be a lot of negative labels placed on those involved. Labels might range from being called an all out crackpot to a person who was highly gullible and was easily misled. Instead of being a party to a miraculous event, you suddenly find yourself being highly criticized and constantly defending yourself and your reputation. Although we would like to believe our advanced society is beyond those things, you could suddenly find yourself at the center of a modern day witch hunt. How often have we seen this happen in recent history, where suddenly a tide swells and investigations begin that even include the government and become a quasi inquiry. People and families are led to personal ruin and later it is determined that an ‘error’ was made.

Imagine how uncomfortable the whole scenario could become if there were stipulations placed on the event. The stipulations are completely hypothetical, but let us assume these conditions were issued. As part of your being a witness to God’s existence and benefit this knowledge gave you, you had to undertake with others in the group to spread the word about what you had seen and to positively emphasize that God did exist. In other words, since God had given you all a sign, you promised to tell others. The scenario would not become uncomfortable if the news was received positively. However, imagine how difficult the promise would be to keep if you are met with even an average response which included an air of indifference and skepticism. The task would

quickly become very onerous when you realize that you need to inform and convince millions of others.

I am not even sure if better evidence would help you. Say that you had a video tape of the event. Would people now readily believe you? The special effects that are created for today's film productions are amazingly realistic. How many stares and quizzical looks would you receive as you showed the tape of God's appearance? Snide comments might be heard such as, "Great special effects!". Others might still ask for further evidence to see if the tape could be authenticated by experts in some way.

Can you imagine how great the challenge would be if further stipulations were placed upon you? In addition to spreading the news that you were a witness to God's existence to millions of other people around the world, what if you were challenged that you also had to pass the message on to future generations of humankind? How would you do this in a convincing way? When you look back on the accounting of a historical event that goes back one or two hundred years, how much credibility do you give to the records? Do you not have some doubts that the information was inadvertently altered in a minor way after such a great passage of time, or, that additional and important information might now be missing or lost. Details such as the exact people involved, exact times and dates, or, the precise location and place of the events become vague and somewhat suspect. This speculation occurs for historical events on which we are confident did occur. We just have doubts as to what may have been lost due to the 'translation' over time. We do not doubt the event happened it is just that the facts are fuzzy around the edges. What would the situation be generations from now when they look back on the records of such a truly incredible event as the appearance of God? Would future generations just write it off with skepticism as the musings of some antiquated and technologically backward group of people? "Yes, maybe they did witness something astonishing, but they had no idea what they were looking at." Are those the comments you would hear and do they sound familiar as comments we make ourselves about previous generations?

Yes, it would be a very daunting task if God were to press for something in exchange for satisfying your request - "Just give me a sign". In exchange for just giving you a sign, you are to *just* convince several million others and *just* ensure the message is passed on continuously from generation to generation. You have now been entrusted with critically important knowledge. Think about how you would go about satisfying these requirements.

Chapter 11 A Calculation of God's Power

How powerful would God be? Realistically, we know at the very outset of this endeavor that a true calculation of God's power is beyond our ability. However, having a background as an engineer, leads me to wonder about such matters and to try and quantify things even if it is only for my comparative purposes.

This fascination with power, quantifying, measuring and comparing items seems to be an innate characteristic of an engineer. We want to improve and make things better. Depending upon the desired goal of course, we want to make things faster, smaller, more reliable, with more features, higher in quality, lower in cost and more powerful. In order to make these types of improvements happen, engineers are constantly measuring and comparing the key characteristics of a product, or a process, so that references or benchmarks are established. Once the benchmarks are established, engineers love to make comparisons using numerical methods whenever possible. There are continuous examples when we hear that some feature is 10 times faster or more powerful than it was before. Engineers love expressing these comparisons in multiples of another number, especially when the number is a factor of 10. Expressing numbers as factors, or powers, of 10 makes the arithmetic so much easier. As mentioned earlier, there are also a lot less zeros to write with this type of 'shorthand'.

So, how do we calculate or compare God's power? Using the engineers' model just described, we first need to compare God's power against something else in our universe that we can relate to. Instead of making this overly complicated, let us just do this simply and make the comparison against ourselves - the power of a human being. This is certainly something that we understand and there is nothing easier to relate to. However, we will have to skip all the details of trying to make exact an correlation between God and a person. We have our own estimates when it comes to the physical strength of a person. As well, we have our personal assessments on the strengths and limits of the various human senses such as sight, hearing, and so on. The details we do not have, are whether or not these senses and abilities are a good one on one comparison to those that God might possess. I have a feeling that God has senses and other capabilities that we may even have difficulty imagining and comprehending.

We need to get everyone, both those that believe in the existence of God and those that do not, on the same wavelength. For the sake of the next questions, it is assumed that we will all believe in God. Having made this step, we need to go through some type of inventory to list and categorize what God's powers and abilities are. That is, what kind of things are God's powers capable of creating? We have a comparison to ourselves, as human beings, as we know the kinds of things people are capable of creating. We know the current state of the various sciences and technologies that are available to us on Earth. We know what we can and what we cannot do. What can God do that is different? This is the 'inventory' which needs to be established that will help us in our calculation.

A good starting point is to list some of the obvious accomplishments which humankind has not been able to duplicate. God has the power and knowledge on how to create life. God created all living things. God created the Earth. God created all the stars. God

has control over all space and time. God is capable of being everywhere and sensing all things at the same time.

This set of powers is very humbling when compared to ours individually or even if we were to compare and totally unite all the powers of humankind. Focus on just the first two accomplishments. In order to create life, God is smart enough to completely understand every facet and all the keys to life. I refer to them as keys and secrets, not necessarily because they have been deliberately kept a mystery, but because the essence of what makes something alive has not been found, understood, or duplicated by the best minds the human race has to offer. Decades of research and study has not cracked the code on creating life. The first accomplishment is a demonstration of the shear intelligence and knowledge which God possesses.

While the first addresses the forces of life, the second accomplishment of creating the Earth, gives us a sense of God's power over all that is physical in the universe. All the forces of physics, all matter, time, and energy, are at God's control. After you let this sink in for a while, how much more powerful is God than a human being? What is the power of being capable of creating something the size of the Earth? Playing the engineer, we can easily discount that God is more than 10 times as powerful as a human. What about 100 times? Yes, this is not enough. How high would we have to go: 1000, 100,000 or it is a 1,000,000 times more powerful? While we do not have an answer, we likely sense that it is definitely towards the latter.

Imagine if God were to suddenly appear before us. While I cannot be certain, I have a strong feeling that we could not physically be able to bear to be in God's presence. This is not based on accounts from the Bible, but rather on some type of gut feeling or vague intuition I have. God's power would be so overwhelming and we would be so small and insignificant in comparison. We would be like a single snowflake placed in front of a great log fire - we would melt and evaporate away.

Chapter 12 The Ten Commandments: What's so Tough to Understand

This chapter is going to be about as short as they get. I am really … is it necessary that I think I an such a detailed expert that I should profess to have new knowledge about the ten commandments and that this topic needs to be covered again? Honestly, this subject has been even covered in famous epic movies that are played every year on television.

There are ten commandments. They are in the Bible. What is so tough about this? In fact, many people are forced into religion at an early age and are made to memorize all ten of the commandments. There is probably a good chance that you have the commandments memorized yourself! Why am I even bothering wasting this printed page? Alright, enough ranting and raving already. This chapter will be short. I will type out the ten commandments just to take up space in this book and we will be done with it.

To save myself time, I am going to commit the terrible act of plagiarism. I need to finish this book fast! There are lots of Bible versions out there and they are written in numerous languages and many revisions and interpretations. Many people have taken great license in an attempt to make God's words on this topic clear. Gosh … I hope they were right and I hope I plagiarized the best version. Please do not try and figure out which version I plagiarized, just be content that I did indeed copy the words. I promise that I have not made them up.

One more explanation and then I start copying out of the book. Each commandment has some kind of meaning. Well, no kidding! So to take up a little more book space, I will copy out the commandment and add a short meaning to each commandment. This is sooo easy, here goes:

First Commandment: Thou shalt have no other gods before Me.

Meaning: We should fear, love, and trust in God above all things.

Second Commandment: Thou shalt not take the name of the Lord, thy God, in vain.

Meaning: We should fear and love God that we may not curse, swear, use witchcraft, lie, or deceive by God's name, but call upon it in every trouble, pray, praise, and give thanks.

Third Commandment: Remember the Sabbath day, to keep it holy.

Meaning: We should fear and love God that we may not despise preaching and God's word, but hold it sacred and gladly hear and learn it.

Fourth Commandment: Thou shalt honour thy father and thy mother, that it may be well with thee, and thou mayest live long on the earth.

Meaning: We should fear and love God that we may not despise our parents and masters, nor provoke them to anger, but give them honour, serve and obey them, and hold them in love and esteem.

Fifth Commandment: Thou shalt not kill.

Meaning: We should fear and love God that we may not hurt nor harm our neighbour in his body, but help and befriend him in every bodily need.

Sixth Commandment: Thou shalt not commit adultery.

Meaning: We should fear and love God that we may lead a chaste and decent life in word and deed, and each love and honour their spouse.

Seventh Commandment: Thou shalt not steal.

Meaning: We should fear and love God that we may not take our neighbour's money or goods, nor get them by false ware or dealing, but help them to improve and protect their property and business.

Eighth Commandment: Thou shalt not bear false witness against thy neighbour.

Meaning: We should fear and love God that we may not deceitfully belie, betray, slander, nor defame our neighbour, but defend them, speak well of them, and put the best construction on everything.

Ninth Commandment: Thou shalt not covet thy neighbour's house.

Meaning: We should fear and love God that we may not craftily seek to get our neighbour's inheritance or house, nor obtain it by a show of right, but help and be of service to him it keeping it.

Tenth Commandment: Thou shalt not covet thy neighbour's wife, nor his manservant, nor his maidservant, not his cattle, nor anything that is thy neighbour's.

Meaning: We should fear and love God that we may estrange, force, or entice away from our neighbour his wife, servants, or cattle, but urge them to stay and do their duty.

Before closing this short chapter I want to add some of my own comments to amplify some of the meanings already stated. About the Sabbath day, wouldn't it be nice if everyone could take one day off in common? Friends, family, loved ones would all have a common day that they would not have to work. If desired, they could easily coordinate and spend it together and not be disappointed because of one party having to work … especially when that work is not of any lifesaving type nature. Why not spend some time to contemplate the big picture and get off that gerbil wheel of life when all that is being collected is some extra peanuts. Will you be remembered for spending time with someone and loving them? Or, do you incorrectly believe you will be remembered for collecting those peanuts? If you believe in God, would it hurt so much to spend one measly hour to think about and worship God? In the Bible it states that God created the Universe in six days. The little bit of humour is that even God took off the seventh day for some rest. While we do not realize it, we have extended this commandment to take

off two days, and call it a weekend. I don't know but maybe people and God were trying to practice good sense and have time for reflection and a get a truly good fresh charge on our "batteries". Why must we complicate and stress things for the sake of money and that almighty super-convenience?

What is wrong with once and awhile going to a church, a synagogue or a temple of any sort? I have found that usually these are the one place that consistently teaches about peace, love, and service to a fellow human being … no matter what background they are from. If you are going to worship at **any** place that does not teach tolerance and love for all living things and people, no matter where they may be on this earth, then I seriously suggest questioning that church or temple, and look elsewhere.

What is wrong with emphasizing a strong and healthy family unit where there is lasting and true love? Would children raised under such conditions "turn out" good, or, bad? What are the possibility calculations? My bets are that the odds are highly in favour of consistently having happy, healthy, well-balanced, loving children who grow into kind and respectful adults. What are your thoughts?

Adultery. I am Canadian. Canada geese are around my house for the seasons of Spring, Summer and Fall. While many people do not like them, I love them and find them truly amazing and fascinating. I have read written articles on their navigational abilities that truly boggle my mind. Also, they have one mate for life (until a partner dies?) and I have seen Canada geese remain behind in a blizzard on a freezing lake until a member finally dies. I have cried at this sight. Why cannot human adults be more faithful to each other in this thing we call marriage? Should we stop thinking with our reproductive organs and use the minds that we were given.

What is the matter with understanding the simplest of commandments and laws? **Thou shalt not kill**. These are simple words and I do not believe God feels that there any exceptions allowed to that short and simple law. Killing if you are drunk, on drugs, enraged, in self defense, under military orders to kill someone, it is still killing. Period. These are all highly contentious issues for strong debate and discussion. It has been going on for millennia. I am not a lawyer and I do not like legal debates whatsoever. One thing I do believe in is God. If I kill any living being, I do not want to have to give God any excuses or other fantastic reasons or situations as to why I thought it was necessary. The sweating and trembling would be incredible.

So many countries have religions that do not condone killing. Yet why do these countries have armies that are commanded into killing by the leaders of the country. Usually the leaders of the country issue the command to kill over some mistaken goal of self-defense, over the sake of religion, land, power and a host of other reasons. These countries and leaders have the nerve to say they are religious. Yet, they break their own religious laws frequently by ordering fellow countrymen to kill on behalf of the goals of "country". You cannot pretend to follow a religion that says do not kill except in a war.

We need law and order. That is the tough part. Through the freedom that God gave us all to choose, many choose evil. I only we could get everyone to simultaneously follow some basic commandments and at a minimum include "do not kill". Wow, what a safe

place this planet would suddenly become! The bottom line is fairly simple too: why choose evil? It only hurts.

Jesus was the most beautiful teacher ever put on this earth. No matter what you think of him! Jesus taught the masses, the poor, the uneducated and tried to simplify complex laws, legal, and interpretations by high priests of the time. This included trying to simplify the ten commandments for the illiterate and the uneducated. Jesus used genius to look at God's ten commandments and break them into two simple categories: those to do with God, and those to do with people.

It is said that someone tried to trick Jesus into picking the most important commandment from the ten. Jesus replied, " 'Love the Lord your God with all your heart, soul, and mind.' This is the first and greatest commandment. The second most important is similar: 'Love your neighbour as much as you love yourself.' All the other commandments and all the demands of the prophets stem from these two laws and are fulfilled if you obey them. Keep only these and you will find that you are obeying all the others."

Chapter 13 Who has the Most Toys Wins: Yeah Right

There is some difficulty being observed with all of the materialistic collecting that is going on around the world. We read, hear, and see about this all the time. The reports include that the gaps between the wealthy and the poor are increasing more and more each day. It is the old - "the rich are getting richer and the poor are getting poorer". This is a very distressing situation and collectively we have to start changing some attitudes in people about this.

The ironic part is that no matter where we are actually positioned in the strata of world wealth … we feel that there are richer people than us, and we would like to be like them and have what they have. Strange how this can not only cause stress and cause us to run into trampling competition, but it goes against the tenth commandment. So what is the harm? In your rush to gather, you drive others to gather. Collection, power, greed, and arrogance suddenly appear in your personal makeup and behaviour. You do not even see it in yourself and you feel this is normal, fun, and the way it is supposed to be. How many cars can one person own or drive at the same time? How many pools and houses around the world can one person own? How much land, buildings and real estate can be possessed without it being enough?

Do you have extravagant items, huge collections of anything, that sit unused by any people, that even you have time to rarely use and touch? If this is the case, I would humbly submit you have too much. If your family cannot even use it because you have so much … if the estate sits empty for months and months, with only security guards and cleaners … maybe you have too much.

A collection for enjoyment is different than collecting for the sake of the obsession. There are poor people who are desperate and are being ignored by us all. Yes, me too as I was not born perfect.

Look around at what you have. If you could just figure out what you have that is excessive, maybe you might start stepping into the direction of helping others who are sick, needy and would cry in joy to have a scrap from the beautiful table of life you were blessed with.

There is a phrase I once heard that still sickens me to this day … "Who dies and has collected the most toys wins". Ouch. I pray that this is not the mantra of yuppies or any generation of people, anywhere! I would hate to have to explain after my death that I left so much excess behind that it could have helped hundreds and instead it just rotted in the continuing hands of a few … who still had too much. Most toys, yeah wrong!

Greed is wrong. Charity would be right. Look around you. Do you have too much? Get a personal feeling of giving and helping somewhere … someone. If the world's people would only get addicted to this inner joy of sharing! Might we get more world peace, might we stop invading our neighbour to get what they got, and have broken one less commandment to ask forgiveness for?

Chapter 14 The Lottery of Life: The Safer Choice

The love of gambling, the false hope it offers, or its addictive nature has many people attracted to casinos, lotteries, and the many other games of chance. Like one of the early chapters that discussed possibility and probability, we sometimes ignore the true reality of the odds. Instead of faith, we put our trust in plain fate … the luck of the draw. The attraction of gambling and taking a chance becomes like the spiral pull of an evening light, which deceives and then misdirects the flight of a flying insect. Instead of using the Sun for its navigation, the insect is drawn by a manmade source of light. The end result is usually disastrous for the insect when it reaches the intense heat of this false sun.

Is the false light of gambling believed to be a quick way that avoids true work for a true day's pay? So many strive to find happiness and their ultimate dream. Some are willing to let chance play a pivotal role in this fundamental pursuit. They begin to increase the chances they place, slowly but inevitably straying more from the safe navigation in the light of the day, to take alternate routes by the artificial light of the night. All of this in the hope of quicker riches. The draw placed upon them is real and powerful. It can be incredibly hard to avoid and is carefully crafted through enticing advertising or exciting and luxurious surroundings.

Maybe the excitement, joy, and revel in splendor is really not that far away from them. It is much closer than they think. Their stretch of living on Earth is relatively a very short span of time. This thing we call our life is but an small instance when compared to measures of time within the Universe.

Is there a heaven and is there a God? Does God exist? Is the concept of God, heaven, and an afterlife the real lottery? What delight and riches could possibly await us in this concept of a heaven? Why have so many people from ancient Egyptians to numerous religions throughout history and around this planet put stock into this concept of an eternal life and heaven? Why did independent cultures spaced by great distances and periods of time come to similar beliefs? Why is there this consistent fascination … why not just let go … why the need to cling and hang on to such concepts. Have so many people throughout all of time been completely fooled and how were they misled? Have they been trying to choose something? Choosing on this hope called eternal life?

We are different from animals and this statement may be contrary to what some scientists would have us believe. We cannot get into the minds of even the most intelligent animals whether they are whales, dolphins, monkeys, and so forth. Do they have hopes for an afterlife? Do they display any behaviour or preparations for an eternal life? My position is that they do not.

Then why do we? What makes us different? Is it just because we are humans, because we are so much smarter, because we seem to be in total charge of the planet, because we can do with it what we will, or because our intelligence allows us to philosophize and speculate? Being smarter or more intelligent does not rationally explain why we would have such beliefs. It does not make sense that there is a trigger point where you reach an intelligent quotient and suddenly you speculate about such things.

Why did early people even begin to believe in God (or Gods) and why this strange notion of an afterlife? Should not they have just accepted the way things appear to be? Their only existence would be on Earth. Most lives would have been simple and happy. Their life spans were certainly long enough. With their intelligence they could reason that a human's span of life was far better than the lot given to insects and many animals. Why not just accept that you live on Earth, then die, and that is it. Nothing more and nothing less. Just live for the here and now. Do want you want, how you want and whatever you want. Take advantage whenever you can and do not be concerned with others. Why adopt a religious lifestyle or behaviour? Why have a concern for doing good, being good, or caring for others? And please … why this widespread, consistent passion, and hope of having an afterlife?

My belief is that there is something instilled deep within each of us. We have had this since our creation and it is not something which animals possess. It is something that we cannot get in touch with directly and easily and yet we sense that it is there. When we open ourselves up to feel another presence, the presence of a Creator, a Designer, it is then that we start to sense that there is much more than just a plain existence on Earth. Some say that it is being born with a spirit or a soul. It is unfortunate that this cannot be scientifically proven. Doubters may refer to the last statement as being the usual excuse but the problem is more significant. The problem is that our soul and this innate sense we feel is beyond methods of normal detection and description. It is beyond all of our regular human senses and any scientific detection methods that may exist. Is this all a part of the sixth sense that we are supposed to have?

Onto a different topic, engineers have an opportunity to study a field of mathematics called statistics. When I was younger and in school, I learned some of the formulas used in the calculating of statistics. In statistics there are many types of symbols, calculations and formulas that are used. There are some people who take it on as a specialty and study it in university for years. As a unique branch of mathematics, it is just as precise and as reliable as you would expect from any field of mathematics. It is very hard to put it into disrepute. Given enough of the right parameters, statistics enables you to calculate the possibility of whether an event may happen, how many tries are needed, and so on. Possibility and probability, this is the same subject we deliberated in chapter two.

The possibility of almost any event and its odds of occurring can be calculated. It can range from calculating simple rolls of dice to the odds of combinations of genes appearing on a chromosome.

It is even used to calculate how long on average we will live and what the odds are of certain accidents happening to us. Some of the top mathematicians in the statistical sciences go on to become actuarials. While not a common career, they are extremely well paid and are typically found as the top calculating minds within most insurance companies. They examine reams of data and the cold, hard and real statistics of life and death are used. If you take a given population of people, examine it over a long enough period of time, and look at the actual records for deaths, you come up with the average life expectancies for men and women. Nothing amazing about that. However the science is capable of much more amazing detail.

While it might be exaggerating somewhat, there may exist actuarial tables of data where you could look up the possibility of a certain age group of men, living in a specific geographical area, and determining what the odds are that they would lose the vision in one eye. While it seems farfetched, the bottom line is that all the possibilities can be carefully calculated if the prior records, history and data exist. We would be astonished at what data is tracked for illnesses and accidents of all types. For the insurance industry having these calculations and good data available are vital to staying in business. It even forms a basis for knowing how much to charge for a given type of coverage. Everything is carefully calculated. Losing at the odds and paying out more than you take in is not an option for the insurance companies. They are in business to make money and not lose it.

Calculating odds using statistics is also a cornerstone in lotteries, gambling and within the casinos. Obviously, paying out more than you take in is negatively viewed upon by the casino owners. Security is very tight and they try to detect anyone using a “system”. Any system that changes or improves the calculated odds in favour of the gambler must be quickly put to a stop.

Do you know how to make a safe choice? You be the actuarial for the following example. There are two people for the example. Just two.

One chooses an approach to life that is based on this thing called faith. We do not know if they are following an inner calling or listening to a sixth sense. The person selects to firmly believe in the existence of a creator, God. For that person, God is the creator of all things seen and unseen, God is the designer behind the Universe, and God is in place called Heaven. Heaven is filled with nothing but love, peace, unending joy, tranquility, and lasts for eternity. Everything that they could possibly desire on Earth is available to them in Heaven. Every question they ever had would be answered there. Accordingly, this first person chooses to conduct the affairs of their life with such a goal, such an objective, and such a passionate desire in mind. That person leads what is referred to as a good life on this Earth. They have an innate knowledge or sense that it will pay off. There are no absolute guarantees. They choose in the existence of God.

The second person is of course the opposite. They do not wish to believe in God, as there is no obvious evidence that God exists. God has not appeared to them and has not given them a discernable sign or signal. For them the Universe is an outcome of nature. Life was a possibility in a primordial sea. Evolution, although a force that causes increasing complexity, is plainly observable in the fossil records which clearly shows how all living species are where they are today. There is no creator, no designer and for that person, there certainly is no God. They do not even consider that they are “gambling” in this matter. They are not betting. There is nothing to bet on. God does not exist.

Which is the safer choice? It is obvious. If God does not exist, neither person loses for neither of them will gain anything. At the end of their lives, both die, are placed in the ground, and left to decompose. They are just two singular events in the grand scheme of evolution. Their contributions in terms of genetic offspring, knowledge, and other physical contributions may be very slight indeed.

What about the other outcome? Where God does exist how do the choices stack up? Maybe the one who chose not to believe is just left in the ground (to rest with their minimal contributions to the grand scheme of evolution)? There need not be pain or suffering for making the wrong choice. The outcome for them is as they desired, nothing. The other person that chose to believe in God may just have won their lottery, their jackpot. The first person would actually have been better off to just pretend and believe, be good, go with the flow … they would have nothing to lose, yet there would be so much to be gained. Make the safe choice and believe in God. You have nothing to lose and everything to gain.

It is even easy to calculate the statistics, why don't you figure out the odds? You do not have to consult an actuarial or take any courses in statistics. It is a simple as 50 – 50. Flip a coin, God exists or God does not exist. I am sorry, as I do not mean to be so coldhearted about something that is so very important to so very many. Please choose to believe as you have everything to gain and yet a great deal to lose. Unfortunately, we all make some bad decisions during our lives and that we have to live with. However, this is truly the ultimate choice and decision. This might be the only decision: that you must make personally, that only you will be responsible for, and that when you die … you take the decision with you. Please do not make the wrong decision, which is choosing not to believe in God. Do not spend eternity with absolutely nothing. The alternative is so much more positive and you have the opportunity of an eternity of unending joy, celebration, family, friends, and dreams that are fulfilled beyond expectation.

I have had great concerns about including this chapter and it subsequently went through some re-writes. The concern is because such an important matter comes across as a simple coldhearted decision. Also, there are the comparisons to gambling and a lottery. This is not a good way to look at the existence of God.

It was decided to go ahead and include the material. While not scientific, or the best of logic, it is best to leave no stone unturned in an attempt to convince people to choose in the belief of God. If this one chapter helps just one person it will have been worth it.

God accepts anyone at any time. Even if you are non-believer for most of your life and at the "last minute" you choose honestly and sincerely to believe in God you will be accepted. Do not gamble though. Do not wait until the last moment, as you will never know when that will be. Gambling is predictable, as you will know when the dealer or croupier halts all new bets or stops any changes. Do not gamble on the most important choice in your existence; do not delay, as you will not know how much time is allotted to you.

Chapter 15 Fate and Faith: The Extreme Odd Couple

Fate and faith, these two words do not have very much in common other that the first two letters. It is my opinion that these two words could be classed as antonyms and in fact have the opposite meaning. Two small words but they have extremely deep meanings if we take them into the context of how we view our lives. They are descriptors of people's attitudes and how we approach or travel through life, how we view our experiences, and how we react to situations. While on small issues we may switch our beliefs between the two with little consequence, it is more important on our long-term outlook as to how we adapt and act. Is it according to fate or faith? The choice likely reflects on our mental outlook, how we act or behave, and even how people view us.

We tend not to think of these two words very often and typically they only come to mind as a result of some type of event. As an example, let us consider a minor car accident that does not involve any personal injury. Since nobody was hurt the consequences are not too severe. Our only worries are filing accident reports, going through the insurance process, making arrangements for the car repairs, and making some non-budgeted cash outlays if we are responsible for the deductible. Certainly, this may be viewed by some as a major inconvenience and add an extra degree of stress to a person's normal routine.

So what is the relationship to fate or faith? Most would agree that this incident would be chalked up as an unfortunate incident, a bit of bad luck, and just the result of some bad fate. Faith would not even enter the picture. The majority of people would not consider this a life altering incident that requires a deep examination or questioning of their outlook, beliefs, or faith. The majority would write it off, learn from it as an example, slowly begin to put it out of our mind, and get on with life.

What about a more serious example where a family member was riding with us in the vehicle and sadly they died as a result of an accident that was determined to be our fault? This type of instance is severe enough that both fate and faith will be brought into question. Depending upon the outlook you have adopted, this event will likely bring about a serious review of the position you have taken on fate or faith. We could examine the possible feelings that might result.

How would the fatalist cope with this type of event? As with any human being, we would expect strong and sad emotions. There may be a self-examination in terms of personal blame and carelessness on why the accident happened. However, would there be anything in regard to a personal consolation for this individual that would promote self-healing due to this tragedy? This would probably not be the case. Instead, with a strong non-belief in God and without faith, this individual is left to console in that this was just destiny, inevitable, and just an adverse outcome. While it may seem very callous, cold and hard logic, what more could this person count on?

What about the situation where a person has a strong faith? There would likely be commonality by both people in respect to the emotions and the personal blame felt. However in going forward and looking to the future, the person with a strong foundation in faith and belief would have more to rely and count on. It would not be a situation of

the cold “this was destined to be”. Instead, over time there would be a sense of healing and almost an understanding. While the reasons for the tragedy occurring could never be totally explained from our limited vantage point, it would be realized that we are not given to understand all things. Why this has transpired and how it is part of a very elaborate design are not made known to us. Acceptance with time does come. A faith in God’s plan for each of us and a belief in Heaven brings important comfort to us. While on Earth we do not have the true closure some expect, we have the comfort that our family member has eternal joy and the answers and reasons will one day be given to us.

People with weak faiths are greatly tested by such events. They can become the example the fatalists point to and challenge saying, “Why did your God let this happen to you?”. Those of weak faith succumb and may be caught in this difficult test. God’s love for us is like a rock. It took a long time to form and may have been growing for a very long time. We need to understand this and let our love of God and our faith in God also grow and become strong like a rock. We need to build our faith life on a foundation like rock. If your faith is weak, built on sand, and there only for the good times, when a storm comes into your life, the foundation of sand simply washes away and your faith with it. Those who use God’s faith to strengthen their life must recognize this. Nurture your faith, recognize that in difficult times it may be tested to the utmost, be patient, know that it strengthens and grows slowly, and pray for the faith of God to be with you and stay within your heart.

What is my personal viewpoint on life and fate? What of my creation and birth into this world? Was it fate that my parents should travel from far away countries to meet in Canada? Should I look at my existence as a chance of fate? Before I write more on this and my outlook, and want to give some personal details and history on my Mother and Father.

My Mother was born Erna Pfitzner in a very small village called Raschewitz. This village was near the major center of Breslau all located in the very eastern part of Germany. After World War II, all of this area was annexed and given to Poland. All of the place names were eventually changed.

Erna was born to Hugo Pfitzner and Pauline Kunoth. She was the youngest child and had two older brothers, Paul and Arthur. Her father was the master blacksmith in the village and from what I understand they enjoyed what we would call today a normal middleclass way of life. My Mother recalled many joyful childhood memories to us. Sadly, she lost one brother, Paul. He succumbed to tuberculosis at an early age and was not diagnosed early enough or able to get to a sanatorium in sufficient time for a cure. Her father died of a stroke when she was a teenager.

My Mother became a registered nurse and decided to practice in the country serving small villages. She told us with excitement how she learned to ride a small motorbike and this was how she traveled between the villages. World War II broke out with drastic consequences. Since they were in the East, they fled west to escape the Russians who were described to be most ruthless of the conquering forces. They lost all of their land, home, and possessions. My Mother was able to pack a suitcase of her most important mementos and keepsakes, but this was lost on a train during a time of mass confusion.

After the war, she served as a registered nurse in a refugee hospital in Munich. Being young and interested in seeing better opportunities, Erna decided to travel and immigrate to Canada. On July 1, 1952, she arrived in the small town of Ninette, Manitoba, where there was a tuberculosis sanatorium. She only intended to live and work in Canada for a few years; this was not going to be the eventual outcome.

My Father, Michael Soszek, was also born in a very small village, it was called Krecilow, and was in the very eastern part of Poland and the nearest major city was Tarnopol. His life was also greatly affected by World War II. As Stalin and Hitler had a pact at the beginning of the war, Germany invaded Poland from the west and Russia invaded from the east. "Fatefully" similar, after the end of the war, Russia annexed for itself the eastern part of Poland. For both my parents, their original birthplaces had the names changed and neither is the original country.

Michael was not born into the middleclass and would be considered today in the poorer class. He was needed to work on the farm and therefore could not attain a high level of schooling. Ironically, or is it faithfully, this was to be a fortunate circumstance. After invading their portion of Poland, the Russians did not want any organized uprisings or strength to exist. Those who were educated, officers, or leaders where taken away into the forests not to reappear. In what is usually known as the Katyn Forest Massacre, this is reported to have taken place during April/May 1940 on Stalin's orders. The mass murder of 3920 Polish officers was conducted under the supervision of the NKVD in Kharkov (further east from Tarnopol).

Non-officers were to have a different destiny. As an able-bodied young man, my Father found himself in exile and treated like cattle was shipped to Siberia. When I was younger I often questioned my Father as to what happened and what this was like. He never explained to me what life was like in Siberia and from the somber expression on his face I understood that there was mostly unpleasantness, pain and great hardship. After reviewing the history literature, I learned that as result of the Nazi-Soviet pact and the 1939 invasion of Poland, the Soviets deported about 1,700,000 Poles deep into the USSR.

After Hitler broke his pact with Stalin and attacked the Soviet Union in June 1941, Stalin thought it would be a good move to now join the other side and became a partner of the Western Alliance. This included the Polish Government, which was in exile in London and was led by General Sikorski. He entered into negotiations with the Soviet Government to free the Poles detained in the USSR and to recruit them to form a new army. Maj. General Anders, himself a former prisoner, was appointed to command the new army. In December 1941, as a result of new negotiations, it was decided to transfer a contingent of 25,000 men to the West.

My Father was part of this army and found himself in a move from Siberia to Iran, which started in March 1942. There was a Soviet reluctance to provide supplies to the new army, which was reduced to starvation. My Mother confirmed his type of hardship and related a description by my Father where he stated how he thought he would nearly die on the long train journey to Iran (Persia).

After Iran, my Father traveled to the Middle East and became part of the 3rd Carpathian Rifle Division as part of the 2nd Polish Corps. While he kept very few mementos, Michael did keep this divisional badge as well as one showing that he was part of the 2nd Brigade, 6th Battalion. While it took some time searching on the Internet, I was able to obtain a lot of information just from these badges.

During July and August, the 2nd Polish Corps moved to Palestine where it participated in maneuvers partly held in mountainous areas in order to acquaint the troops with the terrain they would encounter at their new destination, Italy. Units of the 3rd Carpathian Rifle Division started to disembark at Taranto, Italy, in December 1943. My Father was also part of a great battle in Italy and fought at Monte Cassino that opened up a road to Rome. The battle began on May 11, 1944, but it was not until the morning of May 18 that the Poles were able to occupy the abbey of Monte Cassino. Polish losses on the 17th of May: over 2,500 men in 6 Hours.

My Father has an old picture of himself taken with a very good friend during the war and I believe that he lost this friend at Monte Cassino. At the foot of the Polish cemetery at Monte Cassino is an inscription in Polish. It translates to: *Passerby, tell Poland that we fell faithfully in her service, for our freedom and yours, we Polish soldiers gave our souls to God, our bodies to the soil of Italy, and our hearts to Poland.* My Father received a medal for this battle and has the Monte Cassino Cross (no. 12855).

After the war, my Father went to England and lived in Cambridge as part of a resettlement corps. He was given a choice of countries to immigrate to and chose Canada. He arrived in Halifax, Nova Scotia, on January 8, 1951 and traveled by train across Canada to settle in Manitoba. He was a construction worker and a carpenter when he worked at a job site near Ninette. The paths of my parents crossed here.

Consider their meeting in a very small town in a country as large as Canada, and when you look at their varied histories, a lot could have gone differently and many seemingly small events could have prevented them from ever meeting. Is it a miracle that I am here? Was all of this fate? No, my response is that it was a journey of faith for each of them and ultimately for myself as well.

Like it was mentioned earlier, there are traumatic events that occur to each of us. They cause us to question that odd couple of words; is this fate or faith. When I look at my life's journey to date I have a great deal to be thankful for and my wife Joan and I have been blessed with a great deal. We have five beautiful healthy children and to put things in perspective everything else we have is immaterial compared to this. We have gone through times that could have made us question our faith: I lost my Father, we lost our second child due to a miscarriage, and Joan lost both of her parents.

With a strong faith and belief in God, these events still cannot change our outlook and approach to existence. The fatalist would re-read the previous paragraph and would agree that we did indeed lose those people from our lives … forever. People with faith would correct us. They would say that we did not lose the loved ones from our lives. Our lives, troubles and joys on this earth are only temporary. We are just visiting this world. Our true homes are in Heaven and we will be reunited with all our family and all of God's creation. Nothing has been lost.

Fate and faith is the ultimate example of looking at your cup as being half empty or half full. Is it just a matter or simple perspective? Examining your cup's status is a short-term outlook and we can change from pessimist to optimist during our lifetime frequently depending on what it is we are examining. However, using a meager reliance on fate or using the power of faith, these we cannot change between so readily and the choice becomes a much more permanent perspective for each of us.

I worked for one company for over twenty years. It was the almost typical example of corporate name changes, acquisitions, and the eventual closure of a smaller facility. With the job loss there is also the expected feelings of insecurity. Was this a time for a remission into the world of fate? In reality, this was the time I had the impetus to write this book. We were still ten months from the actual closure date but possibly due to a changed standpoint in my life, various thoughts came to me about working on this book. When did I think of the various topics? Believe it or not of all times, the thoughts and inspirations came a various times through the night. I would awake inexplicably and start to think about such things as creation and the other subject matter written about. Instead of fate having me dwell on an impending job loss, faith guided me into another very unexpected experience.

At times I have wondered about all the scientists in the world and especially about the most famous ones. Too bad there is not a secret and confidential poll to see how many of them believe in God. What would the results be and why do some scientists believe in God? Is it because they doubt the complexity of life and the ability for it to be created spontaneously? I also wonder if being in the field of science unintentionally exerts pressure on its members to be silent on the question of the existence of God. Science demands absolute proof. Believing in God and that an utter proof cannot be furnished must put some type of strain on scientists who do believe.

Our lives and existence is not a fluke, accident, or random occurrence that was then made more complex so that we would become human beings. To be a person of authentic faith means to face and seek out the truth, regardless of our doubts, cynicisms and fears. We all have a common bond and somehow we have a feeling deep within us that we are part of something bigger. Listen to this feeling and let it always grow. For some it may be the start of their faith.

It is written in the Bible: *What is faith? It is the confident assurance that something we want is going to happen. It is the certainty that what we hope for is waiting for us, even though we cannot see it up ahead. Men of God in days of old were famous for their faith. By faith – by believing in God – we know that the world and the stars – in fact, all things – were made at God's command; and that they were all made from things that can't be seen.* (Hebrews 11)

In the book of Proverbs (3:5) it is wisely written that we should trust in God with all our heart – trust not your own understanding. These are very wise words from over two thousand years ago. One of the nicer modern phrase I have heard is that there are only two rules in life: 1. Do not sweat the small stuff. 2. In the grand scheme of the Universe, it's all small stuff. It is so easy for us to begin worrying about one matter after the other and before we know it sometimes we are so anxious it is like it will be impossible to get a

piece of bread on the next day's plate. Here again, wise words from the Bible remind us of the faith we should have: *"Therefore I tell you, do not worry about your life, what you will eat or what you will drink, or about your body, and what you will wear. Is not life more than food, and the body more than clothing? Look at the birds of the air; they neither sow nor reap nor gather into barns, and yet your heavenly Father feeds them. Are you not of more value than they? And can any of you by worrying add a single hour to your span of life?"* (Matthew 6:25)

Please do not only trust in fate. There is a bigger picture. We cannot see it with the limited and undeveloped senses we have. We need faith. You need to open your mind, heart and soul to receive faith. It grows like the smallest of mustard seeds to become the greatest of shrubs and becomes a tree. Please believe in God, take the path of faith, and you will eventually be blessed with true sight and knowledge.

He, who loses money, loses much;
He, who loses a friend, loses much more;
He, who loses faith, loses all.

Chapter 16: Conclusion

Every human being is given choices while they live on this Earth. I find it interesting in how many opposite concepts we have in our existence: darkness and light; poor and riches; bad and good; pain and joy; ignorance and knowledge; nothing and eternity; hate and love; war and peace; fate and faith; denial and belief; and, nothing and everything. There are many more such pairs of words. It does not seem to matter what the concept is from the truly insignificant to a critically important idea; there always seems to be a counterpoint, the matching opposite, or the alternate choice. As the Chinese prefer to define this, it is the yin and the yang of the Universe.

Whether we like to accept it or not, whether the government or laws of the day "allow" it, we have each been given free will and the right to choose. Over history, philosophers have debated greatly and written much on just the two subjects of free will and existence. We may be raised by parents in a certain way, we may have grown up in an unique environment, we may feel we are constrained to act and behave in a certain way, but at the very core and heart of this issue is that we all have free will and choice.

You have been given the ultimate loving gift - total freedom, a free will and an existence. Even though you could be tortured or put under extreme pressure, no one can take this right of choice away from you. No one can force you to choose one over the other. They would not know how to make you strictly abide by that choice anyway. Do you choose to believe that God exists?

Life, Earth and the Universe are extremely complex systems. All of these systems are not an accident of nature, nor spontaneously created, and nor have they evolved. These complex systems have been designed by God.

In the first chapter we looked a force that I termed "simplification" that is constantly driving complex items to breakdown to their simplest forms. Scientists state this as one of the laws of thermodynamics and seem to write it off as something natural and inconsequential. Yet, it is an ongoing force that breaks down the complex. If it were a human trait, we would almost say that it relishes this job in hating organization and structure and that it performs this job with a methodical and almost zeal-like passion. However, another facet of science wants us to accept that life, in its complexity, was able to run counter to these simplification forces. We also looked at the meaning of possibility and probability. While *anything* is indeed possible, the more important question to consider is whether or not it is probable.

Let us consider an example where we want to create a simple living organism. Without knowing exactly what the steps, or events, are let us suppose that ten things must happen in exact order to create a simple living organism. Calculating the possibility of this happening is not that difficult and we will use an old illustration that will put it into perspective for us. Consider that we have 10 identical small coin-like discs. They are each numbered uniquely from 1 to 10. We put the discs in a container, mix them well, and we must take out disc 1. Putting back the disc each time, we must then take out disc 2 and continue successively in the same manner for all 10. Mathematically, choosing disc 1 has a possibility of 1 in 10. Taking out disc 1 and 2 in succession is 1 in 100 and picking discs 1, 2 and 3 has a chance of 1 in a 1000. In order to draw all 10

discs, we would reach the staggering figure of 1 in ten billion. Is it reasonable to assume that creating life involve ten steps? This example does not even take into account the force of simplification. What happens after so many years of drawing discs that one of the discs wears down and breaks during draw number 2 million?

The word evolved is many times used as a catchall excuse: “Oh, that was a complex personal situation with the families and it evolved over time”, or, “The ancient culture settled there and over time it evolved into a great empire”. The use of the word evolved is similar to evolution. It is a copout. To me it implies that someone either does not have the time or the true knowledge to provide an explanation, so they mask the complexity with the word evolve. Do not be fooled and misled.

While I have done my utmost and implore you to believe in the existence of God, I cannot make that decision and ultimate choice for anyone. Also, in the cold reality of the matter, no one is actually capable of proving that God does exist. However in the yin and yang of this question, neither is anyone capable of proving that God does not exist. We cannot have absolute knowledge of God. It is by design. For if we were to be revealed to us one way or the other, we would then lose the free will that was given to us. This is the test we must go through in our existence.

Please choose to believe in God. Unfortunately you cannot sit on the fence on this matter as some might like to. Your eventual passing from a life on Earth will evoke a selection. It becomes a binary decision: yes or no to God. It will not be a maybe, or, we’ll see. Consider all of the word pairs at the start of this chapter and it is like your choice will lead you to a fixed result as to which side of the word pairs you will receive. The positive choice of God yields you to receive: light, riches, good, joy, knowledge, eternity, love, peace, faith, belief and everything. There is so much at stake, you have so much to gain, please make your choice with care. This work has been meant to help and not to hurt. God bless you.