

**THE SEARCH FOR A
NEW ENERGY SOURCE**

by

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Paperback Version January 1997

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PREFACE

In 1955, as a sophomore in high school and a new Ham Radio operator, I recognized that the people writing books about radio wave propagation did not know how antennas worked. In response to this understanding, I decided to attend college, study electrical engineering, and learn how antennas really worked. I took all the electromagnetic theory possible at Kansas State University and the University of Washington in Seattle before completing the Ph.D. at Oklahoma State University in 1966.

I immediately went back to Kansas State University as an Assistant Professor and started a career that lasted for 28 years. I knew there was a problem with the underlying theory of electricity and magnetism, but I did not have a good alternative to propose. Because of the need for published papers and research dollars to assure tenure and promotion I shifted into a different area of research, wind power. However, the idea of studying paradoxes in electromagnetic theory kept coming back. Finally, in the summer of 1982, I started doing the necessary background research in my spare time. This book is an effort to express systematically some of the things I have learned.

Many theories have been proposed to explain electric, magnetic, and gravitational fields, but none has received acceptance. It seems as though something has been missing. I now believe that what has been missing has been a proper understanding of the firmament, the substance or structure that was created by God on the second day of Creation Week. Rather than just another word for our present day atmosphere, I believe the firmament is better described by the term *aether*, used in the last century, or by the term *high energy vacuum*, which is preferred by modern physicists. I would say that the atmosphere exists within the firmament but is by no means identical to it.

By interpreting relevant scripture in a literal, rather than a poetic, fashion, we can gain insight into this poorly understood part of God's creation. I may be guilty of interpreting some scripture literally when it was actually intended to be understood in a poetic sense, but I pray that the reader will not be 'turned off' by such instances. I will be making many arguments from different points of view, and it is not likely that all will stand up to a critical analysis. This does not invalidate the basic concept of the

firmament, however.

There have been several occasions in man's history when energy was in short supply and the future of civilization seemed bleak. Man was running out of wood in Europe when coal was discovered. We were experiencing the limitations of coal when oil was discovered, then natural gas, and then nuclear power. Each time that man has reached a natural limit of a given energy source, another source has been revealed, one that had been present all the time but was awaiting the development of technology for its use.

The world today is facing a severe energy crisis. Many nations have borrowed money to buy oil, burned the oil, and now have only debts to show for it. We need a new energy source that is abundantly present within the borders of each country. If I am correct, the firmament is that energy source.

The presently accepted laws of physics does not seem to allow the energy source I envision. Therefore I ask if the present laws are complete, or if there need to be additions or modifications. Obviously, this question is not easy to answer. My attempt at an answer draws from three areas of literature: sacred literature, mainstream science, and frontier (or fringe) science. The first set of literature would be found in the library of a Christian college. Mainstream science literature would be found in any research university library. The frontier science literature is the most difficult to find, being located in the publications of various fringe groups. These include writings on such topics as UFOs, in addition to the various inventors who claim to have found this new source of energy.

Each area causes questions to be raised about the adequacy of our present understanding of the world around us. I have tried to present the various theories and observational data fairly, with reasonable documentation, and to prepare a list of observations which any new understanding would need to explain. Sometimes, I express my own opinion and attempt to extend knowledge while dealing with published information. Certainly, my selection of papers and quotes is influenced by my worldview.

The present scientific worldview required many able scientists hundreds of years to establish. A substantially altered worldview would, no doubt, require a similar effort. Perhaps this present work will be a small step in that direction.

My thanks go to all who have helped me through the years. My parents, Elmer and Lelia Johnson, who loved me enough to let me walk to a different drum beat. My wife Jolene, who has bravely endured this dream of a new energy source for over 35 years of marriage. Our children, Kirk and Janel, and son-in-law Jack Zhuang, for lending a hand when needed.

There have been hundreds of students who have assisted me in research projects or have asked penetrating questions in class. Some that I have especially enjoyed working with include David Alstatt, Jon Anderson, Barry Clegg, Lance Cooper, Chris Duffey,

Curtis Mersman, Norm Mortensen, and Billy Williams.

A special word of thanks goes to those who reviewed this manuscript in draft form. These include: Les Bieber, Jr., Myron Calhoun, Dennis Hansen, Scott Hassett, William B. Hudson, Richard Hull, Moray B. King, Gary Peterson, Thomas Valone, and Charles A. Yost. The suggestions they made definitely improved the final product.

Gary L. Johnson

Manhattan, Kansas

September 19, 1996

PREFACE TO EBOOK EDITION

I had the 1996 paper version of this book printed in Topeka. I have sold enough copies to mostly repay the publishing costs, but still have a thousand or more copies filling up my garage. I wrote an engineering textbook in 1985, *Wind Energy Systems*, which went out of print without making any significant income. I eventually made it freely available as a .pdf document, and still get a surprising number of thank you notes by email from people all over the world who think the document to be of some usefulness. There seems to be little or no hope for me to make any money by selling my writing, so henceforth it will be free. If anyone wants an autographed copy of *The Search for a New Energy Source*, send me an email to that effect. I will mail you a copy while supplies last. You can then mail me a few dollars/pounds/euros to cover the shipping costs.

Since 1996, I have continued the search for a new energy source, both experimentally and theoretically. The results of that decade of research are in my latest work, *Religion, Science, and PSI—The Search for a New Energy Source*, also freely available as an ebook. There is a little overlap between the two ebooks, but the 1996 ebook still has some good stuff in it that is not repeated in the 2006 ebook. I have reformatted to an 8.5 by 11 inch size, but otherwise this ebook is the same as the paper back edition. May it be helpful to you.

Gary L. Johnson

Manhattan, Kansas

April 28, 2006

CHAPTER 1 INTRODUCTION

I wish to address several questions in this treatise. Is there a flaw in our present understanding of electromagnetic theory? Is there a source of energy that has not been tapped? Is there any evidence of such a source that has been observed in nature or in the laboratory? I believe the answer to each question is yes. But before we can go too far, we need to agree on some definitions.

1.1 DEFINITIONS

Power and Energy

The terms *power* and *energy* are used almost interchangeably in our society, and indeed are closely related. Energy is the same as work, while power is the rate of doing work. Energy is measured in joules or kilowatthours (kWh), while power is measured in joules per second or kilowatts (kW). The average Kansas home uses about 700 kWh of electrical *energy* per month. The electrical *power* required by the home varies from almost zero when most lights and appliances are off, to 10 kW or more when several appliances are on, even though the *average* power is about 1 kW (the energy in kWh divided by the number of hours in the month, 720 for a 30 day month).

It is correct to speak either of an *energy source* or a *power source*. Some writers prefer wind power systems, for example, while others prefer wind energy systems. A wind turbine supplies power to the electrical grid while the wind is blowing. If the wind blows at a good speed for a long period of time, the total energy supplied to the grid will be high.

The term *energy source* in the title of this book was chosen over *power source* because power is not completely descriptive. A lightning stroke contains very high power levels but very small energy content when compared with the monthly energy usage of a typical home. A source of high energy will also be able to supply high power when needed, but a high power source may not be able to supply our energy needs.

Free Energy

The energy source being sought is sometimes called *free energy*. This term has the unfortunate feature of turning people off before they understand what is being discussed. Actually, the term is accurate when properly understood.

The energy source being sought is *free* in the same sense as the sun and wind are free. However, one still needs to build equipment to harness and transport this free energy, thus the energy delivered to one's home is definitely not free. We will always

have a monthly electric bill to pay, although it might be smaller when this energy source is developed.

Let us now define some important terms. The *efficiency* of a machine is defined as the output power (or energy) divided by the input power (or energy). Every machine has internal losses so the efficiency is always less than (or at most equal to) unity.

A good example of this is shown in the heat pump of Fig. 1.1. Electrical energy W_1 is used to operate the pump. Ambient heat energy Q_1 is pumped through the machine (with losses) and appears as output heat energy Q_2 . There are two energy inputs, W_1 and Q_1 , and one energy output Q_2 . The output is the desired result, cold air where cooling is needed or hot air where heating is needed. The input heat energy comes from the atmosphere or the earth.

Note that while Q_2 is always less than $Q_1 + W_1$, it is usually greater than W_1 alone. That is, the output energy is *greater* than the *purchased* input energy in similar units. If we put 1 kWh into a resistance heater in our home, we will get an output heat energy of very close to 1 kWh. However, if we put the same 1 kWh into a heat pump, we may get 3 or 4 kWh of heat energy in the living space.

This leads to another definition, the ratio of output to *purchased* input, called the *coefficient of performance* or *COP*. There is no theoretical limit on the value of *COP*, but it is usually in the range of 1–10 for heat pumps.

The above concepts are standard among engineers. When someone talks about a machine with efficiency above one hundred percent, most engineers immediately reject the statement as being impossible by definition. This usually leads to a breakdown in communication, which could probably have been prevented by simply using the term *COP* rather than the term *efficiency*. A classic example of this is the case of the energy machine of Joseph Newman, which we will consider later in the book. Newman had considerable difficulty with the Patent Office which could probably have been at least partly prevented if he had just used the proper language, *COP* rather than efficiency in this case.

The energy Q_1 is *free* energy from the outside air or ground. Of course, the output energy is not free because of the cost of W_1 and the cost of the heat pump. The heat pump, operating according to well-known laws of thermodynamics, is able to leverage or multiply the input energy W_1 into a greater energy Q_2 . Since the *COP* is greater than unity, the heat pump might also be called an *over-unity machine*. Both *free energy* and *over-unity machine* are often used by searchers for the new energy source, and both terms are often routinely rejected by others who do not really understand what is being said. Conceptually, the only difference between a heat pump and a machine utilizing the new energy source is the form of ambient energy. Both use free energy and both will have *COPs* greater than unity.

Note that while heat pumps operate on well-known (to engineers) thermodynamic principles, their operation is still non-obvious to the man on the street. The concept of removing heat from cold outside air, thereby making the outside air even colder, is not easy to understand. This fact, however, does not keep heat pumps from being widely used.

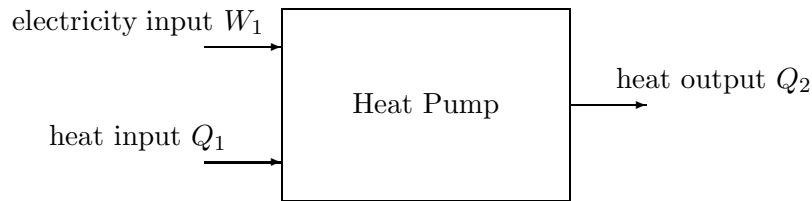


Figure 1.1: Energy Flow in a Heat Pump

The heat pump is also not a perpetual motion system, because the system stops when the electrical input stops.

Many are now looking for another source of free energy, available in our surroundings like ambient heat in the atmosphere, which can be ‘pumped’ by an appropriate machine or device to a desired location. The machine will quite possibly require an electrical input and will stop when the input is removed. An attack on this concept with the statement that it is another perpetual motion machine and therefore cannot work, seems inappropriate. Those who would attack the concept need to do their homework and expose any ideas that are indeed weak or incorrect by careful arguments, rather than an automatic, out-of-hand rejection.

1.2 WORLDVIEWS

It is conceivable that the discovery of a new energy source will require a major paradigm shift. It could be as drastic as the shift from Newtonian mechanics to quantum mechanics which started about a century ago. Western science had been very comfortable with the work of Newton, but a few nagging observations suggested that there was something more. Once the door was opened to this possibility, many important discoveries resulted. Now we say that Newtonian mechanics provides a good model for the macroscopic while quantum mechanics should be used for the microscopic.

This book will explore a wide range of observations that do not fit into Newtonian

mechanics, quantum mechanics, classical electrodynamics, or quantum electrodynamics, suggesting that another paradigm shift is in order. Human beings do not handle paradigm shifts very well. A typical reaction is to refuse to even consider the evidence supporting such a shift. As we shall see, some of the evidence involves the possibility of additional dimensions (besides three space dimensions plus time). Some even involve the supernatural, the paranormal, consciousness, and so forth. There is absolutely no room for the latter concepts in the worldview of the typical western scientist, hence there is an immediate rejection.

We therefore need to discuss various worldviews, including one's religion, to help people understand why they are rejecting evidence that has been accepted as valid by some.

Among those who believe in God, there can be two lines of thought. One is that God is stern and spends a lot of time punishing us for our sins. The other is that God is good and wants our lives to be abundant. Those in the latter group will be more likely to conceive of a new energy source that has the potential to make life more pleasant for billions of people. The former group will prefer to stay miserable, wearing their misery as a badge of distinction, indicating that God is giving them His attention.

An illustration of the above trait of human nature was observed during a two or three year period when I taught Electromagnetic Theory I in a self-paced mode. Each student would work on a concept until he or she mastered it at the A level, and then move on to the next topic. With this approach, every student would get an A in the course. To my surprise, those students who did not view themselves as deserving an A would do anything and everything to avoid mastering the material. Their personal worldview or lack of self esteem just would not allow them to complete the work in a timely fashion and get this high grade. Whether my view of these students's behavior is correct or not, it is obvious that one's view on this subject affects the strategies that one uses in teaching and motivating students to learn.

Likewise, our views on science and religion will affect the range of ideas that we can consider. If we hold the view that there is no God or spirit world, then suggestions about paranormal or spiritual aspects of a new energy source must automatically be rejected. If we do not believe in the accuracy of the Bible, then we would consider it a waste of time to consider biblical passages that seem to suggest a new energy source. If we believe in the Big Bang and evolution, then any theory of a new energy source must be consistent with an old earth and an expanding universe. On the other hand, if we believe that God created the earth and its occupants, perhaps not so long ago, then other theories can be brought to the table for discussion.

It is quite possible that a new energy source will be as natural and repeatable as gravity or electromagnetic waves. It may not need any reference to God or consciousness or the paranormal for a complete understanding. However, it seems premature to reject

all these ‘nonscientific’ possibilities at the very beginning. Let us hold firmly to our own worldviews, but let us listen carefully to those with other worldviews. May we recognize the blinders that our worldviews place on us and not rush to judgment upon those with a different set of blinders. Perhaps by thinking ‘outside the lines’ we can make more rapid progress toward a theoretical and experimental understanding of this new energy source.

The world has many religions or religious worldviews which can have distinctive reactions to the notion of a new energy source. These include:

1. Humanist
2. New Age
3. Eastern(Hindu, Buddhist, Shinto, etc.)
4. Animist
5. Charismatic
6. Evangelical
7. Mainline Protestant
8. Catholic
9. Latter Day Saint (Mormon)
10. Judaism
11. Islam

Within these religions, there are at least four views about early earth history which also color our thinking.

1. Evolutionist
2. Creationist
3. Theistic Evolutionist
4. Planetary Catastrophist

The above lists are certainly not exhaustive and could be structured in many different ways. The author is obviously not a trained theologian nor even a student of world

religions in general. Still, there are some very general observations which might help us understand the biases of our worldviews.

Humanists believe that the earth is billions of years old and that the universe most likely started in a Big Bang. The existence of life is well explained by the theory of evolution, or so they claim. Man is in charge. Humanists who are self-consistent would say there is no need for a creator God. This group basically represents the scientific establishment, with a solid majority of scientists. It is not uncommon for humanists to assert that no ‘real’ scientist believes that the earth is young, for example. Such intimidation serves to stifle honest discussion and inquiry into new concepts, such as that of a new energy source. Many humanists could accept the idea of a new energy source if it were not closely tied to the notion of a creator God and a young earth. The matter of origins and the age of the earth may turn out to be an important issue in the search for a new energy source and the development of a new worldview.

The *New Age Movement* has an extreme range of thought. They would agree with most of the science of the humanists, but would add the dimension of the supernatural. They have many of the concepts of the eastern religions, such as the Mother Earth and reincarnation, as well as evolution. Whereas the scientific establishment tends to ignore data that do not fit their worldview, the New Age tends to focus on such data. Many New Age people will study Unidentified Flying Objects (UFOs) for example. There is an element of distrust of the scientific establishment. Various governmental groups are perceived as conspiring to suppress information about crashed UFOs, dead aliens, new propulsion systems, etc. (Other groups also have elements of distrust, of course).

The *Eastern Religions* also have a wide range of thought. Some form of evolution is commonly accepted. There is belief in a spirit world, perhaps including reincarnation. At the extreme, there are reports of holy men levitating objects, walking on glowing coals, and bending spoons using only the power of their minds. Such reports are instantly rejected by those of us trained as scientists in the West. But the reports seem to keep coming back, hammering away at our western worldview.

Animists believe in a spirit world which needs constant appeasement by ritualistic activities, including animal sacrifice. Most animists are members of primitive tribes and people groups that have not had the ‘benefits’ of a western scientific education. They would argue that the results of a given scientific experiment should vary from time to time, depending on how many chickens and goats have been sacrificed to the gods.

Charismatics form a large Christian group that, for the most part, has not thought seriously about origins or energy. Historically, this group has had a low percentage of scientists and engineers, although this has changed substantially in the last twenty years. The focus of charismatics and pentecostals has been on evangelism, healing, signs and wonders, prosperity, speaking in tongues, and end-time prophecies. They believe that God exists and still does miracles today, hence miracles in the past form no theological

barrier. If God said He created the earth in six days, then it was created in six days, even if they do not understand the details or are not able to reconcile that statement with what is being taught as scientific truth in the classroom. If the charismatic leaders would decide that origins is an important topic, charismatics would become a major force in determining a new worldview.

Evangelicals (as defined here) are those heavily oriented toward evangelism, but neutral or negative toward the charismatics. Many Baptists would fit this definition, as well as many in the campus groups Navigators, Campus Crusade, and Inter-Varsity. Evangelicals are more inclined to intellectualism and less inclined to emotionalism than charismatics. They appear more interested in status and reputation than charismatics. After all, once you admit to speaking in tongues, your reputation in academic circles is already well established. It won't get any worse if you also admit to believing in a young earth.

Mainline Protestants would be those members of the older, established denominations like Methodist, Lutheran, and Presbyterian, who have not thought much about charismatics or about evangelism. Not all believe that the Bible is the inspired Word of God and a larger fraction believe that evolution is the correct explanation for our existence than either evangelicals or charismatics. In fact, there are a good number of humanists that are on the church rolls of these mainline denominations.

Catholics form a very large and very diverse denomination. They include many charismatics in their numbers. They insist that God is still active in the world today, as shown by signs such as physical healings. As far as a general reaction to a new energy source, the typical Catholic would probably react like a typical Methodist or Lutheran.

Latter Day Saints (LDS) are the smallest group of this list numerically, but have thought about the questions of origins and energy more than most. One of the most successful free energy inventors was T. Henry Moray, a member of this church. We shall learn more detail about him in Chapter 6. A little known fact is that he offered his device to the LDS church. The church turned it down, stating that it did not want to be in competition with the utilities. This was consistent with the church's position respecting strict political and economic neutrality unless a moral issue is involved. Even today, a significant number of free energy experimenters, writers, and theoreticians are LDS.

Jews and *Muslims* share the Genesis account of creation with Christians, and, like Christians, have views that range from very conservative to very liberal. I will not presume to make any broad characterizations about them.

Within these religions, there will be a variety of views on early earth history, except perhaps for the humanist, who is also, by definition, an evolutionist. The most common view for our society as a whole would be that of an *evolutionist*, who believes that all life

came from non-life by a series of accidents, mutations, and natural selections. This is the standard story taught in all of our secular schools and most of the religious schools. The odds against evolution actually happening are very great, so evolutionists require long time periods in their attempt to circumvent this basic problem. That is, they say the earth must be several billion years old.

Creationists, on the other hand, believe that the earth is young, say six to ten thousand years old [1], and that God created the earth and all life on it in a six day period. Since God created man, God has certain rights of ownership, and therefore man needs to honor and obey God. This group is small but still contains hundreds of well-qualified scientists.

A large fraction of creationists think that all the creative miracles occurred during the creation week, so that events occurring later would have ‘natural law’ explanations. That is, creationists would tend to explain the flood of Noah in terms of modern meteorology rather than, say, God creating the necessary extra water at the start of the flood and then ‘uncreating’ the water at the end of the flood. This is especially true of the evangelical-creationist.

Theistic Evolutionists attempt to find a middle ground of compromise between the evolutionist and the creationists and are mostly rejected by both groups. They would agree with the evolutionists that the earth is old, perhaps starting with a Big Bang, but that at some point God created life and guided the evolutionary process over the necessary millions of years. They are usually religious people and consider creationists to be an embarrassment to their religion. They will usually side with the evolutionists against the creationists in any efforts for ‘equal time’ in the classroom. This group is probably in the majority in those religions accepting the Genesis account of creation as truth, i.e. Christianity, Judaism, and Islam.

Planetary Catastrophists form a small minority of scientists who reject both the evolutionist and creationist views about much of early earth history. They consider many of the signs in the Bible to be explained by near flybys of the planet Mars when in a orbit intercepting the earth’s orbit. The group includes such writers as William Whiston [40], George McCready Price [31], Byron Nelson [27], Alfred Rehwindel [32], Immanuel Velikovsky [38, 39], and Donald W. Patten [29, 30]. Religious views range from atheist (Velikovsky) to Christian with a somewhat different interpretation of the Bible from many creationists or theistic evolutionists.

We are now able to discuss worldviews with somewhat greater clarity. We can speak of the evangelical-creationist and the evangelical-theistic evolutionist, for example. While close to one another in many areas of theology, these two groups can be bitter enemies when it comes to the age of the earth. One of the favorite spokesmen for the evangelical-theistic evolutionists is Hugh Ross, who can be as vicious as any humanist in attacking creationists [33].

New Age people are willing to collect and discuss data that do not fit anyone's worldview, and thus provide a service to other groups. And there may very well be some observations that are really supernatural or paranormal in character, and therefore cannot be treated in the usual scientific manner. The worldviews of neither the humanists nor the evangelical-creationists would allow a supernatural explanation of UFOs, for example. The possibility that some UFOs are angels or demons, with associated abilities to appear, disappear, change shape, and travel at high rates of speed, would not be conceivable to either humanists or evangelical-creationists. The humanist would say that such beings do not exist and the evangelical-creationist would say that such beings would *never* act like UFOs. Both statements are somewhat arrogant considering the amount of experience most of us have had with UFOs, but most people tend to be arrogant about their worldview. (The present author is no exception).

Many people hold beliefs that fit in more than one worldview. It is not at all impossible for a charismatic to teach evolution in the classroom (humanist) and read his or her horoscope (New Age) with great interest. Oftentimes, this yields inconsistencies in one's worldview, so that those people who need to be internally self-consistent will become humanist or creationist, etc. Others will compartmentalize their lives in such a way that they can be inconsistent on a continuing basis.

The present author is charismatic, creationist, and a potential planetary catastrophist. Other charismatic-creationists should be able to read this book without immediate rejection, except for some of the concepts that appear to be New Age. New Age people are used to reading strange material so will have little problem here. The most violent rejections will likely be from the evangelical-theistic evolutionists and the humanists.

Almost everyone's worldview will be trampled upon at some point in this book (including the author's), with the usual human emotions of anger and rejection. Hopefully, if the reader understands this situation, he or she will be better able to suppress these emotions and examine the concepts carefully to see if they might actually be true.

The view in this book is that God is orderly, so that the created world is orderly and can be investigated by scientific methods. We are hopeful that the new energy source will be found to be a 'natural' phenomenon. However, we should stay alert to supernatural clues and possibilities.

1.3 FRONTIER SCIENCE ORGANIZATIONS

During the many years that I taught a first course in electromagnetic theory at Kansas State University, I would give the class a discussion on Lenz's Law, which deals with the sign or direction of voltage on transformer windings. I would then put an example

on the board and take a vote of the class as to which terminal was positive. Typically, half of the class would vote for one terminal, a third for the opposite terminal, and a sixth abstain. I would then tell the class that truth was determined by majority vote and proclaim the terminal with the most votes as positive. The class would look at me as though I was crazy, because they understood that the proper terminal was positive whether they understood Lenz's Law or not, so a vote had absolutely nothing to do with correctness.

Unfortunately, virtually all of the scientific establishment operates according to the 'Truth is determined by majority vote' principle by means of the peer review system. If one is in the minority, it is very difficult to publish, except perhaps for a few of the elite that are deemed worthy of thinking new thoughts or asking the difficult questions. A classic example would be Moon and Spencer, two electromagnetic theorists who wrote some excellent papers early in their careers about contradictions and unanswered questions in EM Theory (to be discussed in more detail in Chapter 7). But when they published their books, there is not a hint of any problems. Was it because all their questions were answered, or was it because the books would be easier to publish and sell if they were cleansed of any controversial material? I suspect the latter was an important factor in their decisions as to what material to include.

So when scientists with a minority worldview are unable to publish in mainstream publications because of the peer review system, what are the options? A common response is to form a group and publish their own technical journal. In many cases the members have advanced technical degrees and appear quite normal in most aspects, except that they believe that some understanding of conventional science is wrong and needs to be corrected. They often try to do high quality scientific investigations, both theoretical and experimental, consistent with limited resources. They develop their own peer review systems and hope their journals are perceived as well developed by conventional scientists. Depending upon one's perspective, they are operating either on the fringe or on the frontier of science. Several such groups are worthy of mention.

The International Tesla Society (ITS) was formed in Colorado Springs, Colorado about 1984 (and was dissolved before 2000). The idea was to honor Nikola Tesla and further develop some of his concepts. The Society agrees that Tesla invented the polyphase induction motor, many essential components of the 60-Hz power system, and radio. The radio claim is especially interesting to historians because the U.S. Supreme Court decided in favor of Tesla's patents over Marconi's in 1943. Marconi had visited Tesla's laboratory and apparently borrowed some of his ideas. Tesla's accomplishments will be discussed in more detail in Chapter 6.

The ITS operated a bookstore handling many of the fringe-science books and published a magazine called *Extraordinary Science*. It held a conference each July in Colorado Springs, attended by perhaps 300 people. Topics included history of Tesla, Tesla coils, Tesla turbines, new concepts in electromagnetic theory, plus some even more on

the fringe, such as transmutation of elements, health effects of permanent magnets, etc.

A somewhat parallel group was formed about 1992 in Ft. Collins, Colorado, the International Association for New Science (IANS) (also defunct by 2000). The founders included a former astronaut and a director of research at Colorado State University, so there was more of an academic and intellectual flavor than with the ITS. There was a much greater emphasis on New Age and psychic phenomena, although Christian speakers were quite welcome. No effort was made to compartmentalize one's experiences into physical versus spiritual. A speaker on hydrogen fueled vehicles, for example, might take half of his allotted time in giving his Christian testimony, claiming that God had directed him in his research and business endeavors. The next speaker might include references to his spirit guide, which is definitely not the Holy Spirit.

Soon after the founding of the IANS, it spun off another group, the Institute for New Energy (INE), still in existence in 2006. Hal Fox is the editor of its monthly newsletter, the New Energy News [28]. Hal's major interest is cold fusion, so this gets ample attention in the newsletter, although other areas are included as well.

The *Electric Spacecraft Journal* was established in 1991 and produces a nice magazine each quarter [3]. The founding editor was the late Charles A. Yost, an aeronautical engineer. His primary interest was exotic spacecraft propulsion systems which would interact with the aether (or firmament) to produce a unidirectional force without the combustion of large amounts of chemical fuel. The magazine is a good source of information on electrostatics.

A group with a much different focus, but which would be considered to be a fringe activity by many in the mainstream, is the Institute of Creation Science [7]. It was founded about 1970 by the late Dr. Henry Morris, a former department head of civil engineering at a large state university. Following his retirement in early 1996, it is now under the leadership of Henry's son, Dr. John Morris [24, 25]. One activity is a graduate program at San Diego, California. The faculty and associates teach courses, write books, and travel to give workshops and seminars. There is an emphasis on high school and college activities. A typical format is to debate a humanist on the topic of creation versus evolution. One of Henry's books, *The Genesis Flood* has been very important in getting the creationist movement up and going. The group has stayed well focused over the past 25 years and has set high standards on scholarship. Henry has been a very prolific writer [9, 10, 11, 12, 13, 22, 15, 14, 16, 23, 17, 18, 19, 20, 21]. Duane Gish [4, 5, 6], Harold Slusher [37, 35, 34, 36], and others [8, 41] have also done extensive writing.

Another creationist group is the Creation Research Society, [2], founded about 1964, which publishes a scholarly journal, the Creation Research Society Quarterly. The Quarterly contains scientific papers in areas such as biology, geology, and electromagnetism. There is a strong peer-review system such that the Quarterly contains only well written,

scholarly papers. The consensus of the peers is that God set things up during Creation Week and things have been running downhill ever since, with little or no intervention from God. Many papers have little or no reference to God, and would be excluded from mainstream publications because of the assumption that the earth is young (6000 to 10,000 years) rather than any explicitly spiritual content.

A group that has worked hard to build some credibility over the past 25 years is the Mutual UFO Network (MUFON). They have a nice monthly magazine, the *MUFON UFO Journal* [26], published since 1967, and a yearly conference with a proceedings. They have built a network of state and substate directors and investigators, and also a system of MS, Ph.D and M.D. level consultants to help advise on various aspects of the UFO issue. They use volunteers to investigate UFO sightings and maintain large data bases on these sightings. They obviously believe that people really do experience something when a UFO is seen, but are quite open to the various theories about what UFOs might be, whether visitors from outer space, visitors from ‘inner space’, or even an unexplained meteorological condition. A significant amount of energy is expended in trying to ‘prove’ government coverups, such as the supposed crash at Roswell, New Mexico. Spiritual explanations such as angels or chariots of the gods are well tolerated.

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CHAPTER 2

WATERS ABOVE THE FIRMAMENT

Even a casual reading of the Bible will soon reveal that there are significant differences between it and currently accepted scientific theories. The Bible teaches that the earth was created by God rather recently, perhaps 6,000 years ago. Theistic evolutionists will argue with this statement, of course, but have little *scriptural* evidence to support their claims. Mostly, they take the evolutionist belief system and try to fit the Bible to it. But even most theistic evolutionists will agree that a simple reading of the Bible without any prior ‘knowledge’ about the age of the earth will result in the understanding that the Bible teaches a young earth.

It also teaches a world wide flood that destroyed all mankind except Noah and his family. The Bible has a great deal to say about the earth, the atmosphere, and the sun, moon, and stars in addition to the creation and the flood. To creationists, this is the Manufacturer’s Handbook, and a logical place to look for information about the proposed energy source.

The character of the earth’s climate before the flood was much different from today’s climate. The differences are substantial enough that different or unknown physical laws must have been in operation before the flood. The basic assumption in this chapter is that the Bible is correct and that physical laws have not changed since the end of creation week. If the climate before the flood cannot be explained in terms of presently understood physical laws, then additional physical laws must be postulated.

The concepts presented in this chapter do not deal directly with the energy content of the space around us. Rather, I am attempting to show that the Bible and some other sacred writings are consistent with the concept of an aether or a high energy vacuum, which are mostly rejected by the scientific establishment. First we need an aether. Then we can start thinking about extracting energy from it.

The first item we want to examine is that of the firmament as expressed in Genesis. Quotations are from the King James Version.

2.1 THE FIRMAMENT

And God said, “Let there be a firmament in the midst of the waters, and let it divide the waters from the waters.” And God made the firmament and divided the waters which were under the firmament from the waters which were above the firmament. And it was so. And God called the firmament Heaven. And the evening and the morning were the second day. Genesis 1:6–8.

The word translated ‘firmament’ in the King James Version and Revised Standard Version is translated ‘expanse’ in the New American Standard Bible and the New International Version, ‘dome’ in the Today’s English Version and ‘vault’ in the Jerusalem Bible and the New English Bible. The word ‘expanse’ implies a vast open area such as the present atmosphere. The other words imply something hard or firm, like the celestial vault of ancient mythology. The Hebrew word can mean either concept. Dillow in his book *The Waters Above* argues that ‘expanse’ is the better translation [2, pages 43–48].

These verses indicate that God performed a creative miracle in moving or separating water above the firmament. But, how much water was moved and what state was it in (liquid, solid, or gas)? With no contrary evidence, it will be assumed that the water above was in the same state as the water below at the time it was moved, that is, in the liquid state. It could have changed to ice or to vapor after it was moved, or even remained in the liquid state. To deal with this question in more detail we need some other clues provided in the scriptures about the climate before the flood.

These are the generations of the heavens and of the earth when they were created, in the day that the LORD God made the earth and the heavens, and every plant of the field before it was in the earth, and every herb of the field before it grew: for the LORD God had not caused it to rain upon the earth, and there was not a man to till the ground. But there went up a mist from the earth, and watered the whole face of the ground. Genesis 2:4–6.

And they were both naked, the man and his wife, and were not ashamed. Genesis 2:25.

In the six hundredth year of Noah’s life, in the second month, the seventeenth day of the month, the same day were all the fountains of the great deep broken up, and the windows of heaven were opened. And the rain was upon the earth forty days and forty nights. Genesis 7:11,12.

And God said, “This is the token of the covenant which I make between me and you and every living creature that is with you, for perpetual generations: I do set my bow in the cloud, and it shall be for a token of a covenant between me and the earth.” Genesis 9:12,13.

The early earth did not have rain but was instead watered by a mist. The man and woman were naked, evidently not needing clothing because of cold weather. The comfort range for the unclothed human is rather narrow, perhaps 84 to 88° F, so there would be almost no variation of temperature from day to night.

The first mention of rain occurs in Chapter 7 of Genesis at the time of the flood. Then in Chapter 9, God uses the rainbow as a sign of a covenant. If rain had occurred before the flood, the rainbow would have occurred also and would not have been useful as a sign.

We therefore have a world before the flood with a very uniform climate. The temperatures would have had to be similar from pole to pole, or otherwise the temperature gradients would have caused weather systems similar to what we experience today, with the associated rain. The earth would have been like a greenhouse, with lush tropical or subtropical plants growing from pole to pole. There was a period of 1656 years (according to Archbishop Ussher's chronology) from Adam to the flood during which plants grew well, but with no rain or wind to wash the dead plants away or blow them around. The amount of plant material, both living and dead, at the time of the flood must have been enormous. This plant material could easily have formed the world's gas, oil, and coal deposits when buried during the flood.

Many remains of tropical plants and animals have been found in the polar regions, so the concept of a warm earth with no high mountains is common in our science textbooks. The earth's temperature must have been moderated by some mechanism in order for this greenhouse to exist. The only possibility suggested by Genesis is that of the water above the firmament. Water has a high heat capacity, a high latent heat of vaporization, and a high latent heat of fusion, hence is a logical material for moderating temperature. It can be assumed that the amount of water above the firmament must have been substantial in order for the greenhouse effect to be maintained.

Regarding the amount of water, we also note that rain fell for 40 days and 40 nights. The word translated rain carries the notion of a pouring rain, in distinction from the other Hebrew words for rain and sprinkling rain [2, page 69]. The term 'windows of heaven' also implies a heavy rain. But how heavy is a heavy rain? Dillow gives some interesting statistics [2, pages 69,70]. "In New Orleans a rainfall rate of 4.7 inches per hour was reported on April 25, 1953. In July 1862 in Cherrapunji, India, in 31 days it rained 366.14 inches, an average rate of 1/2 inch per hour. On July 14, 1911 it rained 79.12 inches in 63 hours in Baguio, Philippines, about 1.24 inches per hour. At Silver Hill, Jamaica, in the West Indies, rainfall for a four-day period during the passage of a hurricane amounted to 96.5 inches, about 1 inch per hour. Monsoons in India are known to result in rainfall rates of 22 inches per hour, and rainfalls of up to 75 inches per hour have been reported."

It is evident that 1/2 inch per hour is a conservative estimate for a heavy rain in the present climate. Rain falling at this rate for 40 days and nights would total 40 feet of water. This amount would not be nearly enough to cover the earth with a flood, thus requiring most of the flood water to be supplied from the fountains of the deep. Therefore 40 feet of water is probably a minimum value for the water above the firmament. It could easily be several times this amount.

This large amount of water would not have been possible as water vapor in our present atmosphere. It is not hard to show that the maximum amount of water vapor which can be maintained in our present atmosphere with a sea level temperature of 28°C is equivalent to only about 10.5 cm or 4.1 inches of liquid water. The average amount actually present is less than 2 inches. The value of 4.1 inches would yield a 40 day rainfall rate of about 0.004 inches per hour, hardly a heavy rain. Therefore the atmosphere must have been much different from the atmosphere of today, or else the water must have been held up by some mechanism unknown to us today.

2.2 HISTORICAL ACCOUNTS

In nearly every culture there is an account of a great flood that inundated the earth and destroyed all mankind. In these stories a man or a family or a couple were saved by a canoe, an ark, or by climbing a mountain. Many details of these accounts are given in *The Genesis Flood* by Whitcomb and Morris [15]. While these accounts have obviously been distorted in the telling and retelling, they still provide a sort of confirmation for the Genesis account. If there really was a world wide flood as described in Genesis, then we would expect the stories of ancient peoples to contain references to such a flood, as they do in abundance.

These ancient stories also contain references to a water heaven which existed before the flood [2, pages 113-134]. Many of them tell of a visible water heaven scintillating with light. This heaven was the home of the gods, and it obstructed the power of the sun god. One day this water heaven was banished, and the sun came riding through as the conqueror of heaven and master of the wind and rain. A typical account is that of Egypt [2, page 118]. “In ancient Egypt the heaven was regarded as an ocean parallel with that on earth. The sun god traveled in a barge through this ocean which ‘surrounds the world.’ This water heaven was the god Canopus whose symbols were a water vase and the serpent. His very name is a memorial to the vapor canopy. According to the legend, only the ocean existed in the beginning, an egg appeared on it, out of which issued the sun god. From himself he then bore four children, Shu, Tefnut, Geb, and Nut. Nut was the sky goddess. In primordial times she was embraced by the earth god Geb, until Shu and Tefnut, the gods of the atmosphere, separated them by elevating Nut high above the earth and placing themselves beneath her.”

Here we have an obvious reference to the waters (in liquid form) above the earth, and to the separation of the waters above from the waters below the firmament.

Indian religious literature is full of references to a water heaven [2, pages 121,122]. Originally, the upper waters were ruled by Varuna, the guardian of the ‘sea of heaven’ from which he sent rain. The sun was a god called Ahura-Mazda. The divinity of light, Mithras, was subordinate to Varuna. Then a new religion appeared with Mithras being

the new sun. The old sun, Ahura-Mazda, yielded up his authority to Mithras. In some stories, Mithras rescued mankind from a flood.

We cannot place a great deal of confidence in these old myths. However, they have some very interesting similarities to the Genesis account. With substantial amounts of water in the atmosphere, the sun would appear less bright before the flood or at least the heating effects of the sun would be decreased. If this water became dark clouds before the rain started, the sun would be totally blotted out for a period of time. A brighter sun appearing after the flood would certainly be noticed by Noah and his family. It is not hard to imagine this empirical observation degenerating into an account of the Sun God coming into a position of authority.

Canopy Requirements

To summarize, it can be argued that any model for the water above the firmament, usually called the canopy, would have to meet several requirements, such as:

1. It should contain enough water for 40 days and nights of heavy rain.
2. The water should be liquid, at least where Noah could see it.
3. The water should be at a height where the potential energy stored in the gravitational field would not be large enough to cause undue atmospheric heating when the water fell as rain.
4. There must be enough solar radiation incident upon the earth's surface to allow vigorous plant growth, from pole to pole.
5. The temperature at the earth's surface must be in the proper range for both human comfort and plant growth.
6. There should be a source or mechanism for very cold ice over the polar regions, to account for at least one ice age, including quick frozen mammoths [2, 311-420].
7. There should be adequate light in the polar regions for plant growth or at least plant maintenance in the winter months, when the sun is normally below the horizon for up to six months.
8. The canopy should allow the sun, moon, and stars to be seen.
9. Hopefully, the canopy support system should be readily explained in terms of presently understood physics.

Although the Bible was helpful in developing this list, most items are just common-sense suggestions, intended to help explain the observed data of heavy plant growth close to the poles, followed by one or more ice ages. The main problem with the list is that even though the Genesis account and the myths of other cultures imply that the water above the firmament was in the liquid form, our present understanding of physics prevents us from accepting or even comprehending this idea. The water must be in a form which will stay up there, we think. The only practical form would therefore be as water vapor or steam, which, like the humidity in our atmosphere is relatively transparent to sunlight.

Vapor Canopy

Dillow has suggested an extensive model whereby 40 feet of liquid water was placed above the firmament and immediately turned into steam [2, pages 221-310]. This extra mass above the earth would have caused the pressure to be 2.18 times the present atmospheric pressure. (The effects of greater atmospheric pressure are discussed by Smith [12].) There would have been a strong temperature inversion above the earth, with the temperature rising from about 20°C at the earth's surface to 38°C at only 120 m above the surface to 111°C at 9.8 km above the surface. The canopy would actually start about 7 km above the surface. The water vapor would immediately start to diffuse downward if there was no water vapor below the canopy. However, this diffusion would be rather slow, with only about 10 percent of the water in the canopy diffusing through the original bottom of the canopy in the 1656 years from Adam to the flood.

The intensity of light at the earth's surface would have been reduced to 77 percent of today's level. The rate of plant growth would probably have been reduced by a similar amount. The dimmest stars visible to man today, the sixth magnitude, would not have been visible before the flood, but all the rest of the currently visible stars would have been visible to Adam.

It can easily be seen that it is not at all impossible for substantial amounts of water to be present above the earth's surface. One of the difficulties of Dillow's theory, as with any other canopy theory, is the heat load or heat energy content of the canopy. The canopy must somehow be cooled from approximately 100°C to the condensation point, the latent heat of condensation must then be removed at the same temperature, and then the liquid must be cooled to the present atmospheric temperature of about 25°C. The potential energy of the canopy, mgh , must also be removed, where m is the mass of the canopy, g is the acceleration of gravity, and h is the average height above the earth. There is one compensating effect, that of expansion of the atmosphere from 2.18 to 1.0 atmospheres, which is a cooling effect. Dillow shows that if all this energy were released to the atmosphere in a short period of time, the temperature of the atmosphere would rise to 2100°C [2, pages 269-272], an obviously impossible value.

He suggests that the flood must have been preceded by volcanic activity which would inject large numbers of dust particles or condensation nuclei into the canopy. The transparent vapor would then start to condense into clouds. The clouds would reflect a larger fraction of the incident sunlight back into space, tending to cool the earth. With his assumptions, it would take about 16 months for the canopy to cool to atmospheric temperature. He does not have a convincing mechanism for holding all this liquid water up until Noah enters the ark [2, page 277]. In other words, Dillow's vapor canopy should precipitate out over a period of 16 months rather than 40 days. His theory comes close to explaining observations, but is still unsatisfactory [7, 13, 14].

2.3 OTHER CANOPY MODELS

Cloud Cover

The most obvious model for the water above the firmament is a permanent heavy cloud cover. There are several severe problems with this model, however, which should immediately eliminate it from consideration. One problem which has been discussed is that a cloud cover will contain only a few inches of rain, not enough to sustain a heavy rain for 40 days and nights.

Another, more serious, problem is that a cloud cover will reflect a greater amount of the sun's energy away from the earth [1, 3], lowering the temperature of the earth's surface below freezing. The present albedo of the earth is about 0.36 [2, page 217]. A heavy cloud cover over the entire earth would increase the albedo to 0.8, which would yield a mean surface temperature of -75°F . If the albedo were increased to only 0.5 from the present value of 0.36, the mean surface temperature would drop to 23°F . It should be noted that many plants require full sunlight (clear skies) a significant fraction of the time in order to function properly. A heavy cloud cover would have caused many plant species to die out even if the temperature were in an acceptable range.

Yet another objection to the cloud canopy is that it would block out all starlight, while Gen. 1:14–18 seems to imply that the stars were visible before the flood.

Ice Shell

Many writers have suggested that the water above the firmament must have been in the form of ice [2, pages 195–215]. They propose a cylindrical or spherical shell, perhaps 350 miles above the earth's surface and a few hundred feet thick, held in place by centrifugal force. The problem with this concept is the kinetic and potential energy stored in the ice. The kinetic energy for an ice shell at 350 miles above the earth would be 6,855

cal/gm and the potential energy would be 1,114 cal/gm for a total of 7,969 cal/gm. The latent heat of fusion of water is 80 cal/gm, the latent heat of vaporization is 540 cal/gm, and the heat needed to raise the temperature of water from 0°C to 100°C is 100 cal/gm. The potential and kinetic energy in the ice is ten times the amount needed to turn ice at 0°C into steam at 100°C. The collapse of such a canopy would destroy all life on earth in a steam cooker.

It should also be pointed out that a spherical shell would not remain a shell for very long because of decreasing centrifugal force toward the poles. The polar ends of the shell would collapse long before the equatorial portion of the shell.

One reason for suggesting an ice canopy is that it would supply the ice for at least one Ice Age. A sudden arrival of ice is a reasonable explanation for the frozen mammoth carcasses found in Siberia and Alaska [2, pages 311–420]. Frozen mammoths have been found with their stomach contents intact and their flesh edible. The plants found in their stomachs do not grow at temperatures much below 70°F, so these mammoths were evidently grazing in a lush pasture at moderate temperatures when disaster arrived. The flesh must have been cooled to perhaps 40°F within six to eight hours to stop the action of enzymes, so the stomach contents would remain intact and the flesh edible. Detailed studies show that the mammoths must have been frozen at atmospheric temperatures below –150°F to observe these effects. Such low temperatures have never been observed on the earth's surface. The rapid change from warm to cold is also outside our range of experience. There have been instances where temperatures would change nearly 100°F in a few hours, but not during the growing season. We therefore need some other mechanism for very rapid cooling over a large portion of the earth's surface.

Interplanetary Ice

An ice canopy at 350 miles above the earth would have ice at the necessary low temperatures if it could fall to the earth's surface without significant heating. Another possible source of ice would be from a wandering planet or comet. This would explain the suddenness with which the mammoths were buried with very cold ice.

The idea of interplanetary ice has been explored by Donald Patten in *The Biblical Flood and the Ice Epoch* [6]. He suggests that the earth was visited by an invader planet surrounded by either ice rings (like Saturn), or more likely with an icy satellite like Saturn's seventh moon, Hyperion (diameter 300 miles). The visitor is thought to have made two revolutions around the earth before going on to become the planet Mercury. During the first revolution, the icy satellite of the planet came within Roche's limit where the gravitational force of the earth was greater than the tensile force within the satellite, causing the satellite to disintegrate. The ice fragments were ionized by cosmic radiation and followed the earth's magnetic field to the polar regions. This ice would

precipitate any vapor canopy and would also contribute significant water for rain in addition to what was already present in the atmosphere.

According to this theory, the central portion of the falling ice would push the air ahead of it and arrive at the earth's surface without having experienced much air friction. The mammoths would experience a hailstorm at a temperature of about -279°F and would be frozen in their tracks.

Roche's limit for the earth is 2.3 earth diameters from the center of the earth or 5,149 miles above the earth's surface. Patten prefers a height of disintegration of 2.7 earth diameters or 7,208 miles above the earth [6, page 202]. The kinetic energy of the ice satellite could be very small at the time of disintegration, but the potential energy is still quite high. Any material that falls to the earth from over 5000 miles up will have considerable kinetic energy upon arriving at the earth's surface which must be dissipated somehow. Patten does not have a particularly convincing argument for how this energy might be dissipated without melting the ice [6, page 203].

Problems With The Models

The Bible, the fossil record, and the legends of ancient peoples all indicate that the earth's climate was once much different from what is observed today. All these records would be consistent with the concept that the earth was subtropical over its entire surface, that there was water above the earth (liquid, vapor, and/or ice), and that this period ended abruptly with 40 days and nights of rain.

It should be noted that all the worldviews attempt to deal with the same data set. The geological record strongly indicates that the earth was once warm from pole to pole and that the climate changed with an ice age (or perhaps several ice ages). The evolutionist explains the data using very long time periods. This explains some observations reasonably well, but others (like quick frozen mammoths) not very well at all. The creationist explains the warm earth with the concept of 'waters above' and the abrupt change in climate with the flood, but also has problems with quick frozen mammoths. The planetary catastrophist has an explanation for the mammoths and the ice age (if one ignores the potential energy in the ice), but has little to say about the warm earth before the ice age started. All are attempting to explain the same data set in a manner consistent with their worldview. It should be apparent to the neutral observer (if such a person exists) that none of the worldviews have arrived at a fully satisfying explanation of the data.

Most of the models which we have discussed attempt to explain the canopy in terms of presently understood physics, but actually require a suspension of physical laws (miracle) at some point. For example, Dillow's model does not deal with the winter darkness near the poles. The combination of high temperatures and darkness would

actually be detrimental to plant life. The dominant species might be mushrooms in such an environment. A miracle would be required to maintain healthy plant life during the six months of darkness.

A similar argument can be made for the model of a ice canopy held in place by centrifugal force. The idea of centrifugal force would seem to eliminate the need for a special miracle, but actually just changes the character and timing of the special miracle. The miracle would be the elimination of the heating effect of the potential and kinetic energy stored in the ice.

It therefore appears that some sort of miracle, or some unknown physical law, is necessary for any canopy model, either to hold the water up, or to get it down without destroying the earth. A new explanation for the warm earth and the ice age, requiring such new physical laws, will now be given.

2.4 A NEW CANOPY MODEL

The model being proposed here meets all the requirements of Section 2.2.1 except the last one. That is, it cannot be explained in terms of modern physics. Either a miracle or unknown physical laws must have been operating for the proposed canopy to have existed. It would be hard for a local observer to distinguish between a miracle and an unknown physical law, of course. The important difference to us today is that if the canopy were held up by an unknown physical law, then the discovery of that law could have important benefits to mankind. If the canopy were held up by a suspension of the law of gravity, then the primary lesson would be to demonstrate the power of God in the past, with limited benefit to mankind today.

We have argued that the water above the firmament needs to be in liquid form and relatively near the earth because of energy requirements. However, if the water is in a continuous layer above the earth, there is a conflict between the requirement for a large quantity of water on one hand and adequate solar energy at the earth's surface on the other. A layer of water 25 m thick, for example, will absorb or reflect about 96 percent of the incident solar radiation when the sun is directly overhead, and an even larger percentage for the sun closer to the horizon. The 4 percent of solar radiation reaching the earth would be enough to meet the needs of a few shade loving plants, but would not be nearly enough to produce the lush vegetation which presumably became our coal, oil, and gas deposits. A continuous water layer would also obscure the stars, which were apparently created to be seen by people before Noah.

It is proposed therefore that the water was not in a continuous layer but rather in large globules separated by air. The appearance from the earth would be similar to a sky filled with scattered clouds. The globules may also have been in the form of tornadoes

or water spouts. These are unstable atmospheric forms today, but it is conceivable that conditions before the flood were different enough that water spouts were stable then. The appearance would then be columns of water, perhaps 50 m in diameter and 2000 m tall, with the bottoms a few hundred meters above the earth's surface.

The tops of the globules cannot be too high or they would freeze in the cold temperatures of the upper atmosphere. The dry adiabatic lapse rate of today's atmosphere is about 1°C per 100 m. This is probably an upper limit on the temperature gradient existing in the pre-flood atmosphere. The minimum surface temperature in the lower latitudes would probably be in the vicinity of $20^{\circ}\text{C} = 68^{\circ}\text{F}$. If the dry adiabatic lapse rate applied, a temperature of 0°C would be reached at 2000 m above the earth's surface. The earth before the flood could have been much flatter (no mountain taller than a few hundred meters) than it is today, so the globule bottom at a few hundred meters could have been above the highest mountain. We therefore assume that the water globules did not extend much above 2000 m or much below 500 m above the earth.

The proposed layer of water globules close to the earth does not deal with the question of plant growth in polar regions with up to six months of darkness. As mentioned earlier, if the canopy were able to maintain temperature (and humidity) during the dark period, many plants would not be able to survive. For normal plant growth and survival, either the temperature and humidity need to drop during the winter so the plants can go dormant, or significant amounts of light need to be provided during the winter so growth can continue. The geological record seems to indicate polar regions that were warm and supported plant growth during the entire year, so evidently the polar regions were not entirely dark during part of each year before the flood as they are now.

One suggestion that has been made is that the earth has somehow changed its axis of rotation. Perhaps there was no tilt before the flood, and after the flood something happened to give the earth its 23.45° tilt from its plane of rotation around the sun. Such a change of angular momentum would require another miracle or perhaps a visiting planet from space [6].

My suggestion would be solar reflectors in space. If some of the water above the firmament was placed at heights of several hundred km above the polar regions, it would freeze and become highly reflective of solar radiation, much like the rings of Saturn. A reasonable size would be for the ice to extend from each pole for about 23° , or to about 67° N. or S. Latitude. The ice could be in one continuous piece or could be in fragments. The surface would probably be rough so most of the reflection would be diffuse rather than specular. The layer would probably be relatively thin, a few hundred meters if solid, and a few kilometers if in fragments. My proposed canopy model therefore consists of liquid water globules in the equatorial regions and a hemispherical cap or cloud of ice fragments over each pole, as shown in Fig. 2.1.

An ice cloud of this size and a height of 2200 km would admit direct solar radiation to the pole during the summer for the same 24 hour period it now enjoys. During the winter it would reflect diffuse light to the polar area. There would be continuous daylight at the poles on a year around basis. Areas away from the poles but still inside the Arctic and Antarctic circles would not have night in the winter even though they had a short night in the summer.

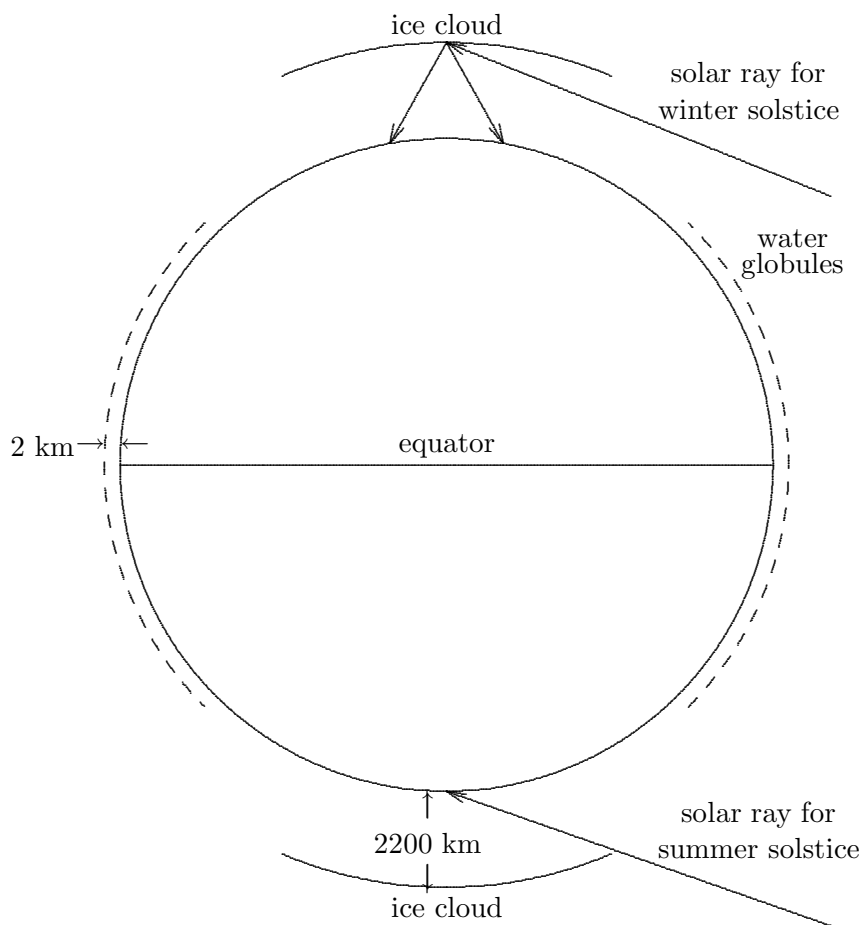


Figure 2.1: A Canopy Model of Liquid Water Globules and Ice Clouds Above the Earth.

Heat Balance

Solar radiation incident on the atmosphere may be reflected back into space or it may be absorbed by the earth or atmosphere. The absorbed energy may be radiated back into space as infrared radiation, it may be stored on a seasonal basis by raising the temperature of soil or water, or in the present climate it may be physically transported to a different latitude by atmospheric movements and ocean currents [4]. In the canopy model presented here, it is assumed that there were no atmospheric movements or ocean currents before the flood. Incoming solar radiation and outgoing infrared radiation must therefore have been balanced at each latitude when integrated over a yearly cycle. In the present climate, equatorial regions are cooled and polar regions are heated by a poleward energy flux. Water globules provide the equatorial cooling in this canopy model by shading the earth, while the poles are heated by reflection from an ice cloud.

According to a computer model [5], no shading of the earth is necessary, and the water globules cannot be maintained in liquid form at higher latitudes than about 45° N. or S. This computer model shows that it is necessary for the fraction of sky covered by the globules to decrease with distance from the equator, from a maximum of about 50 percent to about 10 percent at 40° N. or S. From about 45° to about 67° there would not be a canopy of any type in this model.

Under this model the temperatures near the equator would be about 3°C warmer than today's mean temperature, which would have encouraged the growth of dinosaurs before the flood. There would have been little temperature variation in summer from equator to pole, but a significant variation in winter, with minimum temperatures occurring at latitudes of 50 and 60 degrees. Some regions at these latitudes would experience winter frost, which, of course, is necessary for the survival of some plant species.

This simple model shows that a two level canopy over the earth between the times of Adam and Noah is quite plausible. The lower level would have consisted of liquid water and would not have extended under the upper level of ice. The earth would have been somewhat warmer under the water canopy, favoring the development of large numbers of dinosaurs. The liquid water canopy would have collapsed at the time of Noah, contributing to the flood. The ice canopy would have remained, however. The earth would still have good growing conditions from pole to pole.

Ice Age

The animals on the ark would have multiplied rapidly over the several hundred years after Noah. For a variety of climatic and forage reasons, the mammoths could have been concentrated in the northern latitudes. When the ice layer finally collapsed, it

would have buried the mammoths and permanently changed the climate of the polar regions. The heat input would have decreased, lowering the temperature, but perhaps more importantly, there would not be adequate light for plant growth for six months of the year.

The collapse of the ice would not have been directly visible to Noah's descendants living in the Middle East, which may explain why it is not mentioned in the Bible. It would have had the effect of lowering the earth's temperatures well below the present temperatures for a period of time, which would certainly have destroyed any remaining dinosaurs. There are several references in the book of Job (Job 6:16, 9:30, 24:19, 37:6,10, 38:22,29,30) to ice and snow which are not commonly observed today throughout much of the Middle East, so perhaps it was written during this period of depressed temperatures. The human population tended to live in one region until the tower of Babel incident, so it is possible that there was little or no loss of human life with the collapse of the ice layer because people had not yet migrated into the polar regions. Without direct impact on mankind, there would have been little reason to mention the event in the Bible.

It appears that a combination of a liquid water canopy and a ice canopy meets the requirements of both temperature and radiant energy for the pre-flood era. Collapse of the water layer at the time of the flood and collapse of the ice layer perhaps several hundred years later would explain the ice age and the burial of the mammoths as a totally separate catastrophe from the flood.

A New Physical Law

This model meets the first eight of the nine requirements listed in Section 2.2.1. This model is consistent with the scriptures in that Noah would have seen liquid water above him, but would also have seen the sun, moon, and stars between the water globules. It therefore eliminates several major problems experienced with the other canopy theories. The only problem is that a miracle would have been required to maintain the canopies above the earth, or some as yet undiscovered physical phenomenon. This is similar to each of the other canopy theories which require a miracle either in maintaining the canopy above the earth or in dissipating the heat when it descends to the earth.

The model certainly seems strange to us because we have trouble thinking of large bodies of water suspended above our heads with no visible means of support. However, if Adam and his descendants saw such bodies of water there from the beginning, they would not think it strange, but would proceed to expound physical theories for their support as we do today for things above us (e.g. clouds and birds). It seems to be stretching the point to call this phenomenon a 'miracle' when the 'waters above' behaved the same, day after day, for over a thousand years. To be a miracle means that

it needs to be observed as different from the ‘natural’ order seen before and after the event. The fact that we do not have liquid water a few hundred meters above our heads today does not prove that it was not there before the flood. Likewise, liquid waters ‘above’ could have had a perfectly good physical explanation.

It might be argued that God changed some physical law at the time of the flood, or that the firmament ended its usefulness at that time and was destroyed. Certainly something happened to cause the liquid water to drop to the earth at time of the flood, and the ice a few hundred years later. The gap in time between the flood and the ice age would indicate that at least part of the firmament was still active after the flood, so that whatever caused the liquid water to descend may have also caused the ice to fall, without actually destroying the firmament.

Perhaps the earth’s magnetic field was involved in the support action, and it decayed below some critical value at the time of the flood, causing the firmament to dump its water. The earth’s magnetic field is stronger above the poles, so it would take several hundred additional years to decay to a value necessary for the ice canopy to fall.

Perhaps the firmament has an unstable mode, which it went into at that time. It appears quite possible that the firmament is still with us today, and is still involved with various atmospheric phenomena.

We have gone to considerable effort to argue that the climate of the early earth can only be explained by a dual liquid water and ice canopy. Such a canopy requires what amounts to an anti-gravity mode whereby large quantities of liquid water and ice could be held up for time periods measured in centuries. This certainly requires new physical laws or a new interpretation of existing laws.

We may even discover that water itself has properties that are presently unknown [8, 9, 10, 11]. Perhaps water will be a necessary ingredient to any new energy system.

Other pieces of information about the firmament or aether will be developed as we consider other observations in the following chapters.

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CHAPTER 3

THE HEAVENS ABOVE

We have seen that the Bible and some other sacred writings say some unusual things about the climate of the pre-flood earth, but which have considerable support in the geological record. We now proceed to look for clues in the sacred writings regarding the character of the atmosphere (or the firmament/aether) which would allow such a different climate. It will be very tempting to disregard the literal interpretation of many of the scriptures which will be examined. And it is quite possible that many of these scriptures should be understood in a figurative or poetic sense. What I am really trying to do is ask ‘what if’ a scripture were to be interpreted literally. What would it imply about the world around us?

My ultimate goal is to be a part of the development of a new, quantitative model of the aether, a model that can be used to predict new phenomena. Maxwell’s equations predicted the existence of a transverse electromagnetic wave which traveled at the speed of light. Hertz experimentally verified such a wave a number of years later, opening the door to radio, television, and many electronic discoveries of the twentieth century. Would he have performed the experiment without the theoretical prediction? If he had, would the results have been accepted as an important advance of science or just another anomalous result of a fringe inventor? A definite answer is impossible, but we can say that the scientific method worked nicely in this case, where experiment followed theory.

Even where theory follows experiment, it is important to develop a quantitative theory before there can be widespread acceptance in the scientific community. This book contains many observations that are consistent with an energetic aether. But there will be limited acceptance until a theory is developed. And it has to be more than a general description. Depicting the aether as ‘virtual photons interacting in a quantum foam’ is an interesting thought, but there must be equations with predictive capability before we really have a theory.

The first step in developing a robust theory is to gather as many observations and experimental results as possible. It is probably impossible to incorporate all these observations into our first attempts at generating a theory, and some observations may never fit, but we do not want to throw any data away prematurely. In this chapter, we consider observations in various sacred writings, and similar modern observations, that might indicate an energetic aether.

Let us approach these writings as students, asking what the writer really meant, rather than as critics, thinking about how we would have stated matters so that they would be in perfect agreement with the physics being taught in the late twentieth century.

3.1 THE STRETCHED HEAVENS

One fascinating statement is that of the heavens being *stretched*. Several of the scriptures which use this or similar phrases are listed below. Quotations are from the King James Version.

Which commandeth the sun, and it riseth not; and seaeth up the stars. Which alone spreadeth (Hebrew: *natah*) out the heavens, and treadeth upon the waves of the sea. Job 9:6–8.

He stretcheth (*natah*) out the north over the empty space, and hangeth the earth upon nothing. He has compassed the waters with bounds, until the day and night come to an end. The pillars of heaven tremble and are astonished at his reproof. Job 26:7, 10, 11.

Hast thou with him, spread (*raqa*) out the sky, which is strong, and as a molten looking glass? Job 37:18.

who stretchest (*natah*) out the heavens like a curtain. Psalms 104:2.

And all the host of heaven shall be dissolved, and the heavens shall be rolled (*galal*) together as a scroll. Isa. 34:4.

It is He that sitteth upon the circle of the earth, and the inhabitants thereof are as grasshoppers; that stretcheth (*natah*) out the heavens as a curtain, and spreadeth (*mathach*) them out as a tent to dwell in: Isa. 40:22.

Thus saith God the LORD, he that created the heavens, and stretched (*natah*) them out; he that spread (*raqa*) forth the earth, and that which cometh out of it; Isa. 42:5.

I am the LORD that maketh all things; that stretcheth (*natah*) forth the heavens alone; that spreadeth (*raqa*) abroad the earth by myself; Isa. 44:24.

I have made the earth, and created man upon it: I, even my hands, have stretched (*natah*) out the heavens, and all their host have I commanded. Isa. 45:12.

Mine hand also hath laid the foundation of the earth, and my right hand hath spanned (*taphach*) the heavens: when I call unto them, they stand up together. Isa. 48:13.

He hath made the earth by His power, he hath established the world by his wisdom, and hath stretched (*natah*) out the heaven by his understanding. Jer. 51:15.

According to Young's *Analytical Concordance*, the definitions of the Hebrew words in italics are:

galal. To be rolled.

natah. To stretch out, incline.

raqa. To spread out or over.

taphach. To stretch out, swaddle, train up.

What might be meant by a stretched heaven? A gas cannot be stretched, so this could not refer to the oxygen and nitrogen of our atmosphere. A vacuum cannot be stretched, so the phrase really does not describe the region outside the earth's atmosphere either. The stars seem to form a blanket over earth, so one interpretation of stretching out heaven is that it refers to the placement of the stars. Modern man would probably not think of this action of placing stars as a stretching action, but there are other Jewish thought patterns which seem odd to us today as well, so this poetic interpretation might be possible.

However, we also note that the heavens will be rolled up like a scroll. One cannot roll a gas so this would seem to be an unlikely interpretation. Similarly one cannot roll the stars in heaven. Stars might be burned up, removed from their place, or even cast down to earth, but would not be rolled up with other stars. What, then, could this phrase mean? We note in Gen. 1:6,7 that God spent the second day of creation in making the firmament and dividing the waters above from the waters below. This indicates that this was a significant activity (one day out of six). God called the firmament heaven, so the scriptures referring to the stretching of heaven evidently refer to the making or stretching of the firmament. Something was created to divide the waters that could be stretched into place and then could be rolled up like a scroll.

Most people will spiritualize these scriptures about stretching and rolling, and talk of the beauty of the sky and its great size, so that it appears to be spread out or 'stretched out'. The extensive and consistent use of the word 'stretch', however, when words like 'make' or 'create' or 'place' would work equally well, leads this author to suspect a technical or literal meaning.

Another reason for taking the literal approach is that no present day atmospheric phenomenon resembles a scroll being rolled up, except perhaps for a tornado, and there is no obvious spiritual meaning to the rolling up of the sky.

A scroll is a relatively thin, wide structure which will transmit shear forces. It appears, however, that the firmament is a thick structure. If the water globule and ice cloud canopy model of the previous chapter has any validity, the firmament would need to be at least 2200 km thick. It could easily be much thicker than that, even several earth diameters in thickness. It might even extend to the ends of the universe. Such a thick spherical shell would not be able to roll like a scroll. This implies that the firmament may not be a homogeneous structure, but that it may be made of layers. It might even be a woven structure, as suggested by the ‘tent curtain’ analogy.

If the firmament is indeed ‘stretched’, then it might need some fixed attachment points or supports to keep it from collapsing onto the earth. This may be the meaning of the passage in Job 9:6, *[God] Which shaketh the earth out of her place and the pillars thereof tremble*. The waters above might have been held in an unstable mode, like a pencil standing on its point. A good kick from the foot of God to jar the earth and vibrate the pillars holding the firmament may have been the beginning of the flood.

It is conceivable that the firmament is responsible for the earth’s magnetic field. If so, there might be pillars located at the north and south magnetic poles rather than the geographical poles. There may also be pillars at appropriate points throughout the earth. The scriptures give no hint as to the size or spacing of the pillars.

Most scholars would scoff at the notion of literal pillars because it was a ‘myth’ of the ancients that has long since been discarded by ‘modern’ man. It should be pointed out that many myths have a element of truth in them, and that the ancients were certainly closer in time to the creation than we are. If there were pillars, we would expect the ancients to know about them.

Regarding these myths, some people believe that the ancient megalithic sites (Stonehenge, Avebury, and so forth) were laid out according to a pattern, a ‘world grid’ as it were [4]. This grid is supposedly formed of nodes (pillars?) and lines (energy lines or ley lines).

One of the few scientific investigations of this grid was *Project Magnet* in 1950, funded by the Canadian National Research Council and the U.S. Navy. The Project Director, Wilbert Smith, noted large and sometimes mobile gravity anomalies all over the Lake Ontario area. He noted areas of “reduced binding” in the atmosphere above the Lake; the areas were described as “pillar-like columns” a thousand feet across and extending for several thousand feet up into the atmosphere. Moreover, they were invisible and only detectable with sensitive equipment [4, Page 54].

The pillars of scripture, the nodes of any world grid, and the “pillar-like columns” noted by Wilbert Smith may all be entirely different, of course. Maybe there are actually not any ‘real’ pillars (as opposed to figurative), or perhaps the pillars that are present cannot be detected with our modern instrumentation. We cannot insist that the first model of the aether contain all the features mentioned in this section. But the concepts of an aether that can be stretched (support longitudinal forces), rolled (support shear forces), and with associated nodes and lines should be carefully considered.

3.2 THE SUN AND MOON

In addition to the distinctive features of the stretchable heaven there are a number of interesting scriptures which refer to the sun and moon. These scriptures may also give us some clues on the character of the firmament.

And the Lord said unto Moses, Stretch (*natah*) out thine hand toward heaven, that there may be darkness over the land of Egypt, even darkness which may be felt. And Moses stretched (*natah*) forth his hand toward heaven; and there was a thick darkness in all the land of Egypt three days. They saw not one another, neither rose any from his place for three days; but all the children of Israel had light in their dwellings. Ex. 10:21–23.

For the stars of heaven and the constellations thereof shall not give their light: the sun shall be darkened in his going forth, and the moon shall not cause her light to shine. Isa. 13:10.

Then the moon shall be confounded, and the sun ashamed, Isa. 24:23.

I clothe the heavens with blackness, and I make sackcloth their covering. Isa. 50:3.

And when I shall put thee out, I will cover the heaven, and make the stars thereof dark; I will cover the sun with a cloud, and the moon shall not give her light. All the bright lights of heaven will I make dark over thee, and set darkness upon thy land, saith the Lord God. Ezek. 32:7,8.

The earth shall quake before them; the heavens shall tremble: the sun and the moon shall be dark, and the stars shall withdraw their shining. Joel 2:10.

The sun will be turned into darkness, and the moon into blood, before the great and the terrible day of the Lord comes. Joel 2:31.

The sun and the moon shall be darkened, and the stars shall withdraw their shining. Joel 3:15.

Shall not the day of the Lord be darkness, and not light? even very dark, and no brightness in it? Amos 5:20.

And it shall come to pass in that day, saith the Lord God, that I will cause the sun to go down at noon, and I will darken the earth in the clear day. Amos 8:9.

That day is a day of wrath, a day of trouble and distress, a day of wasteness and desolation, a day of darkness and gloominess, a day of clouds and thick darkness. Zeph. 1:15.

Immediately after the tribulation of those days shall the sun be darkened, and the moon shall not give her light, and the stars shall fall from heaven, and the powers of the heavens shall be shaken: Matt. 24:29.

But in those days, after that tribulation, the sun shall be darkened and the moon shall not give her light, and the stars of heaven shall fall, and the powers that are in heaven shall be shaken. Mark 13:24,25.

The sun shall be turned into darkness, and the moon into blood, before that great and notable day of the Lord come: Acts 2:20.

And I beheld when he had opened the sixth seal, and, lo, there was a great earthquake; and the sun became black as sackcloth of hair, and the moon became as blood; and the stars of heaven fell unto the earth, even as a fig tree casteth her untimely figs, when she is shaken of a mighty wind. Rev. 6:12, 13.

And the fourth angel sounded, and the third part of the sun was smitten, and the third part of the moon, and the third part of the stars; so as the third part of them was darkened, and the day shone not for a third part of it, and the night likewise. Rev. 8:12.

And the fourth angel poured out his vial upon the sun; and power was given unto him to scorch men with fire. And men were scorched with great heat, and blasphemed the name of God, which hath power over these plagues: and they repented not to give him glory. Rev. 16:8, 9.

In one other sacred writing, the Book of Mormon refers to the Nephites (in the Americas) being in thick darkness for 3 days just after Jesus Christ's crucifixion and prior to visiting them. Regarding this incident we read:

And it came to pass that there was thick darkness upon all the face of the land, insomuch that the inhabitants thereof who had not fallen could feel the vapor of darkness. And there could be no light, because of the darkness, neither candles, neither torches; neither could there be fire kindled with their fine and exceedingly dry wood, so that there could not be any light at all. 3 Nephi 8:20-21.

The Bible also mentions darkness during the crucifixion, but only a three hour period.

Now from the sixth hour there was darkness over all the land unto the ninth hour. Matthew 27:45.

There is about a 7 hour time difference between Israel and the eastern USA, so if this incident of darkness was worldwide, the eastern USA would have experienced this darkness from 5 am to 8 am, and the western USA from 2 am to 5 am. A good fraction of the Native Americans would have slept right through the supernatural darkness, making it marginal as a sign. Did God use a longer period of darkness in the Americas, similar to the sign given to the Egyptians many years earlier?

It appears from these passages that there have been at least two recorded incidents of supernatural darkness in the Middle East. Most of these quotes indicate that the sun and moon will be darkened at some point in the future, however. How can this be?

The moon reflects the sun's light so we would expect both of the 'great lights' in the heavens to be dimmed together. There are several possibilities on how this might be accomplished. One is that the sun itself changes so it does not produce light, or at least much less light than normal.

Another possibility is that light is produced by the sun as normal, but the light cannot effectively propagate to earth. This would imply that something had happened to the propagation medium which would keep it from functioning. A century ago this concept would have been stated in terms of an aether, a medium or fluid able to support

propagation of electromagnetic waves. The idea of an aether as a propagation medium has fallen into disfavor among mainstream scientists in the last century, partly because the experiments of Morley and Michelson would seem to disprove it and partly because no wholly satisfactory model for the aether has yet been proposed. (The concept of an aether is doing quite well among frontier scientists, however.) The firmament or aether as a propagation medium is not a new idea, therefore. But the concept of a medium that can change to *stop* propagation may lead to some new thinking on the subject.

Yet another possibility for the sun being dark is that of thick clouds obscuring it. Clouds are mentioned in several of the scriptures so they might be a part of the total picture, but it would seem that the sun and moon actually change appearance. The sun looks like sackcloth and the moon like blood. Cloud cover would certainly not fit this description.

A fourth and unlikely possibility is that of some change in our vision. If we all became partly blind, we might observe the effects described, but there is no hint of such a physical problem.

The Egyptians had darkness for three days while the Israelites had light. The sun was still active therefore. There was no mention of clouds, and the darkness was more intense than we ever observe with clouds. The Egyptians could feel the darkness and could not even see to get out of bed (Exodus 10:23). The light was apparently produced by the sun but did not arrive at the Egyptians location. I interpret this to mean that the propagation medium was interrupted or disturbed.

According to our present understanding of the atmosphere, it could not have the stated effects on light passing through it. The firmament (as distinct from the atmosphere), however, may undergo some change, and cause light to be viewed differently than it normally is.

3.3 FALLING STARS

The previous section listed several scriptures regarding the sun and moon which also included a reference to the stars. Additional scriptures which mention stars include the following.

And it waxed great, even to the host of heaven; and it cast down some of the host and of the stars to the ground, and stamped upon them. Dan. 8:10.

Now when Jesus was born in Bethlehem of Judaea in the days of Herod the king, behold, there came wise men from the east to Jerusalem, saying, Where is he that is born King of the Jews? for we have seen his star in the east, and

are come to worship him. . . . Then Herod, when he had privily called the wise men, enquired of them diligently what time the star appeared. . . . When they had heard the king, they departed, and, lo, the star, which they saw in the east, went before them, till it came and stood over where the young child was. When they saw the star, they rejoiced with exceeding great joy. Matt. 2:1, 2, 7, 9, 10.

There is one glory of the sun, and another glory of the moon, and another glory of the stars: for one star differeth from another star in glory. I Cor. 15:41.

The mystery of the seven stars which thou sawest in my right hand, and the seven golden candlesticks. The seven stars are the angels of the seven churches: and the seven candlesticks which thou sawest are the seven churches. Rev. 1:20.

And the third angel sounded, and there fell a great star from heaven, burning as it were a lamp, and it fell upon the third part of the rivers and upon the fountains of waters; Rev. 8:10.

And his tail drew the third part of the stars of heaven and did cast them to the earth: . . . Rev. 12:4.

We note in Rev. 1:20 and other places that ‘star’ is often used in place of ‘angel’. Both are bright shining heavenly beings or objects, so the comparison is obvious. The problem for the translator and the reader is then to decide from the context when ‘star’ means what we see above us on a clear night, and when it means a created living being that goes forth from the presence of God to minister to people.

This is not a simple problem. The star seen at the birth of Jesus, for example, evidently appeared in the heavens with the other visible stars, but did not behave like the other stars. It could maintain its position above the earth and indicate the position of the birthplace rather precisely. This is totally impossible from the standpoint of our current understanding of astronomy, if ‘star’ refers to a standard textbook sunlike body.

There are several scriptures which refer to stars falling to the earth, including Matt. 24:29 and Rev. 6:13 that have already been quoted. It appears that the literal sun, the literal moon, and therefore the literal stars are being referred to in these scriptures. But how can a literal star fall to the earth. Our astronomy books say that stars are like the sun, large glowing bodies located millions and billions of miles away. Distances are such that it would be impractical for the star to make the trip to earth, and if a

star did fall on the earth, it would totally engulf and destroy the earth with its burning gases.

What are our options for interpreting the word ‘star’? The following list includes most of them.

1. Literal stars like our sun, located vast distances away.
2. Angels.
3. Meteors entering the earth’s atmosphere, forming ‘falling stars’.
4. Near miss of planet sized bodies.
5. Ball lightning, of unusually large size and duration.
6. A figurative meaning, such as a preacher caught with a woman not his wife and falling into disgrace.

I think we can agree that the passages referring to stars falling to earth or to the star above Bethlehem do not mean literal textbook stars. I also do not believe that the writers are talking about meteors burning up in the earth’s atmosphere. People have watched meteor showers for thousands of years and have even picked up stones fallen from the skies (in spite of grand pronouncements to the contrary by scholars in the Middle Ages). Even a really big meteor shower would not have the uniqueness implied by these passages.

Most people like the figurative meaning, but this interpretation also has its problems. Consider Matt. 24:29 where it states: “. . . the sun [shall] be darkened, and the moon shall not give her light, and the stars of heaven shall fall . . .” We all have our favorite religious or political leader to nominate for the falling star. But what about the sun and moon? Are these even more important leaders? But the sun and moon do not fall. They just quit producing or reflecting light. A figurative interpretation for the sun and moon is obscure and ambiguous at best, while a literal interpretation is consistent with the two blackouts (Egypt and at the time of the crucifixion) mentioned in the previous section. If Matt. 24:29 is referring to the literal sun and literal moon, then it must also be referring to star-like lights in the heavens.

Several authors have advocated the idea of a large heavenly body, perhaps a comet or asteroid, making a close pass by the earth at some time in the past. These include Velikovsky [10, 11], Sitchin [8, 9], and the recent book by Allan and Delair [1]. There may have been more than one body, with a smaller one getting too close to earth and disintegrating. At a distance, these bodies would have looked like Venus or Mars in the present-day heavens, and, for want of a better word, would have been called ‘stars’. As the body or bodies approached, surface details would have become much more evident,

but the ancients would probably not have changed the name. If one disintegrated, there would have been falls of hailstones (meteorites). Even today, ‘falling stars’ is not a bad way of describing meteor showers.

The body of evidence is large that something like this has happened in the not-so-distant past. Allan and Delair speculate that it happened in 9500 BC. The Bible is not explicit about such an event, but some miracles, such as the Long Day of Joshua, could also be explained by this ‘near-miss’. But even if some Biblical references are consistent with such an event in the past, what about the future references? A key reference would be Matthew 24:29,30 (which has already been discussed in part).

... the sun [shall] be darkened, and the moon shall not give her light, and the stars shall fall from heaven, and the powers of the heavens shall be shaken: And then shall appear the sign of the Son of man in heaven: and then shall all the tribes of the earth mourn, and they shall see the Son of man coming in the clouds of heaven with power and great glory. Matt. 24:29,30.

It is hard to read this passage in any other way than referring to the Second Coming of Christ, which is yet in the future. Perhaps there will be another ‘near-miss’ of a wandering comet then. But, while this provides an explanation of sorts for the falling stars, it really does not do justice to the change of appearance of the sun and moon. So while a ‘near-miss’ in the past is quite possible, and another could happen in the future, it does not seem to meet all the conditions of the passages like the one in Matthew.

This leaves us with two alternatives, ball lightning and angels. Ball lightning is an interesting ‘natural’ explanation for the star of Bethlehem. We will consider this phenomenon in more detail in the next chapter. Ball lightning is usually not very bright and lasts only a few seconds, so the star of Bethlehem would have been a very bright, very stable, and very long lasting form of ball lightning. If located always above Bethlehem, it would have been perhaps 50 to 100 miles above the earth in order to be seen by the wise men hundreds of miles to the east. It could have dropped as the wise men approached, to indicate the town and even the exact house where Jesus was to be found. This ‘natural’ explanation would require that the firmament or aether be a minimum of 50 to 100 miles thick and be able to supply power to a beacon visible hundreds of miles away for a period of weeks or months.

Of course, the star of Bethlehem may have been a special miracle, devoid of any scientific implications, which may be exactly what God would want us to believe.

The final alternative, angels, has some interesting implications. Is it possible that there are not two types of shining heavenly bodies, angels and stars, but just angels? This is a mind boggling question because of the extent of the scientific indoctrination we have all received. We have been told that the stars are like our sun since childhood, so that this belief system is deeply ingrained within us.

How do we ‘know’ that stars are indeed like our sun and are located great distances away. What is the solid evidence and what is inference? No one has been to a star, nor is anyone likely to make such a trip if the great distances are correct. Our information comes from looking through telescopes, which cannot distinguish surface features such as are observed on our sun. Distances are inferred from the intensity and color of light emitted. Distances to a very few nearby stars can be estimated from parallax measurements, given the diameter of the earth’s orbit around the sun and the assumption of a star fixed in space several light years away. The telescopes show us stars which pulsate in brightness, stars which rotate around each other, and generally a rich variety of sizes and colors.

Can all these observations be explained in terms of a large number of angels located outside the solar system, but not necessarily light years away? It would appear that they could. Angels seem to be created in a wide variety of appearances like the rest of the creation, so differences in intensity and color of light would be expected. Two angels dancing around each other could explain the binary rotating stars. An angel spinning or dancing in place could explain the pulsating appearance. Presumably the angels would get quite bored with this repetitive activity, perhaps even to the point of wanting to quit and do something (anything) else. Perhaps this is why a third of them accepted an offer from Satan and were thrown down from heaven.

We might even ask which approach God would be more likely to take, to create a universe of almost infinite size, or to place an almost infinite number of angels around the earth. It seems evident from the Bible that God’s interest is centered on planet earth. There is no clear mention of other planets, other suns, or other peoples (located on other planets). If this is true, then there is no particular reason for creating a huge universe. A task force of angels, dancing before God and praising God in the heavens would do nicely.

Certainly a huge universe would be impressive, which would presumably bring glory to God. However, this great size would not be known to mankind until the invention of the telescope, which causes this concept to lose some of its impact. The apparently huge universe has not caused people to praise God to any extent. Instead, the talk is of the Big Bang, of earth being an insignificant planet circling a mediocre sun near the edge of a small galaxy. The idea of evolution is encouraged by having many potential planets where life could have evolved. Somehow the idea of God sending His Son to die for mankind loses its impact because earth is such an insignificant planet.

It appears then that the scriptures do not require, or even support, the idea of a huge universe. Satan has certainly used the idea of a huge universe to his benefit. God would receive more glory from a crowd of angels surrounding the solar system than He would from any huge universe. This would get us back to the earth-centered view of the scriptures. After all, the earth was created on the first day, but the sun, moon, and stars were not created until the fourth day, so the focus of God’s attention is quite

evident.

The concept of the visible stars actually being angels located somewhere outside the solar system would also eliminate the debate over whether God created the stars with light extending millions of light years away, as would be necessary if the earth is young and light from stars more than about 6000 light years away would not have had time to reach earth since the creation. The notion of apparent age at creation has been debated for centuries, of course. There was little choice for God but to create full sized, mature animals and man, with the associated apparent age. This would not be a lie or misrepresentation in any sense. However, a star could probably be created without light at great distances, so putting the light there would give the appearance of age, with the only obvious purpose being to fool man on the age of the star. This is certainly contrary to the character of God.

I suggest then that the stars visible on a clear night are perhaps actually angels, located perhaps not too far outside the solar system. A star (angel), either a new one or one of the existing ones, could easily move over Bethlehem and hold its position while the wise men were getting there. Stars could literally fall to earth, the morning stars could sing for joy, and other obscure scriptures could be fulfilled or explained in a simple, straightforward fashion.

This suggestion is not essential to the understanding of the firmament. That is, there could actually be astronomy book stars out there, and also a firmament with unsuspected properties around the earth. The Latter Day Saints might even be found to be correct that some of the stars have planets with people like us inhabiting them. The point is that there are many scriptures that state concepts in straightforward terms, that would be scoffed at by most ‘modern’ scientists. Special creation rather than evolution, and an universal flood, are concepts clung to by a remnant of conservative Christians in the face of considerable opposition. But even this remnant accepts most claims of ‘modern’ science, and would therefore be inclined to reject the idea of angels visible from earth in the night skies. This author believes that modern physics has some major flaws, while the Bible can be trusted completely. To accept new concepts will require some degree of doubt in the correctness of the old concepts. Perhaps asking these ‘what if’ questions about some of these topics in the scriptures will help stretch our imaginations and help us to see the world in the way intended by God.

We really did not add anything to our list of requirements for an aether model from this section. However, some of the notions not added might make model development easier. We do not have to include a mechanism for the Big Bang, for example, nor for an universe that is almost infinite in size.

3.4 THE HEAVENS WILL BURN UP

The firmament was created to divide the waters, thereby making the earth more livable, but also making the flood possible, with its purifying and cleansing effect on the earth. I believe it is still operating to make the earth livable, perhaps through interaction with the atmosphere and through the earth's magnetic field. I also believe it will be involved with the next cleansing of the earth, as described by the Apostle Peter.

For this they willingly are ignorant of, that by the word of God the heavens were of old, and the earth standing out of the water and in the water: Whereby the world that then was, being overflowed with water, perished. But the heavens and the earth, which are now, by the same word are kept in store, reserved unto fire against the day of judgment and perdition of ungodly men. . . . But the day of the LORD will come as a thief in the night; in the which the heavens shall pass away with a great noise, and the elements shall melt with fervent heat, the earth also and the works that are therein shall be burned up. . . . wherein the heavens being on fire shall be dissolved, and the elements shall melt with fervent heat? II Pet. 3:5–12.

One clue as to what 'heavens' means is the statement that they will pass away with a loud noise. Sound waves do not propagate through a vacuum. A supernova may be seen on earth but would not be heard. The firmament, on the other hand, appears to be earth bound, and its burning would certainly be heard on earth. Therefore the passage is talking about the firmament and the earth.

We might ask if this burning is for purification, which would leave behind a cleansed earth (the new earth), or whether it is for total destruction and annihilation, leaving behind only empty space. I believe that by analogy with the flood, the burning would be for purification. Water purified the earth, making it fit for Noah and his descendants, and likewise fire would purify the earth, making it fit for Jesus and His bride (the Church). This would also be consistent with the economy of God, by using His creation for an additional purpose and an additional period of time. The firmament would thus be involved twice in purifying the earth.

The same argument could be made from our knowledge of chemistry. Burning does not annihilate the elements, but rather changes their form. Carbon in wood combines with oxygen in air to form carbon dioxide. The original elements are still present but in different form.

Another argument would be that fire is a good method of purification, but if God really wanted to annihilate the earth, He would not need fire. He would just 'uncreate' what He had created in the beginning, and then create (from nothing) a new heaven and

a new earth. Since fire is specifically involved, the function is more likely purification than annihilation.

A related scripture is

And I saw a new heaven and a new earth: for the first heaven and the first earth were passed away; and there was no more sea. Rev. 21:1.

The phrase ‘passed away’ might seem to indicate annihilation, except for the note that *the sea was no more*. This note is only meaningful in the context of a purified earth. A new earth (created from nothing) would not have any past history. It may or may not have seas, but the lack of seas would have to be stated as such, without saying the sea was no more. If the first earth was annihilated, then the sea would certainly be annihilated with it and *the sea was no more* would be redundant. It appears the phrase is a transition between the old and the new, and describes the new earth by what is different about it from the old (unpurified) earth. The purification would certainly vaporize the oceans. The new earth will have a different type of climate and a different type of atmosphere, so oceans will be unnecessary to moderate the climate. Eliminating the oceans would also provide a greater land area for man to live.

Where does the energy come from for this purification? Directly from the hand of God as a miracle totally outside any earthly energy source would be one possible answer. I believe, however, that the energy for this purification was stored in the firmament, just like the water for the first purification (Noah’s flood). Creating the firmament did occupy God for one day out of the six of creation, so it is quite likely a complex structure. To build in the means for purifying the earth twice, as well as making it livable for man in between, would be a nice piece of work. It has a God-like simplicity and elegance. For this reason, I will assume that the firmament has a high energy density. The total energy stored would be enough to vaporize the oceans and melt the earth’s crust to a depth of perhaps one or two km (or however deep is required to remove the evidences of sin). This would be many orders of magnitude greater than the energy stored in nuclear weapons, indicating that man is not capable of bringing about this great destruction by nuclear warfare.

A firmament or aether with this sort of energy density would evidently be capable of supplying all of mankind’s energy needs for many years without running out. All we need to do is just tap into it.

3.5 FIRE FROM HEAVEN

The notion that the firmament has a high energy density may also have some support from the many scriptures which speak of fire from heaven.

Then the Lord rained upon Sodom and upon Gomorrah brimstone and fire from the Lord out of heaven; Gen. 19:24.

And there went out fire from the Lord and devoured them (Nadab and Abihu), and they died before the Lord. Lev. 10:2.

And there came out a fire from the Lord, and consumed the two hundred and fifty men that offered incense. Num. 16:35.

... the fire of the Lord burnt among them, and consumed them that were in the uttermost parts of the camp. Num. 11:1.

... The fire of God is fallen from heaven, and hath burned up the sheep, and the servants, and consumed them; ... Job. 1:16.

These were certainly amazing miracles. We might ask if such miracles were only for Old Testament times, or if such miracles persist even up to modern times. An analogy might be miracles of healing, which many evangelicals and mainline Christians say ended with the death of the last apostle, or at best happen rarely, but which most charismatics affirm still happen regularly. A related question, of most interest to the charismatics, would be about the possibility of counterfeit miracles. The Devil is not particularly creative, but does have some power, and will attempt to replicate or counterfeit some of God's miracles. So one can always ask if an unusual event was from God, from the Devil, or caused by 'natural' circumstances for which we do not as yet have a scientific explanation.

Surprising as it may seem, there are many modern accounts of human death by fire that lack a ready scientific explanation. They also lack obvious spiritual causes. That is, there is little or no evidence that would indicate either a real miracle from God or a counterfeit miracle from the Devil. Therefore there is the possibility that 'fire from heaven' still kills people, but as a part of the 'natural order' rather than the miraculous.

Michael Harrison has written a 379 page book called *Fire From Heaven* [7] on this subject so there is more documentation than one would suppose. There is also a 478 page book on the topic by Larry Arnold [2]. Harrison calls the burning Spontaneous Human Combustion, where Spontaneous refers to the concept that there is no obvious source or cause of the fire. There are literally thousands of accounts of these fires over the past few centuries. A few of them will be reviewed here.

One classic case, which even had FBI involvement, was that of Mrs. Mary Hardy Reeser, age 67, who died during the night of July 1, 1951 in her apartment in St. Petersburg, Florida [7, Pages 136-154]. She was last seen alive by her landlady, Mrs.

Pansy M. Carpenter about 9 p.m. on July 1. She was in her nightgown, over which she wore a housecoat, and was sitting in an over-stuffed easy-chair, smoking a cigarette. The landlady went back the next morning about 8 a.m., found the door knob hot, and was greeted by a blast of hot air when the door was opened. Inside, “Within a blackened circle about four feet in diameter were a number of coiled seat-springs and the remains of a human body. The remains consisted of a charred liver attached to a piece of backbone, a skull shrunk to the size of a baseball, a foot encased in a black satin slipper but burned down to just above the ankle, and a small pile of blackened ashes.” There was smoke damage starting at a level four feet above the floor. The FBI found no flammable liquids in the residue. To have a fire hot enough and long enough to consume even the bones but not go outside the boundary of a four foot diameter circle is certainly unusual.

Another interesting example [7, Page 70] was Mrs. Euphemia Johnson, a 68-year old widow, weighing about 170 pounds, who died by fire in London during the summer of 1922. She made a cup of tea in the afternoon, brought it to the table, and drank part of it before she died by fire. When discovered, all that remained was a pile of calcinated bones, implying a very hot fire. However, her clothing was unburned. The chair on which she was sitting had fallen over, but showed only a slight bubbling of the varnish to indicate heat, even though it was just inches from the body. The oilcloth on the table hung down to within nine inches of the body but was only slightly yellowed. The linoleum under the body was just slightly charred.

A case of partial combustion was that of Mr. James Hamilton [7, Page 78], a professor of mathematics at the University of Nashville, Tennessee, on January 5, 1835. He walked home from work, felt pain in his left leg, and saw that a bright flame, several inches in length, ‘about the size of a dime in diameter, and somewhat flattened at the top’, was spouting, like a lighted gas-jet, from his leg. He slapped at the flame several times, but, as it did not go out, he cupped his hands around it to reduce the supply of oxygen, which was successful in extinguishing the fire.

He went indoors, took off his pants and underpants, and examined the wound. On the surface of the outer and upper part of his leg was an injury that resembled an abrasion, about three-fourths of an inch in length, very livid in appearance. The wound was extremely dry and the scar tissue had gathered in a roll at the lower edge of the abraded surface. A small hole had been burned in the underpants, with no scorching around the hole, and the pants were not burned at all. The wound and some associated muscular soreness took a long time to heal. The wound did eventually heal, however, and Mr. Hamilton enjoyed good health without further incident.

Jack Larber was a resident in a home for the elderly [7, Page 81]. He was not an alcoholic. A nurse gave him a glass of milk to drink. Five minutes later, the nurse found him enveloped in flames, from which he died. There were no matches or other sources of heat in the room.

John Greeley was a helmsman of the SS *Ulrich* on April 7, 1938, and was steering the ship when another crew member noticed the ship beginning to yaw [7, Page 91]. This crew member found Greeley ‘burned to a crisp’, ‘a human cinder’. However, nothing else in the small pilot-house showed any signs of heating. The compass, the varnished wooden wheel, and the scrubbed floor on which the body fell were all unscorched.

Marilee Mars, 22 years old and a senior at Le College de Ste Marie, outside Paris, was taking a shower when the fire hit [7, Page 317]. According to a fellow student and eye witness, the young woman started to smoke and then burst into flames under a heavy stream of water in the shower.

Harrison [7, Page 38] cites a number of trends that he has observed in the literature:

1. Little damage is done to combustible substances – clothes, furniture, etc. – even in the closest contact with the body.
2. There is a residue of greasy ashes.
3. There is almost total consumption of the body.
4. The extremities usually escape serious burning; certainly hands and feet – and often the head – are never totally consumed.
5. Females form the majority of victims.
6. Victims are often heavy drinkers, but abstemers are also burned.
7. Victims are often overweight, but thin people are also burned.

What are we to make of these accounts? They certainly do not fit our ‘modern’ understanding of reality. However, they do sound much like what happened to Nadab and Abihu, Lev. 10:2. Could it be that what happened to Nadab and Abihu was a rare but ‘natural’ event, and the miracle was in the timing. Certainly that was the case with Ananias and Sapphira in Acts 5:1-10. They died, an experience common to all of us at some time, so the obvious miracle was in the timing and circumstances. Since the scriptures contain several accounts of people dying by fire, it would seem to be in the realm of possibility that this is a ‘natural-but-rare’ phenomenon that God will occasionally use for His purposes.

This fire can be exceedingly powerful, as seen by the conclusion of the conflict of Elijah with the 450 prophets of Baal:

Then the fire of the Lord fell, and consumed the burnt sacrifice, and the wood, and the stones, and the dust, and licked up the water that was in the trench. I Kings 18:38.

We see here that the fire from God was hotter than is possible by burning fossil fuels. Consuming stones would require something like an electric arc to produce the high temperature required.

While these miracles could certainly have come directly from the finger of God, it is conceivable that God would use the energy content of the firmament to produce the fire. The precise timing and location of these incidents would certainly qualify them as miracles even if something already created was used to actually produce the fire.

Arnold makes many suggestions about the possible cause or origin of these fires. One particularly interesting one is that of a high-energy particle that he calls the *pyrotron*. It is something like a cosmic ray or gamma ray, but with much greater energy. He states [2, Pages 100-101]:

Pyrotrons are as penetrating an experience as they are small. To a pyrotron, the quarks in your body look like galaxies. To a pyrotron, your body is so full of wide-open spaces that the chance of an atom inside you getting pricked by a pyrotron rocketing through you is, shall one say, astronomically small! But once in a rare while, the odds catch up.

And subatomic hell breaks forth, as a freak accident rapidly unfolds. The pyrotron rockets into a quark and, in smashing it, triggers a complex subnuclear chain reaction within the body.

The precise development of this personal Hiroshima will vary, depending on the momentum of the pyrotron; the point of impact on and size of the subatomic particle impacted; and the location of the collision within the body. Generally, the energy released in the initial collision would cause neighboring atoms to spontaneously speed up, enlarge their diameters, and thus increase the probability of more interactive collisions. As the transfer of energy continues, some over-energized atoms would at this point react with the oxygen in the respiratory system of the body. (Or in the atmosphere.) So there could be complete combustion (oxidation) in the immediate vicinity. The likeliest point of origin would be the bulkiest area of the body: the torso. The farther removed from the center of the point of the first collision, the lower the thermal level would be, resulting in less complete combustion (that is, nuclear disintegration) and creating partial dehydration, distillation, or other limited decompositions in the body.

The rapid distillation of decomposed fats (mostly hydrocarbon) and glucose ($C_6H_{12}O_6$) with the liberated carbon coming in contact with steam vapor condensed on the wall, explains the oft-reported presence of the “oily soot” encountered in many SHC cases. It explains why victims experience absence of struggle or pain; why they so often exhibit perplexingly varied degrees of disintegration; why their extremities (feet, hands, legs, head) are often

discovered intact; why adjacent objects are rarely damaged (the “fire” being an internal atomic disruption incommunicable to, or having very limited effect on, energy patterns external to the human biosystem).

And how much energy does this unbelievably small pyrotron pack as it jets neutrino-like through your body, the planet, indeed the galaxies themselves? Quantum theory again provides an answer, and what an answer it is! *The pyrotron’s energy is 9.6×10^{26} electron-volts . . .*

Arnold is postulating a pyrotron to help meet the energy requirements in these SHC cases. It is well known that cremation of a human body requires high temperatures for an extended period of time. Ordinary chemical combustion of body fats will not supply the temperatures or the total energy required. The doubter is encouraged to throw a piece of meat (with fat and bone) on a charcoal fire sometime. The bone will still be solid (not ash) and the meat will be recognizable (not ash) when the fire has gone out.

An aether with a high energy density would also supply the required energy for combustion. The event could still be triggered by a high energy particle such as a gamma ray, and a little thought might reveal other trigger mechanisms.

The reader is probably asking why such a ‘natural’ phenomenon is restricted to humans. Why not animals or plants? Arnold actually documents a number of cases where dogs and other animals have experienced spontaneous combustion. Animals are normally found outdoors, where lightning would be a ready explanation for strange burns. Fortunately, it is a rare phenomenon, with documented cases of SHC being well under one hundred per year, worldwide. Dead animals do not require a visit from a coroner or a death certificate listing cause of death, so it is not surprising that accounts of animal combustion are rare.

For the past quarter century, I have been a part-time consultant in the areas of electrocutions, electrical burns, and cause-and-origin of electrical fires. I have observed that a fire marshal will typically put down ‘electrical’ as a cause of fire when nothing else is immediately obvious. Several times, I have attempted to replicate the fire in my laboratory, always without success. I have written reports which outline all the possibilities that I could think of (mice, bugs, defective insulation, voltage surges, and so forth) and then concluded “This fire could not possibly have occurred, but it did”.

Certainly, some fires do occur from natural electrical causes. However, my experience is that there is a residue that need another explanation. This residue could be as high as one-half of the fires for which ‘electrical’ is listed as a cause. Whatever the percentage, it is consistent with my experience that, once in a while, something happens in a building to produce an intense fire. If there are combustibles nearby, the fire continues. If it happens in a metal bus duct (found inside commercial buildings), the conductors melt and the fire stops for lack of combustibles.

The electrical wiring may interact with the aether in some fashion, to guide or focus the energy flow so the fires start at or near the conductors, even though the conductors and insulation are in perfect condition. This would certainly give the fire marshal reason to write ‘electrical’ as the cause of fire. However, it does not mean that anybody is ‘at fault’ for causing the fire. Rather it is more in the category of getting hit by lightning, just one of the features of the world we live in.

Again we see that the Bible is consistent with the above observations of the world around us. Both support my belief in a high-energy aether, which can be tapped as a new energy source.

3.6 INFERRED PROPERTIES OF THE FIRMAMENT

It is apparent that there are many scriptures that have a meaningful literal interpretation only if there is a firmament with certain properties and features that have not yet been discovered by man. Without a firmament, most of these scriptures will remain obscure, with no obvious spiritual meaning. There are also empirical observations which agree with the scriptures and support the concept of an energetic aether. To summarize, the inferred properties of the firmament or aether include:

1. The aether is able to hold up liquid water and probably ice. Both the holding up and the letting down to earth without overheating the earth from stored potential energy imply that the aether is able to interact with and even counteract the forces of gravity.
2. The aether has some sort of structure such that it can be stretched and rolled up. The stretching implies fixed points of attachment, which might be called pillars. This further implies some sort of world grid.
3. The aether can affect the propagation of light such that the sun and moon would change their appearance, and even would appear to be completely dark.
4. The aether has a high energy density. Energy can be extracted rapidly, as in the case of spontaneous human combustion. There may be a very high threshold or trigger energy required to burn (explode) the aether in this manner. (We will see in later chapters that power can apparently also be extracted from the aether without a burning process).

Other properties will be deduced from a careful observation of the world around us, especially of those data which do not fit comfortably into the existing scientific worldview. We now turn our attention to unexplained atmospheric phenomena.

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CHAPTER 4

UNEXPLAINED ATMOSPHERIC PHENOMENA

We have seen that a literal interpretation of the Bible and some other sacred literature (and some supporting modern observations) leads to a concept of the space around us that is much different from that accepted by most modern scientists. We must then ask if there are any other data or observations which would support the concept of an energetic aether. We will discuss several such phenomena which may be explainable by the operation of the firmament or aether. The first such phenomenon is lightning.

4.1 LIGHTNING

Lightning can be defined as [50, Page 1] a transient, high-current electric discharge whose path length is generally measured in kilometers. Lightning occurs when some region of the atmosphere attains an electric charge sufficiently large that the electric fields associated with the charge cause electrical breakdown of the air. The most common producer of lightning is the thundercloud. However, lightning also occurs in snowstorms, sandstorms, in the clouds over erupting volcanoes, and even from clear air.

A cloud-to-ground lightning discharge is made up of one or more intermittent partial discharges [50, Page 3]. The total discharge (time duration on the order of 0.2 seconds) is called a *flash*. The component discharges (time duration of one millisecond or less) are called *strokes*. There are usually three or four strokes per flash, the strokes being separated by 40 ms or so. Sometimes lightning as observed by the eye appears to flicker. In these cases the eye is discerning the individual strokes which make up a flash.

Each lightning stroke begins with a weakly luminous pre-discharge, called the *leader*, which propagates one direction between cloud and ground, and is followed by a very luminous *return stroke* in the opposite direction. The first leader in a flash is called the *stepped leader*. It appears to move in luminous steps of typically 50-m length with a pause time between steps of about 50 μ s. The typical average velocity of the stepped leader during its trip to the ground is 1.5×10^5 m/sec, so it takes about 20 ms to traverse a 3-km distance. There is charge movement, perhaps on the order of 100 A, so the stepped leader establishes a charged, conducting channel between cloud and ground.

Once the channel is in place between the two regions of high charge, the very luminous return stroke flows along the channel at a velocity of typically one-third to one-tenth the speed of light, making the trip in a time of the order of 70 μ s. The current measured in the stroke at ground level rises typically to 10,000 to 20,000 A in a few μ s and falls to one-half of peak value typically in 20 to 60 μ s. Currents of the order of hundreds of amperes may continue to flow for several ms.

Clouds are even poorer conductors of electricity than the clear air surrounding them. Measurements indicate electrical relaxation times of 4000 s [22, Page 75] as compared with 600 s in clear air. Because clouds are poor conductors of electricity, large amounts of free charge can accumulate there and culminate in lightning.

A thunderstorm will have a positively charged region at the top of the cloud, centered at about 6 km above ground, and a negatively charged region lower in the cloud, centered at perhaps 3 km above ground. There may also be a small positive region at the bottom of the cloud. The upper positive region may contain from 20 to 60 coulombs while the negative region may contain from -40 to -340 coulombs. The maximum vertical field strength in a thunderstorm has been measured at about 150,000 V/m, with an average value closer to 10,000 V/m. This compares with the fair weather ground level electric field of about 130 V/m.

These levels of charges and fields imply substantial forces within a cloud. The charged regions would tend to expand and to move toward a region of opposite charge. It requires significant amounts of energy to separate the charges in high potentials like these. The source of energy is assumed to be the latent heat of condensation. An updraft of clear air occurs near the base of a cloud. As the clear air moves upward it expands and cools, reaching the dew point at the cloud base. The moisture in the air starts to condense, releasing heat to the surrounding air and maintaining its temperature above that of its surroundings. The rising air continues to experience upward acceleration over several kilometers of rise. Vertical velocities in excess of 60 m/s have been measured, with average velocities in the range of 4 to 6 m/s [22, Page 56].

After most of the moisture has been condensed out, the momentum of the air continues to carry it upward. It becomes colder than its surroundings, slows down, and eventually sinks back toward earth. This downdraft may be alongside the updraft, so that an airplane flying through the thunderstorm may experience both an updraft and a downdraft in quick succession.

This vertical motion of air is assumed to provide the energy for charge separation. There are at least two different categories of explanations: one uses the falling precipitation particles to separate charges within clouds (called *induction*) and the other depends on the *convective* motions of cloudy air to transport externally derived charges in a somewhat organized fashion. The induction method is found lacking in [22, Page 85]:

It has long been widely assumed, without evidence, that negative charge is selectively separated and transported downwards in thunderclouds by falling precipitation particles. Modern proposals to explain how this may be accomplished began with Elster and Geitel's (1885, 1913) induction charge transfer process in which charge is postulated as being separated in elastic collisions between cloud particles and falling precipitation polarized by a ver-

tical electric field. Although many other interactions involving precipitation have been suggested in the past 90 years to explain thundercloud electrification, most of them have been shelved as unworkable for various reasons. One of them, the selective capture of ions by raindrops polarized in an electric field (Wilson, 1929) appears, however, to provide an adequate explanation for the charging of precipitation beneath thunderclouds. On the other hand, however, this mechanism has been found inadequate for the production of intense fields in electrified clouds for two reasons: there are insufficient ions in cloudy air and this ion-capture mechanism depends on the precipitation fall velocity being greater than the ion velocity in the local electric field; in fields stronger than 10^5 V/m, many ions move faster than the precipitation.

The lack of supporting experimental data is a major difficulty with all precipitation-powered mechanisms (excepting Wilson's beneath the thundercloud). There are no good observations showing that falling precipitation is carrying sufficient charge in opposition to the local electric fields to account for the accumulation of electrical energy in the cloud in the observed time sequence. Thus far the observations indicate that the fall of charged precipitation is dissipating rather than increasing the electrical energy of the cloud.

The convective mechanism is thought by the above authors to have more promise [22, Page 87]. This requires the prior existence of space charge, say positive at the top of the cloud and negative at the bottom, in order to get the process started. The negative charge will pull positive ions from sharp points at ground level. These positive ions will be carried upwards by updrafts to join the positive charge already at the top of the cloud, thus increasing the total positive charge concentration, as shown in Fig. 4.1. This positive charge concentration will also attract negative charge from the clear air above the cloud. By some obscure mechanism the positive charge stops while the air continues going up, into the negative charge region. The air overshoots its equilibrium point, becomes more dense than its surroundings, moves horizontally and then goes into a downdraft, carrying negative charge along with it to add to the negative charge already at the bottom of the cloud. The negative charge stops, by a similar obscure mechanism, while the air continues on, picking up positive ions near ground level before going back into the updraft. If we visualize two adjacent columns of air, updraft and downdraft, the updraft contains positive charge, concentrated at the top, while the downdraft contains negative charge, concentrated at the bottom. Overall, the cloud is more positive at the top and more negative at the bottom, but locally may have different values. Exactly how the charge knows to stop in the location where coulomb forces are the highest, while the flow of air continues on is not spelled out in detail.

We see that the mechanisms by which charge is separated in a cloud have not been proven to everyone's satisfaction even after over a century of research. This certainly leaves room for a new explanation, even a new aether model.

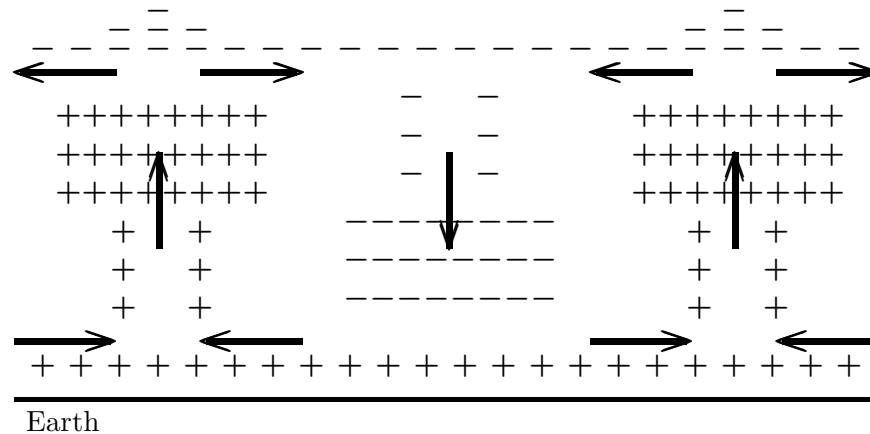


Figure 4.1: Convection Theory of Thunderstorm Electrification

Electrical Balance of Earth and Atmosphere

Lightning is a component of the overall exchange of charge between the earth and the atmosphere, which we now want to examine. Considering the macroscopic scale, the earth possesses a negative net charge of the order of 540,000 coulombs. This causes an electric field of about 130 V/m to be directed from space toward earth [22, Page 70]. The upper atmosphere is at a mean potential of about +300 kV relative to the earth. Positive ions in the earth's atmosphere drift toward earth, carrying an average current of about 3×10^{-12} A/m², which would neutralize the charge on the earth in less than half an hour in the absence of a regenerating process. According to Israel [36], the charge conversion balance between the atmosphere and the earth's surface can be broken down as follows:

1. The fair weather air-earth current of about 3×10^{-12} A/m², or a total of 1530 A for the earth's surface as a whole.
2. The precipitation current. Under a cloud, the electric field usually reverses. When it reaches 1500 to 2000 V/m, positive ions are produced at sharp points on grounded objects. These ions drift upward and some are captured by falling precipitation. On the average, this amounts to about 10^{-12} A/m² or about one third of the fair weather current.
3. The lightning current. On the average, there are about 1800 thunderstorms active above earth at any instant of time. (This number is estimated as 1000 in [22, Page 52].) There are also about 60 lightning discharges per thunderstorm per hour, which yields about 108,000 lightning discharges per hour. The average quantity

of charge transferred per lightning discharge is about 20 coulombs, and there are about four lightning discharges carrying negative charge to the earth for every one carrying positive charge to the earth. If the positive stroke is canceled by a negative stroke, only three out of five strokes actually carry a net negative charge to the earth. This would yield a total charge per hour of $(108,000)(3/5)(20) = 1296$ kilocoulombs, which corresponds to a current of $1,296,000/3600 = 360$ A. This may be low by a factor of two, but it appears that lightning does not carry enough current to compensate the fair weather air-earth current.

4. The thunderstorm air-earth current. Measurements on this current have not been extensive, but it appears that this current balances the others. We have a positive current toward the earth of 1530 A in fair weather areas, a positive current toward the earth of 510 A in precipitation, a negative current toward the earth of 360 A in lightning, and a negative current toward the earth of $1530 + 510 - 360 = 1680$ A in thunderstorms.

We see that the charge exchange between the earth and its atmosphere is quite complex. Why do the charge differences persist century after century? Why not have a world without static electricity, without lightning? Why is this chaotic process stable even when the solar energy presumed to be the driver is known to vary with sunspot cycles and volcanic eruptions? Could the real energy input be from the aether?

Lightning Anomalies

Many other aspects of lightning are also anomalous. Corliss [10] is a premiere collector of anomalies and we will list here several of his categories of more unusual observations of lightning.

ROCKET LIGHTNING [10, Page 130]. Ascending strokes of lightning, usually originating in clouds and terminating in clear sky. The bolt often shoots up in a single column “like a rocket” and burst like fireworks into innumerable fingers. Occasionally strokes rise directly from the surface of the ground or sea. Rocket lightning strokes frequently seem thicker and slower than those of ordinary lightning.

BEAD LIGHTNING [10, Page 133]. Lightning strokes that appear to dissolve into many luminous segments, usually spherical but sometimes rectangular, as the stroke fades away. In some cases, the long lines of bright beads seem to appear without any precursor normal lightning stroke. In both cases, the beads may persist for 1 to 2 seconds. Also called pearl lightning, chain lightning, segmented lightning, punctuated lightning, pinched lightning, perlschnurblitz, eclair en chapelet, and other names.

HORIZONTAL LIGHTNING [10, Page 138]. Lightning that travels horizontally many times the cloud-to-earth distance before striking the earth. Many apparently

inviting targets, such as church spires and tall chimneys may be bypassed in favor of distant low-level targets located miles from the cloud-of-origin and often in bright sunlight.

LIGHTNING FROM A CLEAR SKY [10, Page 140]. Lightning discharges that appear to originate in clear portions of the sky. Thunder often follows such discharges, but not always. Most examples cited involve well-defined bolts, but other flashes are diffuse, like heat lightning.

TUBULAR LIGHTNING [10, Page 158]. Very broad lightning discharge channels possessing a tubular appearance. Channels up to 18 feet in diameter have been measured in photographs. These broad channels frequently meander and display a striated or broken structure.

MEANDERING LIGHTNING [10, Page 159]. Intricate, looping, reversing, wandering lightning strokes. Such discharge channels often approach the ground closely but do not touch seemingly inviting objects. Meandering lightning is frequently broken and/or tubular.

Others have also speculated about unknown phenomena hiding behind the awesome display of lightning power, including [6, 23, 27].

Unknowns About Lightning

There are a number of nagging questions about lightning that remain to be answered. One is that of observed vertical velocities. To examine this question, we compare the lift on a parcel of warm air to that of a hydrogen filled weather balloon, which has a maximum vertical velocity of about 3.6 m/s. The acceleration force on a hydrogen filled balloon will be several times greater than that of a parcel of air with a temperature slightly different from the surrounding air. It would appear then that even with lower friction at the air-to-air boundary (as compared with the balloon-to-air boundary), the maximum observed vertical air velocity should be much less than the measured 30 to 50 m/s.

Uman [50, Page 5] also recognizes a problem that most electromagnetics books do not explicitly mention. Electromagnetics books typically assert the following concepts, although rarely on the same page:

1. Current consists of the flow of electrons.
2. Current flows at the speed of light in the medium surrounding the conducting path.
3. Electrons move at speeds determined by their mass and the accelerating electric

fields, usually at speeds eight orders of magnitude less than the speed of light.

Students typically compartmentalize their learning from different chapters in a book and rarely notice the obvious contradiction in the above concepts, if the teacher does not mention it. If pressed, the teacher typically waves his arms, raises his voice, and talks knowingly about billiard balls or water molecules in a pipe. The student feels somewhat foolish and never raises the question again.

Uman has at least thought about the issue, and suggests that the step leader has introduced considerable charge into the channel by relatively small currents over relatively long periods of time. The entire charge column moves during the lightning stroke, so the current can be high and be observed over several km while individual electrons move only a few meters at most. The concept is certainly plausible. It has not been shown to work in a detailed model, however, and may be discovered to not represent reality at all.

Uman [50, Page 203] is also honest about other aspects of lightning research:

Considerable experimental data have been accumulated regarding the lead and return-stroke processes. From these data information has been derived regarding the relative intensities and the propagation velocities of various luminous phenomena and the charges and currents associated with these phenomena. Unfortunately, the physical models derived from the experimental data or from the information determined directly from experimental data have often been obtained more on the basis of intuition than on the basis of detailed quantitative analysis. Lightning research has, in fact, been characterized by a marked absence of quantitative theoretical work. To some extent, this lack of quantitative theory is excusable. There is, for example, no quantitative theory for laboratory electrical breakdown due to *nonuniform* electric fields, although considerable experimental data for this type of breakdown have been collected. To muddle further the literature on lightning “theory,” the laboratory data, much of which is conflicting, have frequently been extrapolated in an effort to “explain” lightning phenomena. The whole lamentable situation is well characterized by the various theories of the stepped leader, some of which we shall discuss [later]. In much of the lightning literature the words *pilot leader* and *streamer* have attained the status of explanations or theories. To name is not to explain.

Not only do we not know how the discharge process works, but we are unsure about how the charge was accumulated in the first place, as Uman comments [50, Page 2].

Thunderclouds range in size from small clouds, which occur in the semitropics and in which the temperature may everywhere be above freezing, to giant

electrical storms, which may have a vertical extent exceeding 20 km. The height of a typical thundercloud is perhaps 8 to 12 km, although, strictly speaking, typical values can only be presented for a given geographic location. Within a typical thundercloud there is a turmoil of wind, water, and ice in the presence of a gravitational field and a temperature gradient. Out of the interaction of these elements, in a way or ways not yet fully understood (Coroniti, 1965), emerge the charged regions of the thundercloud.

Another quote about our lack of knowledge about thunderstorms is [22, Page 52]:

The processes that operate in a thundercloud to produce these actions [wind, lightning, thunder, rain] are varied, complex and poorly understood. Since thunderclouds are vast, turbulent and hazardous, their interiors have been inaccessible and good information is unavailable on the conditions within their boundaries.

Yet another comment in the same vein is given by Krider [42, Page 4]:

The updrafts and downdrafts and the interactions between cloud and precipitation particles act in some still undetermined manner to separate positive and negative charges within the cloud.

It may be that everything which is happening in a thunderstorm can be correctly explained with present day physics, but it is possible that something else is happening that can be explained only with a new theory, such as some activity of the firmament or aether. An aether model that explained lightning would be a great addition to our scientific knowledge.

4.2 BALL LIGHTNING

One piece of evidence for a new energy source which has some scientific respectability is ball lightning. Not all scientists believe there is such a phenomenon, but at least articles can be printed in journals like *American Scientist* and *Nature*. The history of ball lightning dates back at least as far as 1753, when G. W. Richman was killed by such a ball [45]. According to a witness, a pale blue fireball the size of a fist left an ungrounded lightning rod and floated silently through the air to Richman's face, where it exploded with a sound like a small cannon. Afterwards, Richman was not breathing, had a red spot on his forehead, and two holes in one of his shoes.

Another example quoted in the same source is the following:

A few seconds after a lightning stroke in the neighborhood, we observed outside the window a brightly gleaming sphere the size of a fist which moved downward in short serpentine lines. Then this luminous ball penetrated through the closed window pane (without damage to the glass) and entered our room. At a depth of about 1 meter it performed a sudden turn of 90° parallel to the wall and continued floating another meter further into the room. Thereupon it burst, and the luminous sphere disappeared with a brief deafening explosion.

This ball lightning was purplish with a reddish cast which persisted during the entire duration of the phenomenon. It lasted approximately three seconds. No damage whatever was caused either on the inside or outside of the room. After the bursting of the luminous ball, we could perceive the typical odor which occurs in the case of electrical discharge.

Corliss [10, Page 54-67] records 180 examples of “ordinary” ball lightning. Among them was the following account of events during a typical summer thunderstorm about 1958 in Cheektowaga, New York.

At one point a single lightning stroke was observed coming from a cloud directly over the open field. Some distance above the ground, the stroke divided into two simultaneous branches, each of which moved toward one of adjacent telephone poles. At a distance of some meters above the pole tops the entire lightning stroke disappeared, and in its place two (one over each telephone pole) large luminous spheres appeared. The color was yellowish, much like the flames of a brightly burning wood fire. The diameter was at least two or three pole diameters, possibly as much as five or six such diameters (0.4 to as much as 1.2m). The luminous spheres slowly descended toward the pole tops. When the spheres came very near or in direct contact with the pole tops, they exploded with a loud sharp bang. During the extremely brief ‘explosion’ phase, the spheres appeared to contract (much against my expectation for an event described as my expectation for an event described as ‘explosion’) and turned brilliant bluish white, as if to indicate much higher internal temperatures. Following the explosion, dark smoke was seen to rise from the pole tops, but it did not persist to indicate a fire.

The following incident of a ball lightning with considerable energy occurred on August 6, 1868, in Ireland.

Another instance of a remarkable kind is recorded by Mr. M. Fitzgerald as having occurred in the Glendown Mountains in Ireland. He noticed a globe

of fire in the air floating leisurely along. It descended from a ridge into the valley and reached a stream about 800 yards from the spot where the observer stood. It then struck the land and reappeared in about a minute, again disappearing and reappearing several times, until it flew across the stream and finally lodged in the opposite bank, leaving a hole where it buried itself. On examination of the track of this meteor, an aperture about 20 feet square was found in the peat where it had first touched the land, with the peat turned up on the lea as if it had been cut with a huge knife; it next made a trench about 20 perches in length and 4 feet deep, afterwards ploughing up the surface to about a foot. Next it tore away the bank of the stream about 5 perches in length and 5 feet deep, and then hurling the immense mass into the bed of the stream. ... From its first appearance till it buried itself could not have been less than twenty minutes, during which it traveled leisurely as if floating with an undulatory motion through air and land over a mile. It appeared at first as a bright red ball of fire about 2 feet in diameter, but became rapidly smaller, particularly after each dip in the soil, so that it looked not more than 3 inches in diameter when it finally vanished.

Other effects which have been reported in the literature include the melting of circular holes in a closed glass window, digging trenches in the ground, cutting metal cables and wires, shattering wooden logs, and the boiling of water in a rain barrel. In reviewing many observations, it appears that

1. Ball lightning often occurs during thunderstorms
2. The ball often moves downward
3. It can penetrate closed windows or cracks
4. It is usually accompanied by a hissing sound
5. A typical diameter is 20 centimeters
6. A typical lifetime is 5 seconds
7. The color is quite variable (violet and green are rare)
8. Brightness is similar to a strong fluorescent lamp [29, Page 141]
9. It often ends with an explosion
10. An odor and/or smoke is noticed after the ball dissipates.

Some lightning balls fade out slowly, others disappear abruptly, sometimes with a loud bang. They seldom damage anything, although they have scorched wood and burned through wires. Normally the ball moves about, sometimes along a conductor or an insulator and sometimes directly through the air.

Corliss [10, Page 68] lists many variations of ball lightning, including the following:

BALL LIGHTNING WITH DIVERGING RAYS: Luminous spheres with long, radial, fan-shaped rays shooting from their surfaces. These rays appear most often during detonation or disintegration of the balls, but occasionally they are long-lived features.

ROD-SHAPED BALL LIGHTNING: Luminous masses of cylindrical shape but otherwise possessing most of the characteristics of ordinary ball lightning. Sizes from 12×40 cm to 1×3 m have been reported. Bright flames sometimes issue from the surfaces of the cylinders. In general, the phenomenon seems somewhat more bizarre and energetic than ordinary ball lightning. Rod-shaped ball lightning has been seen to change into spherical ball lightning.

DOUBLE BALL LIGHTNING: Two or three balls of lightning connected by a luminous rod-like structure. The balls may be of different sizes but they move together.

GIANT BALL LIGHTNING: A luminous, roughly spherical but sometimes shapeless mass ranging in size from approximately 1 to 20 m. These glowing masses usually descend from thunder clouds, drift a bit, and fade away silently. There is often a strong resemblance to electric discharge phenomena.

FRAGMENTING BALL LIGHTNING: Ball lightning that bursts into many smaller balls or incandescent pieces that fly off in all directions. The formation of multiple, smaller, long-lived balls is rare. The “pieces” of ball lightning may carry dangerous amounts of energy or be harmless.

MATERIALIZATION IN ENCLOSURES: The formation of luminous spheres, usually smaller than average ball lightning, inside closed houses, aircraft [18], and electrically shielded volumes. Ball lightning may penetrate glass windows without breaking them. It may emerge from electrical apparatus, including telephones and aircraft instruments. The energy density has been estimated as high as 5×10^9 J/m³, with a total energy as much as 4×10^8 J [1]. Materialization may be coincident with lightning strikes outside the closed volume. Otherwise, this phenomenon has all the attributes of ordinary ball lightning.

BALL LIGHTNING WITH LONG TAILS: Luminous spheres similar to ordinary ball lightning but possessing long tails. The tails may be many times the diameter of the ball in length. Flat, tape-like, crinkled tails have been reported several times.

What appears to be ball lightning can be created rather easily in the laboratory in a radio-frequency induction furnace. Pictures are shown [29, page 145] of ball lightning

in a eight-foot metal box open to the atmosphere but filled with RF energy at 78 MHz. The air seems to be in a metastable state of excitation, in which most of the energy comes out as visible light. This has been called electroluminescent air.

What appears to be ball lightning can also be created easily by an arc discharge in a low pressure gas-discharge tube [29, page 154]. By interrupting the voltage across the electrodes, varying the internal air pressure, and by introducing capacitance or magnetic effects through movement of the operator's hand or of a magnet along the tube, many different effects can be produced.

Ball Lightning Theories

There have been many theories presented which attempt to explain ball lightning with conventional physics. These include the following [48, Page 78–145]:

1. Cosmic dust saturated with combustible gases sinking through the earth's atmosphere and being ignited by air pressure.
2. A Leyden jar structure where a spherical layer of air is compressed by the attraction between two opposite charges accumulated on either side of the layer.
3. A transformation of ordinary lightning into ball lightning.
4. Chemical reactions
 - (a) Nitrogen triiodide produced by electrical discharges
 - (b) Nitrogen dioxide
 - (c) Nitrous oxide
 - (d) Ozone
 - (e) Polyatomic oxygen and nitrogen molecules up to O_{12} and N_{12}
 - (f) Hydrogen and oxygen produced by electrolysis of water
 - (g) Hydrogen methane
 - (h) Propane
 - (i) Benzene
5. Radioactive decay of radioactive carbon, oxygen, and nitrogen produced by lightning
6. Biochemical reactions of atmospheric dust
7. Electrical interaction of highly charged water droplets

8. Molecular ion clouds
9. Vortex structures
10. Electrical discharges
11. Very hot incandescent materials
12. Plasmas and plasmoids
13. Focused electromagnetic radiation

Most authors point out difficulties with other authors ideas. It seems that every hypothesis has some difficulty in explaining all the observed phenomena. Models with high energy density typically lack stability for the observed time periods. Not all models show the necessary electrical effects. Some are quite speculative [2]. A few of the mainstream papers dealing with ball lightning include [18, 19, 26, 30, 39, 45, 46]. Those in the fringe literature include [12, 16, 17, 24, 25, 28, 40, 41, 47, 49, 52].

Singer [48, Pages 77, 146] makes the following comments about the status of ball lightning research:

The wide range and diverse properties exhibited by ball lightning and contained in the information gradually accumulated in the literature over the past 130 years present a difficult challenge to the natural scientist. Despite an unusual profusion of theories there is no conclusive or widely accepted explanation adequate to account for all the reported properties. . . . ball lightning remains one of the greatest mysteries of thunderstorm activity. Still less can it be said that experiment has succeeded where theory fails in duplicating more than the simplest appearance of the glowing spheres.

Uman [50, Page 12] is also blunt in his opinion of the matter:

Ball lightning is the name given to the mobile luminous spheres which have been observed during thunderstorms. A typical ball lightning has a diameter of 20 cm and a lifetime of a few seconds. No satisfactory explanation for this phenomenon has been advanced.

It appears that some new theory of ball lightning is required. Perhaps a better understanding of the firmament or aether will help explain the rich variety of ball lightning phenomena. An aether model that predicted the conditions necessary for ball lightning, and which could be validated experimentally, would be a considerable advance of scientific knowledge.

4.3 TORNADOES

One mentions Kansas to people from other parts of the nation, and a typical response is something about tornadoes and the old movie *The Wizard of Oz*. Kansas (as well as other parts of the Midwest and Great Plains) certainly had tornadoes before this movie was produced, but the awareness was increased by this movie. Even so, tornadoes are relatively rare.

I was born in Kansas and have spent my entire life here except for part of my graduate studies and some vacation time, but have seen only one tornado in the state. This occurred while I was at a summer picnic near Lyndon (about 25 miles south of Topeka) on June 17, 1974. The clouds to the east were low and threatening. A spout dropped down and was met by a spout rising from below, perhaps 2-3 miles away. I could not see the point of contact, but the dark color of the lower part of the spout led me to comment that the tornado was over Lake Pomona, a large man-made lake. It lasted only a minute or two. No wind or rain was experienced at our picnic. The arrival of a fleet of ambulances from Topeka indicated a problem, and we learned later that the tornado had capsized a showboat filled with a dinner party. Sixteen people had been killed and three injured.

So, even though tornadoes are relatively rare events, they can be very destructive. They can level a small town (Udall, Kansas, May 25, 1955, 80 dead, 270 injured) or cut a several block wide swath across a larger city (Topeka, June 8, 1966, 16 dead, 406 injured). One should definitely pay attention to tornado warnings.

Actually there are several types of rotary storms. Tornadoes occur over land and are generally the most violent. Waterspouts occur over water and can suck up large amounts of water. Much weaker rotary storms are called dust devils or whirlwinds. These usually occur in warm, dry conditions with clear skies. The spout is made visible by the dust or plant debris that is being carried aloft. The diameter is a few meters and the height is perhaps 100 to 300 meters. They are accompanied by changes in the vertical electric field, indicating that they carry some electric charge [7, 13, 14, 20]. They rarely do any significant damage.

One of the dozens of dust devils that I have seen in Kansas occurred on March 21, 1996. I was checking some meteorological towers in a native grass pasture in southern Kansas about 3 p.m. The winds were less than 2 m/s from ground to at least 60 m above ground. The air temperature was about 13°C, skies were clear, conditions were quite dry. I heard a sound like a swarm of bees, and looked around to see a dust devil about 10 m away. I walked over to it and walked in the center of it for several minutes. The sound was that of wind through tall grass. The diameter was in the range of 3 to 10 m and the wind speed in the vortex was perhaps 10 m/s. There was little plant material being lifted and the dust devil did not hit the anemometers on the meteorological tower

so I could not estimate the height. Horizontal motion was slow and erratic. The swirl in the grasses would move a short distance to the north, northeast, or northwest. I would take a few steps to maintain my position in the center of the swirl and wait for it to move again. No physical sensations (e.g. ears popping due to lowered air pressure) were noticed. I would estimate the total time of existence to be at least 10 minutes.

All of these rotary storms have a question about their cause. A dust devil, as mentioned above, may occur in essentially calm winds. There will be some vertical mixing of air due to thermal gradients produced by solar insolation, of course. But considering the law of conservation of angular momentum, how does vertical air movement get translated into horizontal rotation? An answer is attempted in [22, Page 61].

Updrafts in clouds on occasion become so vigorous that angular momentum in the air supplying the updraft becomes concentrated. The resulting circulation may limit the further horizontal influx of air into the updraft although air may continue to flow into the updraft from below. This causes the circulation to propagate downward as air flowing into the updraft continues to leave its angular momentum behind. The resulting vortex is a region of low pressure around which air circulates in balance, with its centripetal acceleration supplied by the pressure-gradient force.

The minimum pressures in tornadoes are not known but some observers have reported values of about 0.8 that of the surrounding atmosphere (Flora, 1953). The means by which the low pressure is maintained have also not been established; although meteorologists generally agree that heat releases into the atmosphere can produce low pressures by increasing the temperature of the air and thus decreasing its density. Fire-storm vortices of tornadic violence have been reported over large conflagrations produced by burning cities, forests and oil tank farms (Hissong, 1926; Graham, 1952; Ebert, 1963). These observations suggest that large updrafts caused by local heating can become organized and that they can concentrate angular momentum to produce strong whirlwinds.

Vonnegut (1960) has concluded that temperature contrasts in the atmosphere are insufficient to account for severe tornadoes and suggested that some of them may be powered electrically: repeated lightning and other discharges through the low pressure vortex may heat the air and intensify the updraft.

Although significant progress is being made both with improved observations and with modeling of convection processes, the preceding should illustrate that the motions of air in thunderclouds are complex and that our present understanding is inadequate.

Considerable effort has been expended in the past two decades on theoretical and

numerical modeling of tornado type storms. Even so, there seem to be some nagging questions remaining. Rotunno comments in [9, Page 69]:

I think most observers would judge the supercell (this solitary, rotating and propagating thunderstorm) an extraordinary, possibly singular, meteorological phenomenon. Although the work just described gives, I believe, a good picture of how the machine works, one suspects that there might be some kind of “super” principle at work.

Trapp and Fiedler make a similar statement [9, Page 49].

Most current knowledge of the dynamics of tornadolike vortices has been obtained from axisymmetric models with initial vertical vorticity. One question which continues to elude researchers is how tornadoes, which appear at least locally axisymmetric, are born out of nonaxisymmetric ambient flow with initial horizontal vorticity only.

One possibility that has been suggested is an electrical origin for these rotary storms. Vonnegut [51] quotes estimates of wind speeds in a tornado up to 250 m/s, with a corresponding power input from some source up to 10^8 kW, which is on the order of the total installed capacity of electrical generation in the United States. He mentions observations of other electrical effects, such as St. Elmo’s fire, odors of ozone and nitrogen oxides, noises of electrical discharges, and dehydration of vegetation and the surface soil along the path.

Fifteen years later, however, a paper from the National Severe Storms Laboratory in Norman, Oklahoma [15] cast doubt on several of Vonnegut’s suggestions. This paper states there is “little hard evidence for tornadic winds in excess of 110 m/s”. They state: “We have approached within 1-20 km of tornadoes, using conventional automobiles aided by visual cloud observations and by frequently relayed radar information. Collectively, 18 tornadoes, numerous funnel clouds, and several intense (tornadic) dust whirls below congestus extensions of cumulonimbi have been sighted and documented with motion picture photography. . . . Lightning in the funnel or within 2-3 km of it was rarely seen by the observers”. In surveys of damage caused by 21 tornadoes, they did not see any evidence of scorching or dehydration of vegetation.

If intense atmospheric electricity does not cause tornadoes, then what does? A full model for rotary storms may require some action of the firmament (aether). For now, we will content ourselves with a few examples of tornado activity.

A tornado touched down 9.6 km from a geophysical observatory located near Tulsa, Oklahoma on May 27, 1962. Earth currents and magnetic fields were recorded by Brook

[8]. He assumed a very conservative model of current flow in a 20-km long horizontal line in the cloud 6 km above the observatory, a vertical current from the cloud to earth at the tornado, and an image current 6 km under the earth. The observatory is assumed centered between the horizontal currents. A current of 225 A was necessary to produce the observed field change of 15 nT. This is a small current compared with lightning currents, but extremely large when it is considered that it flowed for perhaps 10 minutes while the tornado was functioning. A current of 225 A flowing for 10 minutes involves a total charge of 135,000 coulombs, or about one-third of the total charge on the surface of the earth. The release of charge in this amount should be detectable anywhere on earth. Brook mentions one instance where a tornado was detected 150 km away [8, Page 1436], but more observations are needed to confirm that such large charges can actually flow during a tornado.

Corliss [10, Page 117] records an interesting account of lightning inside a tornado that occurred June 22, 1928 near Greensburg, Kansas:

Steadily the tornado came on, the end gradually rising above the ground. I could have stood there only a few seconds but so impressed was I with what was going on that it seemed a long time. At last the great shaggy end of the funnel hung directly overhead. Everything was as still as death. There was a strong gassy odor and it seemed that I could not breathe. There was a screaming hissing sound coming directly from the end of the funnel. I looked up and to my astonishment I saw right up into the heart of the tornado. There was a circular opening in the center of the funnel, about 50 or 100 feet in diameter, and extending straight upward for a distance of at least one half mile, as best I could judge under the circumstances. The walls of this opening were of rotating clouds and the whole was made brilliantly visible by constant flashes of lightning which zigzagged from side to side.

An Assistant Dean of Engineering at Kansas State University, Ray Hightower, told me that he ran into dust devils many times as a child, and remembered one occasion where he had difficulty breathing while inside. Was the oxygen ionized so that the lungs could not absorb it, or was some other factor involved? Including this effect in an aether model could be a real challenge!

Corliss [11, Page 158] gives examples of a number of what might be called ‘pranks’ of a tornado:

May 27, 1896. Saint Louis, Missouri. Willis L. Moore, then chief of the Weather Bureau, who visited St. Louis, Missouri, the day following the great tornado of May 27, 1896, reported seeing a two-by-four pine scantling which had been blown through solid iron five-eighths of an inch thick on the

Eads Bridge, the end of the scantling protruding several feet through the hole it had gouged in the iron. He also reported seeing a six by nine timber driven four feet almost straight down into hard, compact soil, a gardener's spade shot six inches into the limb of a tree, and wheat straws forced into the trunk of a tree to a depth of more than an inch. . . . a man driving a team to a heavily loaded wagon suddenly found the team missing, blown away, but the wagon and himself uninjured, except, of course, for the tongue of the wagon.

June 3, 1927. Topeka, Kansas. . . . a rafter, badly weathered and charred with old age, was blown from an old barn through the siding and two-inch sill of a nearby comparatively new house, pointed end first, and left sticking in the hole it punched. The most incredible part was that the charred, tapered end of the old rafter showed no battering effect whatever. The speed of its impact must have been tremendous.

March 14, 1933. Nashville, Tennessee. The following were observed by the official in charge of the local weather station. "A cornstalk was found driven endwise through a piece of weather boarding. A 2 × 4 inch timber plunged through a panel door without causing the slightest splitting or splintering. The timber exactly fitted the opening. A 1 × 6 inch plank was forced through the trunk of a sturdy young tree, splitting the latter in half."

These accounts of relatively soft material (wood, straw) penetrating harder material (compacted earth, steel) are very common in the tornado literature. The standard explanation is a high speed impact, although the speeds are probably well under 100 m/s. Such speeds are well under bullet velocities. If someone tried to build a machine that would punch holes in steel plate using a wood punch traveling at 100 m/s, I suspect they would get wood splinters rather than holes in the steel plate. It is almost as if the characteristics of matter were changing, either the soft material becoming harder or the hard material becoming softer. If the firmament or aether were in a different mode, it is conceivable that matter in the aether would behave differently. John Hutchison has observed instances of aluminum being fractured or wood going through aluminum in certain combinations of electromagnetic fields [35], so there exists a possibility that there yet exists much to be discovered about the character of matter when subjected to special fields or unusual states of the aether.

4.4 DECAY OF THE EARTH'S MAGNETIC FIELD

Lightning, ball lightning, and tornadoes are transient phenomena in the earth's atmosphere, with time constants ranging from microseconds for lightning to minutes for tornadoes. In this section is discussed what may be another transient phenomenon observed in the vicinity of the earth, the earth's magnetic field. The time constant is obviously much longer, but it is conceivable that the earth's magnetic field is also somehow associated with the aether.

The earth's magnetic field has been used for navigation since about the time of Christ [44, Page 1]. One of the first books ever written using an experimental philosophy was published by Gilbert [21] on magnetism in the year 1600. By that time, it was well known that magnetic compasses did not always point to geographical north (what is now called *declination*), and that a compass needle free to rotate in all directions would usually have one end lower than the other (called *dip* or *inclination*). Even today, every aircraft cockpit will have a magnetic compass mounted in it, that Gilbert would have little problem in identifying and explaining. This compass is now used as a back-up for more modern navigation equipment that depends either on electricity or air pressure from a functioning engine for operation.

In addition to navigation, it is now known that the earth's magnetic field protects mankind from many cosmic rays and high energy charged particles from the sun. It is therefore no surprise that the earth's magnetic field has received considerable attention for the past several centuries.

One of the early discoveries was that both declination and inclination changed slowly with time. In London, for example, declination changed from 11.3° E. to 4.1° E. between 1580 and 1634 [44, Page 6]. The earth's magnetic north and south poles do not coincide with the geographic north and south poles, and change position over time. The apparent position of the north geomagnetic pole was at about 83° N. Latitude and 320° E. Longitude in 1600 but is now closer to 79° N. Latitude and 290° E. Longitude [44, Page 48].

A somewhat later discovery, starting with data collected by Gauss in 1835, is that the overall strength of the earth's magnetic field has decreased since that time. Merrill [44, Page 48] shows a graph of the earth's dipole moment versus time that shows a clear decrease of about 7.6% from 1835 to 1980. When any parameter associated with the earth changes by that much over a time period of less than two centuries, it is of keen interest to all that are interested in earth history. There have been at least three interpretations of these data:

1. The earth's magnetic field is produced by some sort of dynamo inside the earth, perhaps in chaotic motion like weather patterns above the earth's surface. This

model naturally yields variations in the field, even complete reversals [37]. This is the accepted view of the scientific establishment.

2. The earth's magnetic field is produced by a current loop inside the earth, which was established by God at the time of creation a few thousand years ago and is now decaying by ohmic losses in an exponential fashion. This view was presented by Barnes [3, 4, 5] in several papers in the Creation Research Society Quarterly in the early 1970s.
3. The earth's magnetic field is produced *both* by a current loop and by motions in the core fluid. Humphreys [32, 33, 34, 31] considers this concept to be a generalization of the work of Barnes, but it is enough different to be considered a *second* creationist hypothesis about the earth's magnetic field.

The question being asked here is whether any of these hypotheses do an adequate job of explaining the observed data, or whether we have another anomaly, another situation where we actually know less that we think we know. We will now consider palaeomagnetism in more detail, then look at the dynamo hypothesis and the current loop concept.

Palaeomagnetism

About 90% of the earth's magnetic field can be considered to be produced by a magnetic dipole located at the earth's center and tilted by 11.5° with respect to the axis of rotation. The remaining 10% is called the *non-dipole field* and causes the magnetic field to be nonsymmetric over the earth's surface. Both the dipole and non-dipole fields change with time, but not necessarily at the same rate or in the same direction.

The total intensity of the magnetic field ranges from 24 to 34 μT over South America, 50 to 60 μT over the United States, 46 to 62 μT over Australia, 29 to 42 μT over Africa, and 42 to 60 μT over Europe and Asia. The largest intensity is over the south magnetic pole at about 66 μT .

The solar wind carries charged particles which interact with the earth's field to increase the intensity on the sun's side of the earth, and decrease it on the dark side. Solar storms and sunspots will affect the field by larger amounts. These variations are almost always less than 5 μT [38, Page 61].

Rocks, fired bricks, and water-borne sediments have all been used to estimate the earth's historical magnetic field, both direction and magnitude. When a rock or brick cools from a temperature above the Curie temperature of its magnetic minerals in an external magnetic field (such as the earth's magnetic field), it acquires a remanent

magnetization (RM) referred to as *thermoremanent magnetization*. Other methods of acquiring a remanent magnetization include the following [44, Page 60]:

Chemical Remanent Magnetization. That RM acquired by a sample during a chemical change in an external magnetic field.

Viscous Remanent Magnetization. That RM acquired over a long time in an external magnetic field.

Isothermal Remanent Magnetization. That RM acquired in a very short time at one temperature (usually room temperature) in an external magnetic field (that is usually strong).

Depositional Remanent Magnetization. That RM acquired by sediments when grains settle out of water in the presence of an external magnetic field.

Post-depositional Remanent Magnetization. That RM acquired by physical processes that cause translation or rotation of sedimentary grains after deposition.

If the remanent magnetization is produced antiparallel to the external field, the material is said to have *self-reversed*. There are several mechanisms which produce this effect, but palaeomagnetists do not consider the effect of great importance.

The technique of determining the ancient field strength is not easy, as Merrill and McElhinny point out [44, Page 87]:

If the rock's magnetic properties have not been altered since formation then it is clearly a simple matter to determine the ancient field strength. Unfortunately in practice this is seldom the case and often chemical changes occur in the laboratory when the rock is heated. Coe has shown that only a very small percentage of historically erupted lava flows (cases in which the correct field strength is known in advance) are suitable for palaeointensity studies. It might be expected that this small percentage would decrease even more for older rocks, because they are much more likely to have picked up unwanted remanences. The basic idea behind all *reliable* palaeointensity techniques is to develop a method by which several *independent* estimates of the ancient field strength can be obtained from the *same* sample. Consistency between such estimates provides some confidence regarding reliability. Unfortunately many techniques do not do this. The reader is warned that there are numerous poor palaeointensity values that have been published, making it difficult for those not familiar with palaeomagnetism to decide what is really known. Before accepting a palaeointensity value one should determine what *consistency checks* have been used to see whether or not they are acceptable. . . . in practice only a small percentage of rocks can be used for palaeointensity estimates. In the case of archaeological material, a common problem is the

effect of weathering causing chemical changes.

Again they comment [44, Page 207]:

Geophysicists have done a remarkable job in obtaining information about the earth's interior, considering the difficulties involved. However, often the accuracies quoted for some of the important physical parameters are far higher than warranted.

We can see from these comments and others that at least some of the published research on ancient field strengths is suspect. And it is conceivable that some fundamental problem has not been recognized, such that much of the published material does not represent reality.

Dynamos in the Earth's Core

The equations which must be solved to find a dynamo include the following [44, Page 220]:

1. Maxwell's equations
2. Ohm's law
3. Navier-Stokes equation
4. Continuity equation
5. Poisson's equation
6. Generalized heat equation
7. Equation of state for density as a function of pressure, temperature, and magnetic field

A number of 'constants' are needed, such as viscosity, density, conductivity, temperature, pressure, heat sources (e.g. radioactivity), thermal diffusivity, etc. We also need appropriate boundary and initial conditions. Together, the equations, constants, and boundary and initial conditions form the *earth dynamo problem* and is clearly very formidable. Several of the equations are nonlinear, so simple closed-form solutions are not possible. Computer modeling is almost mandatory.

One approach that has been taken is the *kinematic dynamo model*. Here the velocity of the core material is specified, along with some initial magnetic field. Other models

include the hydrodynamic dynamo, magnetohydrodynamic instability, turbulent dynamo, and mean-field electromagnetic.

All of these models have to contend with *Cowling's Theorem* [44, Page 250] which states that non-steady axisymmetric magnetic fields cannot be maintained by symmetric fluid motions. That is, if there is a dynamo, it must be non-symmetric. There may even be helicity involved [44, Page 252]:

Although it can be shown that no dynamo action can occur unless the volume integral of helicity over the earth's core vanishes (i.e. mean helicity is zero), Ruzmaikin and Soloff have also shown that no dynamo action is possible if the helicity vanishes everywhere.

Merrill and McElhinny [44, Page 283] summarize the status of dynamo theory as follows: "Although there is little doubt that some dynamo process is responsible for the magnetic field of the earth, there is not good agreement on the details of the process". That is, the best minds have worked on the problem for decades, and failed. The current loop is unthinkable because it implies a young earth, and no other suggestion has survived even a cursory examination.

Current Loops in the Earth's Core

Sir Horace Lamb published a paper in 1883 [43] in which he solved Maxwell's equations inside the earth's core in terms of Legendre polynomials. The lowest mode solution yielded a current rotating about an axis through the magnetic poles, and which produced the observed magnetic field of the earth. Barnes [4, Page 228] took Lamb's solution, the measured decay of the earth's magnetic field, and the assumed radius of the earth's core of 3.473×10^6 m, and solved for the core conductivity, obtaining $\sigma = 4.04 \times 10^4$ siemens/meter. The total current was found to be 6.16×10^9 A (in 1965). The current density is not uniform in the core because of magnetic forces on current elements, but peaks at about 5.95×10^{-4} A/m² at a distance of about 2/3 of the core radius from the center. The time constant (time for the field to decay to 1/e of its initial value) was calculated to be 1970 years. The half life would then be about 1400 years. That is, if this hypothesis is correct, the magnetic field 1400 years ago should be twice that observed today, the field 2800 years ago should be four times that observed today, and so on. The field in 4000 BC should have been about 20 times that of today.

Using the square of the current density and the conductivity, and integrating over the core yielded a total power dissipation of 8.13×10^8 W, very close to the value predicted by the dynamo theories. This is at least eight orders of magnitude below the power arriving from the sun, hence is not significant in the heat balance of the earth. The heat balance is still not affected at 4000 BC, but this power dissipation obviously

becomes a significant factor well before 100,000 BC, a very short time period compared with evolutionary time scales.

There is no major restraining force on this hypothesized current loop that will keep it in the same position. It can drift with respect to the earth, perhaps like the jet stream, and produce the observed movement of the magnetic poles.

This hypothesis therefore has some very desirable features to the creationist:

1. The mathematical solution is simple compared to the dynamo theories and no flaws have been detected in the last century.
2. It predicts the recent decay in the earth's magnetic field.
3. Values for conductivity and power dissipation in the earth's core are plausible.
4. It has a nice 'feel' to it, in that God would wind the clock (establish a current) at creation and then let it run down.
5. If valid, it provides a strong proof of a young earth.

Unfortunately, finding a solution to Maxwell's equations does not prove that it describes what is actually happening. There may be something else in operation that is not explained by either the dynamo or the current loop hypotheses. The main problem with the current loop hypothesis is that it does not predict the observed long term data. Merrill and McElhinny [44, Page 294] state: "The majority of the palaeointensity data (excluding reversals) group around the present dipole moment of the earth's magnetic field. For example, the archaeomagnetic data for the past 10,000 years indicate moments with values that are essentially within $\pm 50\%$ of the present dipole moment. Although the field might have been lower than this at times, it seldom was much higher. In short, there appears to be an upper value for the field strength which is often approached but is seldom exceeded." They comment [44, Page 122] on the Lake Mungo Excursion where fields reached as high as 100 to 200 μT , or up to five times the present field, as an exception to the general state of affairs.

If the current loop hypothesis is correct, there should be considerable data for fields of 1.5 to 5 times the present field, with excursions to 10 and 20 times the present field, and not the observation of only rare data above 1.5 times the present field. There are perhaps three possibilities:

1. The palaeomagnetic researchers are incompetent.
2. The palaeomagnetic researchers have joined a conspiracy.
3. Something is wrong with the current loop hypothesis.

I have discussed the difficulties of making palaeomagnetic measurements, so there remains a distinct possibility that these researchers have been reporting noise rather than signal. However, they have expended a great deal of effort, with many different techniques, so it seems improbable that virtually all the samples that should be of higher strength have been improperly measured. There is always the ‘reinforcement syndrome’, of course, where researchers report numbers that other researchers have reported before, but it would seem that if the fields really were three times as large at the time of Christ, that this would become the value to be reinforced after enough samples were measured.

After all, such observations would not prove the current loop hypothesis over the dynamo, since dynamos could conceivably operate at much higher field levels, so researchers would not have that pressure to disregard high readings.

Strange things do happen in our peer-review, Truth-is-determined-by-majority-vote society, but it seems unlikely that the worldwide community of palaeomagnetic researchers would mishandle their data so badly. Creationists should not put all of their eggs in this basket.

If both the dynamo and current loop hypotheses have major problems, what else might explain the data? Perhaps the aether produces the magnetic field, either directly or by interacting with charge inside the earth’s core. If so, we would expect the aether to be a dynamic structure, perhaps even chaotic, like weather systems. The magnetic field would then be similar to climatic features like average wind speed or rainfall. Wind and rain have wide short term variability and can also vary over time periods of centuries. The magnetic field has much less short term variability, but might vary over the centuries by as much as $\pm 50\%$. One would not expect a climatological feature to vary monotonically over the life of the earth, but rather to vary randomly about a mean, just as observed by the palaeomagnetic data.

So the earth’s magnetic field joins the list with lightning, ball lightning, and tornadoes as not being fully explained. The complexity of the equations involved means that even if a numerical computation finds ‘a’ solution, we cannot be positive that it is ‘the’ solution. Perhaps all these phenomena are explainable by our present day physics. Then again, perhaps some or all will be better explained by a good model for an energetic aether.

From the observations presented in this chapter, this model should include the following:

1. An interaction mechanism to transfer large amounts of charge in a thunderstorm.
2. A mechanism to produce large vertical wind speeds in a thunderstorm.
3. A quasistatic mode where energy from the aether can be transferred into the

surrounding space over a period of several seconds, to form ball lightning.

4. A mode by which breathing becomes difficult in a tornado or dust devil.
5. Interaction with (or production of) the earth's magnetic field.

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CHAPTER 5

FORTEAN PHENOMENA

In the previous chapter, we looked at well known atmospheric phenomena like lightning and tornadoes, the less well known but still scientifically respectable ball lightning, and variations in the earth's magnetic field. It was argued that these phenomena are still not well understood, that no models of operation have even near universal acceptance, and therefore a physical structure like the firmament (or energetic aether) is plausible. In this chapter, we look at less well known, or less respectable, atmospheric phenomena. In many cases, the observations are so strange that any one observation would be dismissed out of hand as some sort of mental problem on the part of the observer. The sheer number of observations, however, force us to at least think about the possibility of some of the observations being true.

5.1 CHARLES FORT

No discussion of non-traditional scientists would be complete without Charles Fort. At age 42, Fort (1874-1932) came into an inheritance which allowed him to do exactly what he wanted to do for the rest of his life, an activity actually started some years previously. He spent a total of 27 years at the British Museum and the New York Public Library researching scientific journals, old periodicals, newspapers, and manuscript accounts to gather material on phenomena from the borderlands between science and fantasy. His researches appeared in four books, *The Book of the Damned*, *New Lands*, *Lo!*, and *Wild Talents* [12]. In these four volumes Fort gathered together, organized, and commented on a wild host of phenomena: flying saucers seen in the sky before the invention of aircraft, flying wheels, strange noises in the sky, correlations between volcanic activity and atmospheric phenomena, falls of such things as red snow, frogs, fishes, worms, shells, and jellies, finding of 'thunderbolts', discrepancies in the schedules of comets, sightings on Mars and the moon, infra-Mercurian planets, inexplicable footprints in snowfields, disruptions of gravity, poltergeist phenomena, stigmata, surviving fossil animals, spontaneous combustion, and similar weird effects.

Fort took an approach that was reasonably scientific. That is, he collected data, organized it, and formed hypotheses. He was basically asking the same question being asked in this book: Is our present worldview adequate or complete? His data came from observations of other people, as reported in newspapers and journals of the day. He recognized that not all the data were valid. There would be hoaxes, yarns, 'sensational journalism', and so on. He did not take any one datum too seriously, nor for that matter, did he take himself or his hypotheses too seriously. He would list some data and then add some philosophical comments which both added spice to his books and

made them seem very long winded to the modern reader. He was certainly not overawed by the scientific establishment. A typical comment would be [12, page 628]:

Science is very much like the Civil War, in the U. S. A. No matter which side won, it would have been an American victory. By Science, I mean conventionalization of alleged knowledge. It, or maybe she, acts to maintain itself, or whatever, against further enlightenment, or alleged enlightenment but when giving in, there is not surrender, but partnership, and something that had been bitterly fought then becomes another factor in its, or her, prestige. So, seventy years ago, no matter whether evolutionists or antievolutionists had won, it would have been a big, scientific victory anyway. No wonder so many of us are humbled by a reputation that can't lose any way. Science is a maw, or a headless and limbless stomach, an amoeba-like gut that maintains itself by incorporating the assimilable and rejecting the indigestible.

Fort was similarly cynical about God and religion. He would make negative comments about both evolution and creation. He appeared to be, indeed, open minded and a seeker after truth. He had no ambition to establish a dynasty after himself. The Fortean Society was established by others (Tiffany Thayer and Aaron Sussman) in 1931. Fort had to be tricked into attending the celebratory banquet. He said he would not join the organization himself, 'any more than I'd be an Elk.' His interest was in exploring the 'damned' data, by which he meant all the wide range of mysteries that are ignored by orthodox science or explained away improperly.

Data sources were by no means limited to newspapers and 'sensational journals'. Fort read *Scientific American*, *Nature*, *Monthly Weather Review*, and many astronomy journals. He was self-taught in astronomy, but was able to interpret the technical details with some proficiency. He made comparisons and correlations among data which were fascinating, even though we would not agree with all of his conclusions.

One area of interest to us is gravity (and gravity shields and anti-gravity). We will look at a few of Fort's examples of things falling from the sky that should not have been up there in the first place.

Fort commented [12, page 544] that he had collected 294 records of showers of living things, plus his records on showers of nonliving things. When we consider the times such happenings were not reported because of the obvious reaction of people to such an impossibility, it is evident that such observations are reasonably abundant.

Typical items include a rain of little frogs and fishes in South Africa on March 21, 1925 [12, page 544]. Another rain of innumerable little frogs appeared in a thunderstorm in northern London August 17, 1921 [12, page 545]. There was a two day long shower of little toads in France in 1922 [12, page 546].

Philadelphia Public Ledger, Aug. 8, 1891 - a great shower of fishes, at Seymour, Ind. They were unknown fishes. *Public Ledger*, Feb. 6, 1890 - a shower of fishes, in Montgomery County, California. "The fishes belong to a species altogether unknown here." *New York Sun*, May 29, 1892 - a shower, at Coalburg, Alabama, of an enormous number of eels that were unknown in Alabama [12, page 546].

There was a shower of red worms, one to four inches in length, that fell in a snowstorm in Halmstead, Sweden Jan. 3, 1924 [12, page 547]. Tons of periwinkles (a small marine snail) and crabs fell near Worcester, England on May 28, 1881, during a violent thunderstorm [12, page 549]. The fall covered fields and a road for about a mile. The fall was unaccompanied by sand, pebbles, other shells, or seaweed.

There was a report from France in 1843 of stones falling slowly in an open field [12, page 559]. Two little girls at the site were lifted off the ground, but their parents, apparently unaffected by the lifting force, pulled them back to the ground. Another case is reported as [12, page 560]:

The simplest cases of seeming teleportations are flows of stones, into open fields, doing no damage, not especially annoying anybody, and in places where there were no means of concealment for mischievous or malicious persons. There is a story of this kind, in the *New York Sun*, June 22, 1884. June 16th - a farm near Trenton, N. J. - two young men, George and Albert Sanford, hoeing in a field - stones falling. There was no building anywhere near, and there was not even a fence behind which anybody could hide. The next day stones fell again. The young men dropped their hoes and ran to Trenton, where they told of their experiences. They returned with forty or fifty amateur detectives, who spread out and tried to observe something, or more philosophically sat down and arrived at conclusions without observing anything. Crowds came to the cornfield. In the presence of crowds, stones continued to fall from a point overhead. Nothing more was found out.

On September 4, 1886, three separate showers of hot stones fell near a newspaper building in Charleston, North Carolina. They were flint pebbles, ranging from the size of a grape to the size of a hen's egg. They fell on an area of 75 square feet, and about a gallon of them were picked up. They were seen to fall straight down from a point overhead [12, page 563].

Fort then moves on to falling water. During a drought in Oklahoma, rain fell on a large cottonwood tree near Stillwater [12, page 560]. There was a continuous fall of water, during a succession of clear days, near a brickyard in Akron, Ohio [12, page 561]. There was a garden in Brownsville, Pennsylvania, in which was a peach tree, upon

which water was falling from some height above the tree, and covering an area about 14 feet square [12, page 561].

In addition to normal rainfall, there were accounts of deluges, like lakes of water falling from the sky. Falling columns of water hit Lausanne, Switzerland, flooding some of the streets five feet deep [12, page 760]. A ‘large body of water’ was seen crossing Coburg, Ontario. It dropped two miles on the other side. The resulting river flow broke every dam between Coburg and Lake Ontario [12, page 760]. A column of water fell on Batcombe Hill, near Chetnole, Dorsetshire, England, gouging holes in the hill, some of them eight or nine feet deep [12, page 761].

An interesting collection of events occurred in Assam, India, in 1897 [12, page 768]. The moon turned green on June 6 and June 13. Torrents of rain fell on June 11. The downpour was greater than anything ever seen by the observer. At the same location, a major earthquake was centered on June 12. Somewhat to the south of the earthquake center, out of a clear blue sky, dumped a lake, while the earthquake was in progress. The concept of the ‘waters above’ the firmament being in the form of liquid water globules is seen to have some support from modern day observations!

This is no more than a brief sample of the many observations recorded by Fort. His collection of four books contained a total of 1125 pages, including the extensive index.

The observations he records indicate that it is possible to move homogeneous material (periwinkles without seaweed, eels without fish), over long distances. A waterspout or whirlwind would be an obvious explanation, except that no waterspout or whirlwind was seen in any of the observations he records. And high winds are not very good at separating species, say eels from fish. If rocks, eels, snails, and large globules of liquid water are ‘up there’ without the benefit of a tornado or whirlwind, then our list of *plausible* explanations gets very short very fast.

If any of these observations really happened, we have to consider the possibility that gravity can be interrupted or shielded. Under some circumstances water, rocks, and living creatures can be lifted up and carried for long distances without tornado-like conditions. Any quantitative model for the energetic aether therefore needs to include gravity.

All of us trained in scientific methods are adept at discarding the ‘outliers’, those data which do not seem to fit. Fort looked at these ‘damned’ data with fresh eyes. If there really is an aether with a high energy content, many of these data will start to make sense. How many times in history has an experimental observation not fit into the then current paradigm, but someone was willing to follow the leading of the data and made an important discovery?

5.2 DOWSING

Dowsing is the act of searching for something hidden or unknown. Underground water is the most common material sought, with oil, mineral deposits, buried pipes, and even graves also being the subject of searches. Devices used for dowsing include a forked stick, a single stick or wand, L-shaped metal rods, and a pendulum. The classical technique is for an individual to hold a forked stick horizontally in front of him or her and walk across a field where water or other substance is desired. The stick moves up or down when passing over the desired material.

The material in the device used seems to be of little consequence. Fresh cut wood, dry wood, plastic, bone, and metal are all used regularly. The dowsing device is usually held in an unstable manner so a very small movement of the hand is amplified in the movement of the device. Most people feel that the movement of the device is due to muscle movement rather than to some independent force.

It is conceivable that the human body is a more sensitive detector of signals near the surface of the earth than any electronic device. Tests have been performed [5, page 256] which indicate that humans with a dowsing device can detect a ground current of 20 mA (milliamperes) rather easily, 2 mA in some cases, and down to 1 μ A (microampere) in one case. This means that dowsers react to magnetic gradient changes as small as 10^{-9} gauss in some cases, and 10^{-12} gauss in the one case. The dowsing reaction could be stopped by shielding either the kidneys or the forehead with aluminum rectangles [5, page 261]. It appears that the body has two sensors of magnetic fields, hence can discriminate between vertical and horizontal magnetic fields. By programming his mind or body properly, the dowser can apparently filter out noise and function like a magnetometer which is able to discriminate a different magnetic field signature for objects as different as electric cables, pipes, dry underground cavities, water courses, faults, and other geological anomalies. An electronic device of the same sensitivity is not very useful because of noise.

Another author [14, Page 249] describes a study made in 1962 by Professor Y. Rocard, Professor of Physics at the Sorbonne in Paris, who believes that dowsing

is a faculty not controlled by the *conscious* will of the dowser. Assuming that the dowser ‘knew’ (even though subconsciously) of the presence of, say, water, when his forked wand bent downwards ‘of its own accord’, Professor Rocard studied the relevant phenomena, and discovered two facts which are already recognized to be of prime significance: (1) The presence of water in the soil produces changes – though admittedly very small – in the terrestrial magnetism; (2) The change in terrestrial magnetism, slight though it be, seems strong enough to relax the dowser’s muscles, thus causing the rod or wand to dip.

One of the most interesting aspects of Rocard's objective investigation of the phenomena of dowsing was his examination of the 'biophysical effectiveness' (the Russians' jargon) of subjects who were not professional dowsers. The professor discovered what the makers of commercially produced 'pipe-locators' could have told him years before: that nine out of ten ordinary people can operate the dowsing rod successfully, or, in Rocard's more scientific phrasing, 'that the capacity for detecting weak magnetic gradients is not rare at all'. Rocard, by careful measurement, demonstrated that an average subject – dowser or non-dowser – discriminates between magnetic changes in the range 0.3 to 0.5 mOe/m, 'which would seem much too small to be detected, except that they are of the same order of magnitude found among animals by biologists'.

The above explanation of dowsing is quite plausible to the scientific mind. It may indeed be the actual technique used by dowsers, but this has not been proven. Proving that humans are very sensitive detectors of magnetic fields does not prove that magnetic fields are used to detect underground features.

There are many other aspects of dowsing which are strange at best. One is the technique of map dowsing whereby the dowser will take a map of the region of interest and move a small pendulum over the map. When the pendulum starts to rotate or move in a circular pattern, it is over the desired location. The map may be many miles from the actual location so it is very doubtful that any physical phenomenon is being detected by the dowser. If no physical phenomenon is being detected, then the effect must be psychic or paranormal.

Another form of dowsing is that of information dowsing. In this form, questions are asked, usually which require only a yes or no answer. A yes answer might result in the pendulum rotating in one direction, and a no answer might see the pendulum rotating in the opposite direction. This technique is used to locate lost objects, lost people, medical problems, etc. There are some very interesting success stories of people using this technique, but again it appears to be in the area of the paranormal.

Many people have attempted to test dowsers over the past two or three centuries. Results have been rather uniformly unfavorable. Dowsers with excellent success ratios in finding water or oil when by themselves or with 'believers' are usually unable to find anything in a test situation when there are 'unbelievers' present. It reminds one of the situation where Jesus could not do any mighty works at Nazareth because of their unbelief (Mark 6:5). This means that scientific validation under controlled conditions is basically impossible. The same can be said for any attempt to 'prove' that God does miracles today. God heals the sick when the time and circumstances are correct, and usually not when the sick person is surrounded by 'unbelievers'. For example, Oral Roberts has been recognized by many Christians as having a healing ministry, but to

try to prove that by taking Oral to a hospital and asking him to start praying for the sick would probably not be successful. God does not need to prove Himself, hence will seldom do mighty works in a artificial or controlled situation. The failure of a controlled test does not prove anything about God, and similar failures prove little about dowsing except that a reasonable amount of self-confidence and support from the people nearby are important in the success of dowsing.

It is likely that dowsing for water and perhaps for oil and other minerals is based on the human detection of some natural field. This field may be magnetic, electric, gravitational, or some field as yet undiscovered (the energetic aether?) It is not unthinkable, however, that there are paranormal or spiritual aspects. Perhaps the machinery for extracting energy from the aether will be activated by a prayer beginning ‘Our Father which art in heaven’, rather than by throwing a switch.

Certainly dowsing is an interesting phenomenon for which no explanation of conventional science is entirely satisfactory. A model for the aether should include a mechanism whereby underground water, oil, and pipes can be located without visual contact. It would be nice if the model had enough predictive power to allow the invention of a dowsing machine that would replace the human operator.

5.3 UFOs

We now move to a subject of great strangeness, mostly rejected or ignored by the scientific community. Unidentified Flying Objects (UFOs) have been reported frequently since World War II, with many sightings back to the beginning of the century and even earlier [13]. A large fraction of these sightings can be identified as stars, weather balloons, airplanes, and even hoaxes. There is a fraction, however, that resists identification as known phenomena. The observations occur in the atmosphere (or underwater, on rare occasions), and hence could be caused by some action or attribute of the atmosphere (or aether), perhaps giving us a clue to the new energy source we are seeking.

There have been perhaps 300,000 cases of UFO sightings that have been reported, with many being collected in a computer file at the Center for UFO Studies in Chicago [22] and others by Whitley Strieber [25, Page 101]. Many other sightings have not been reported for various reasons, including fear of ridicule. It has been estimated that as many as one out of every forty people have experienced an UFO. If there is an energetic aether or firmament around the earth, then it is reasonable for this aether to be manifested in ways that cannot be explained by conventional physics. Some UFO observations may actually be observations of activity within the aether.

What are the Options?

Not all observations can be explained by an energetic aether, of course, so the data need to be examined with care. Before looking at the data, however, it might be useful to list the various possibilities or categories into which the data might be placed. Just what do people think about UFOs, anyhow? The following list includes most of the options:

1. UFOs have purely naturalistic explanations as conventional aircraft, weather balloons, planets, birds, vision problems of the observer, or hoaxes. Highly classified aircraft and spacecraft built and operated by humans are included here.
2. UFOs are of extraterrestrial origin. Intelligent life from other planets is visiting us.
3. UFOs are of terrestrial origin. There is intelligent life on (or within) this planet which is being observed periodically. This could be a modern form of the myths about elves, fairies, giants, etc. [20].
4. UFOs are a religious phenomenon [3]:
 - (a) Myth
 - (b) New Age
 - (c) Demonic
 - (d) Angelic
5. UFOs are psychic phenomena, perhaps something like a dream of a collective subconscious, and therefore caused by a group, but experienced individually.
6. UFOs are purely mental phenomena, in the general category of dreams and nightmares.
7. UFOs are a manifestation of a natural phenomenon, not yet discovered by science. It would be like fog, clouds, or ball lightning which would be quite evident while in existence, but would leave little or no residue behind when they cease to exist.

There perhaps are other possibilities as well, but these illustrate the range of thought on the subject. Most people tend to force all the data into one explanation, rejecting all the data which do not fit. It is quite possible, however, that more than one explanation will turn out to be valid. For example, some observations might be of weather balloons, some of the aether, and some of angels or demons. Allowing such a wide range of possibilities makes it easier to consider each observation objectively, no matter how bizarre it might be.

The Mutual UFO Network (MUFON), discussed in Chapter 1, is a worldwide organization dedicated to the express purpose of seeking answers to four basic questions pertaining to UFOs, according to Walter H. Andrus, the International Director [1, Page *vi*]:

1. Are UFOs some form of spacecraft controlled by an advanced intelligence, conducting a surveillance of our Earth, or do they constitute some unknown physical or psychological manifestation that is not understood by twentieth century science.
2. If UFOs *are* found to be extraterrestrial craft controlled by some unknown intelligence, what is their method of propulsion? Or, if they have developed a technique for operating in another dimension, how is that accomplished?
3. Postulating that they may be controlled by an extraterrestrial or nonterrestrial intelligence, where do they originate—in our physical Universe or possibly in another dimension?
4. Assuming that some of the craft might be piloted by beings (humanoids, entities), what can we learn from their apparently advanced science and civilization through study or possibly through direct communications with the occupants of these vehicles that will benefit mankind on the planet Earth?

MUFON obviously skips the first option (purely naturalistic explanations) and focuses on the extraterrestrial option. The group is willing to consider all of the other options, however.

UFO Data

Some of the UFO observations will now be considered, after which the various interpretations will be discussed in more detail.

The term ‘flying saucer’ was introduced by newspaper accounts of a sighting of nine large discs near Mr. Rainier, Washington, by Kenneth Arnold in June, 1947. Other shapes are also seen, hence the more generic term, UFO. About half of all sightings seem to be disc shaped [21, page 13]. Other shapes include egg, oval, triangle, sphere, cigar, and even mushroom.

Size can be anywhere from two or three feet in diameter to football field size or larger [21, page 17]. They can be smooth or bumpy. They may be metallic gray, silver, or a bright color of red, orange, yellow, blue, or green. Color may change with movement. There may be windows or other openings, or the surface may be featureless. Shape and size may change with time. They often appear out of focus as if they were in a mist or cloud. Photographs generally appear out of focus.

The majority of UFOs are silent. Witnesses are surprised that they do not hear the sounds typical of airplanes and helicopters. There are cases, however, where loud noises are heard, like explosions or shock waves [21, page 47]. Sometimes a low pitched sound is heard, like a transformer or electrical generator. Sometimes a high pitched sound is heard, not unlike a high speed drill. There have even been reports of signals, or sequences of beeps.

One effect which is often noted when relatively large UFOs are relatively close to an automobile or house is that the electrical systems tend to fail. The engine quits running, the car lights go out, and the radio stops playing. The engine may run rough and the radio may have static on it as the UFO approaches. The electricity to a house may stop abruptly and then come back on as the UFO leaves the vicinity. The electrical system of the car is usually not harmed by the incident, with the battery being able to start the car and run the lights and radio after the UFO leaves the vicinity. Diesel engines usually continue operating when spark ignition engines fail [21, page 57].

The observed motion of the UFOs is quite interesting. They are often observed hovering in an almost motionless fashion. There may be a slow rotation of the structure, or a slight side to side oscillation similar to that of a falling leaf. They can accelerate rapidly in any direction, including straight up, and can change direction abruptly at high speeds. Speeds up to 5000 miles per hour have been recorded. They can travel underwater, also at high speeds. There have been observations of a UFO coming out of the water, pausing for excess water to run off, and then taking off in air. They have been known to follow airplanes, even to circle airplanes in flight. When visible to the human eye, they are usually also visible to radar, and many simultaneous visual and radar sightings have been made.

One physiological effect is a ‘heat wave’ on the human body. McCampbell reports the comments of the pilot of a small plane in Uruguay that flew within 700 meters of a brilliant object shaped like a ‘musical top’ [21, page 68]:

I saw that (the UFO) rocked twice in a balancing motion. Then it took off in the direction of the sea at a fantastic speed. It left a little trail in the form of water vapor . . . The temperature was greatly increased, so much that I had to open the windows and door of the plane, and take off my field jacket. I almost fainted.

There are also actual burns of first and second degree, usually on the face and hands. The burns may appear as severe sunburns. There may also be related eye damage, similar to staring at the sun or at an electric arc.

Sometimes there is temporary paralysis while the witness is within about 100 meters of the UFO. Involuntary functions like breathing and heart beat do not seem to be

affected. Recovery is usually quite rapid when the UFO leaves. There may also be loss of consciousness.

About half the people reporting paralysis or loss of consciousness also report a prickling sensation or an electrical shock. This implies that some sort of electrical phenomenon is involved. On various occasions, amnesia, headache, eye pain, loss of vision, nausea, and vomiting have also been reported.

Dogs are quite sensitive to UFOs. They may bark wildly, or they may show symptoms of extreme fright. Unusual behavior by a dog has caused a number of persons to open the door to their house and discover a UFO outside. Effects have also been noted upon wild birds, pigeons, ducks, geese, chickens, turkeys, sheep, cows, horses, and cats. Fear seems to be the major effect.

Dr. Hynek, a leader of UFO research until his death, defined three categories of close encounters between a UFO and an observer. The CE-I involves a close encounter with a UFO at a given distance. A CE-II occurs when there is a UFO induced physical impact on the environment. CE-III involves UFO occupants. The term *percipient* refers to the UFO observer, or the one involved in the UFO experience. A UFO *flap* is the occurrence of a large number of UFO sightings or events during a short period of time. A UFO *contactee* is a person who claims to be in personal contact with UFO occupants on a continuing basis. A UFO *abduction experience* is where a person claims to be involuntarily taken on board a UFO.

There are many close encounter cases. Drs. Hynek and Vallee performed an analysis of 1,276 close encounter events and found that 60 percent involved landings, and 32 percent had occupants.

UFO Occupants

At perhaps the highest level of strangeness are the reports of occupants of these UFOs. They are seen both inside the UFO and outside on the ground. Occupants usually appear as one of two types. One is a tall, trim, human appearing individual. He (or she) may be dressed in a one piece coverall type garment with a metallic appearance. With more conventional clothing, this type of occupant could walk down most streets in America and not be noticed as unusual. If anything, a comment would be made on the individual having the proper build to be a good basketball player.

The second type of occupant is between three and four feet tall, with a head proportionally large for the body. The arms are long and thin. The face is almost featureless. The mouth may look like a slit. The nose may be only two small air holes above the mouth. The eyes tend to be large and shaped differently from human eyes, perhaps being pulled around to the side of the face. The skin color tends to be some shade of

gray. Clothing is typically a tight, metallic appearing garment, but can be loose with the appearance of cotton or linen.

The two types of occupants can appear together in a UFO, or only one type may be present. If both types are present, the more human appearing type seems to be in charge. Both types show curiosity and will examine soil, plants, and animals, and will collect samples.

There have been a number of accounts where humans were taken aboard a UFO and subjected to a physical examination. There are typically physical side effects to this as well as emotional problems which result. The event is often forgotten, and can only be remembered with the help of hypnosis. With the forgetting, there will usually be a time lapse. For example, a person will leave for a one hour trip at 10 pm, and not arrive until 2 am, with unexplained physical and emotional symptoms. The books, *Intruders* [16] and *Communion* [24], deal with such observations and have received considerable attention.

Each of these UFO characteristics has been reported hundreds or thousands of times by reliable witnesses. It seems beyond question that people are experiencing ‘something’ besides birds, weather balloons, or other ‘natural’ phenomena. While many observations do have natural explanations, there is a residue which does not. Therefore we will examine the other options.

The Extra-Terrestrial Option

Most of the general population would immediately argue that the extraterrestrial hypothesis is most likely. This notion has been popularized by TV, movies, and science fiction for years. It may come as somewhat of a surprise that many students of the UFO phenomenon do not share this view. Many UFO experts do hold the ET belief, of course, but it is by no means unanimous. The latest book by Jacques Vallee argues against the ET hypothesis, for example, and Vallee has been one of the leaders in the UFO community for many years [26].

Several observations can be used to argue against the classical notion of our being visited by extraterrestrial intelligence. One is that it would seem that visitors from another planet would have a small number of models or types of space craft. There might be a large mother ship, capable of holding a number of moderate sized ‘manned’ ships and perhaps also some ‘unmanned’ probes. Size, shape, and color of each model should be fixed, at least within a given geographical region and a given time frame. The observations are, however, that everyone sees a different UFO. Size seems continuously variable. There are many different shapes and colors. Some have windows and some do not. The variety is that of clouds or snowflakes or dreams. The large variety indicates that it is possible, if not highly probable, that another explanation besides visitors from

another planet would be the correct one [18].

One would also suspect that visiting space ships would occasionally crash, leaving hard evidence of their presence. There are claims of a small number of such crashes, but in each case, as the story goes, military personnel stepped in, roped off the area, picked up all the debris and any bodies, swore everybody to secrecy, and flew all the evidence to Wright-Patterson Air Force Base, never to be heard of again. One classic case is the crash near Roswell, New Mexico, in June, 1947 [4]. Another is the Bentwaters Incident or the Rendelsham Forest Case [6]. There have been several others. Such accounts do more to tease than to illuminate.

There are a number of examples of people who believe they have been contacted by aliens from other planets, with Adamski being one of the early ones [2]. As these cases are carefully examined, however, more questions are raised. Lewis puts his concerns in these words [20].

My puzzlement over the years has been brought about by the overwhelming contradictions in the data presented by UFO percipients from throughout the world. At first blush, it would seem that we are indeed being visited by creatures from another planet. That's what they tell us anyway. They even go so far as to name the planet, over and over again, in fact, with a different name supplied each time. We receive messages, urging us to "Stop atomic testing. You are destroying the balance of the Universe," "Prepare to join the Galactic Brotherhood" and other equally limpid advice.

We see spacemen in tight-fitting suits, sometimes wearing breathing apparatus, sometimes not, sometimes walking with difficulty or floating above the ground. We are taken aboard wondrous examples of flying devices, and shown 3-D maps of the UFOLKS' home planet(s). We see space ships stopped on lonely roads for nocturnal repairs and are offered celestial pancakes by their occupants. The DML's (Hynek's "Damn Meandering Lights") flit about our skies at night, purportedly examining our military facilities and nuclear power plants.

All in all, the popular picture that emerges is one of covert surveillance of our planet by omnipotent other-worldly beings, intent on saving us from our own ignorant failings. Or so it would seem.

Yet, if we examine ALL the evidence, we begin to feel that this explanation, as desirable as it may seem, is a bit too simplistic. It begins to become all too apparent that someone or something does indeed want us to believe this fairy tale, and act accordingly. To this end they have succeeded. A goodly portion of the population of the United States (exact figures depending on the pollster you choose to follow) believe that the Earth is now or has been in the past, under the surveillance of extraterrestrial intelligence.

Thus, it is a *fait accompli*; if people believe a thing is so and act accordingly, the reality of the situation makes not one whit of difference.

We see numerous individuals who are in daily mental contact with self-claimed extraterrestrials, and who pass on extremely practical advice on the conduct of daily affairs, as well as predictions of future events, some disturbingly accurate, others curiously short of the mark.

This situation has remained virtually unchanged for the past 25 years, with no signs of abating, and promising no increase in knowledge of the phenomenon in years to come.

Carpenter [7] gives a number of instances where abductees were returned to the wrong place, or without clothes, or in different clothes, so if we are being watched by extraterrestrials, they certainly are not omnipotent.

I am not sure what would serve as an acceptable proof that we are being visited by extraterrestrials. Certainly some hardware would be of interest. An alien (or alien body) available for inspection would convince some. Instruction about new technology would be helpful. In the meantime, we should not ignore the other options.

The Terrestrial Option

This option is largely ignored by the UFO research community, so one has to go to other sources for detailed information. A brief introduction comes from [19, Page 31]:

In the Celtic and Germanic countries of Europe there are long traditions of races of small humanoids which dwelled inside hills, mountains, or ancient burial grounds. These beings ventured out onto the surface mostly at night, holding feasts and dances in woods and meadows, or roaming the earth about mysterious business of their own. They stole away babies and children, and sometimes lured adults into their subterranean homes. In England they were known as Fairies or Elves, in Ireland as Sidhe or Gentry, in Scotland as Sith or Good People, in France as Fees, and in Brittany as Korrigons. Fairy lore is a complex subject, for beliefs in Fairies often differed as much from village to village as they did from nation to nation. They did, however, share some basic traits throughout western Europe.

The Fairies were usually divided into two races—the “Fair Folk” or “Light Elves” [slightly shorter than the people of the surface, and much more lightly built, with long, curling blond hair], and the “Dark Elves”—swarthy, squat, and often hairy beings who seemed more truly creatures of the earth. The

race of Dark Elves has included Brownies, Kobolds, Gnomes, Dwarfs, Trolls, and a host of cavern and mine spirits.

But the more human-seeming Fair Folk were usually associated with the insides of hills and barrows as well, and the European villager feared and respected their power far more than the modern image of the gauze-winged, Tinkerbell-style “fairy” would suggest. Even the smallest of the Fair Folk could cause more than mischief if angered or offended. A number of illnesses were commonly attributed to harmful Fairies before the last century. Strokes, for example, were believed to be caused by elf-shot; the term “stroke” is itself a shortening of “Fairy stroke”. The Fairy stroke felled its human or animal victim, which the Fairies carried off invisibly, leaving a “stock” in its place. The stock was a Fairy or a log transformed into the victim’s likeness, but corpselike or only minimally functioning.

One suggestion for the source of these entities is that they are from another dimension. Einstein suggested that we really live in a four dimensional world, consisting of three space dimensions and one time dimension. Many physicists since then have postulated higher dimensional spaces (up to at least eleven dimensions). If there are more dimensions, then it would be theoretically possible to move from an invisible condition in some of the higher dimensions to be visible in our world, and then move back when the mission was accomplished. Elves would not ‘go’ underground, but into a ‘parallel universe’.

The same suggestion applies to the extraterrestrial option. Time and distance would not necessarily be barriers to interplanetary travel. Malfunctioning spacecraft would disappear by going back into the original dimensional space. This explanation would answer several of the earlier objections to alien space travel, but would be very hard to prove or disprove.

Could God create such lifeforms as Fairies and Elves, and would He? If God created millions of lifeforms on earth, and created millions of angels in heaven, then it should be obvious that He has the ability to create a few lifeforms that can shift back and forth between the spiritual dimension and the physical dimension, or between our three dimensions and higher (but still physical) dimensions. And it is the height of folly to proclaim what God would or would not do in such circumstances, since man’s wisdom is quite inferior to God’s. God does not need to ask man if it is okay to create Sasquatch, and man’s grand pronouncements on the matter really do not make any difference. Therefore, I will assume that if anyone actually saw Sasquatch or a Fairy, that they saw a part of God’s creation (which happens to have some interesting properties).

Are UFOs a Religious Phenomenon?

Scientists like Carl Sagan would probably call UFOs a modern religious myth (referring to something unreal, a creation of the human mind). They would include UFOs with Santa Claus. This is easy and convenient, but does not do justice to the thousands of people who really have experienced something.

Several members of the UFO research community have recently moved in the direction of the New Age view of UFOs [10]. Most other researchers worry that a New Age interpretation will damage their scientific credibility (which it will). However, New Age people are trying to answer a valid scientific question: What is the purpose of UFO behavior toward the human race? Their answer is that UFOs are pushing us toward a spiritual transformation of society which will usher in a golden age of peace, spirituality and love. I think they are too optimistic.

Demons and angels would fit one of the observations of UFOs and that is the ability to disappear. There are many accounts in the Bible of angels appearing to God's people, and they apparently still appear at appropriate times [17]. While present, they appear quite real, and even quite human. They can eat, drink, and leave tracks in the snow. But when their mission is finished, they vanish without a trace. In some sense, they have moved from our dimension to a different dimension.

It is recorded in II Corinthians 11:14, 15 that "Satan himself is transformed into an angel of light. Therefore it is no great thing if his ministers also be transformed as the ministers of righteousness; whose end shall be according to their works." It appears in the account of the temptation of Jesus (Matthew 4:1–11) that Satan had taken on a physical form. Therefore it is possible that the UFO occupants (and perhaps the UFOs themselves) are the servants of Satan in disguise. They would appear real while in our dimension, even leaving footprints, but would vanish at the end of their mission. Since Satan's domain seems to be the earth, his servants would not 'go' somewhere else, but would become invisible where they are. This is certainly a reasonable explanation for the lack of crashed UFOs and dead bodies of their occupants.

The CE-I and CE-II cases do not have much spiritual content. Seeing or experiencing something new and different, such as the electricity in a house or car going off when a strange object floats by, does not have a strong spiritual impact. It does not turn us toward God or away from God any more than the viewing of a flower or some other part of God's creation. It may puzzle us so that we go looking for answers, which can certainly change our spiritual status, but normally it just goes on the mental shelf with the other things we do not understand, to be thought about again at a later time.

The CE-III cases, on the other hand, definitely have spiritual implications. A rather strong case can be made [27] that CE-III cases involve the occult or demonic activity. This may indeed be the case, but it is also possible that at least some of the CE-I and

CE-II cases are observations of ‘natural’ phenomena, such as plasmas, even if CE-III cases are demonic.

The possibility of demonic activity is of concern to well-known writers like Whitley Strieber, who comments [25, Page 36]:

What if I was opening a door to hell or something? I am not interested in helping demons. They seem to do fine on their own.

A summary of the motives of the UFO occupants is given by [27, page 91]:

The UFO phenomena are both historical and worldwide. In the last few years they have increased dramatically in interest, research, and sightings. A computer analysis of 50,000 UFO sightings over the last 30 years revealed definite patterns of behavior. There is a peak activity every 61 months. Every five years and one month they have been moving across the globe from west to east in 1,500-2,000 mile leaps. Thus they are very deliberately revealing themselves to the entire planet. Sightings during these peak periods range from 10 to 100 times the normal number of sightings, and they are leaving mankind little choice but to believe in them. UFOs have taken every conceivable shape, size, and characteristic possible, as have their occupants. There have been millions of sightings and thousands of contactees.

It is reasonable to ask, ‘Would they be going to all this trouble, if they were not planning something on a vast scale?’

Obviously they want us to believe in them. If we do not believe in them, their plan will not work. Overall they have been very successful, and the small minority who do not believe them to be extraterrestrials are comparatively insignificant. The vast majority of people who believe in UFOs are convinced they come from other planets, for many sightings conform more or less to what we would expect from visitors from other worlds. Knowing that in a perplexing situation humans will take a majority view, they have acted appropriately. They know what they can get away with and are confident that the demonic and evil aspects of ufology will not damage their present purpose, which is to make mankind believe in extraterrestrial contact. The world is clearly in a desperate situation, and the thought of deliverance by advanced intergalactic visitors is increasingly attractive. The entities use the present confusion as a means of insuring belief in them as benevolent space visitors.

Even with this master plan, the UFO occupants are often anything but benevolent. Dr. Berthold Schwartz is quoted [27, page 130] as saying:

All too little has been done in clinical and laboratory study of such alleged UFO-related psychic and psychological effects as anxiety and panic reactions, confusion, mood and personality changes, loss of consciousness, automatisms, amnesia, paralysis, paresthesia, weakness, wasting, burns, heat sensations, eye injury, transitory blindness, hoarseness, skin lesions, reported radiation effects, and healings.

Brad Steiger is quoted as saying [27, page 131]:

There is a wealth of well-documented evidence that UFOs have been responsible for murders, assault, burnings with direct-ray focus, radiation sickness, kidnappings, pursuits of automobiles, attacks on homes, disruptions of power sources, paralysis, mysterious cremations, and destruction of aircraft.

There are a number of similarities between UFO appearances and the occult. These include [27, page 169]:

1. Nauseous odors are encountered in séance rooms, haunted locations, and a minority of UFO appearances.
2. There may be a deposit of certain substances. These would include ectoplasm and falling stones in séances and poltergeist phenomena, and ‘angels hair’ and oily fluids in UFO appearances.
3. There is an aversion to strong light. A large majority of CE-III cases occur at night.
4. Voices may be heard in the mind (as opposed to the ears).
5. There may be levitation and teleportations.
6. The temperature may change.
7. The phenomenon may appear, disappear, or change size suddenly.
8. Entities may appear transparent, incomplete, or vaporous.
9. There may be unusual noises and high pitched sounds.
10. Physical laws appear to be violated.
11. Observers often experience a dreamlike effect.
12. Psychological effects are similar.

Contactees are typically given messages similar to those long received by mediums and mystics. The UFO occupants usually proclaim the New Age doctrines such as reincarnation, universalism, the divinity of man, the dawning of a new age, etc. The deity of Christ and the inerrancy of the Bible are either not mentioned or are denied. They predict the future with an accuracy rate of 30 to 85 percent. (This is certainly in contrast with the prophets of God who were 100 percent accurate.) Contactees are often told they are on an important mission to the world which only they can perform. This often results in severe emotional, business, and family problems to the contactee.

According to Dr. Barry Downing, a Presbyterian pastor and theologian [10]:

The view that UFOs are demonic has long been promoted by writers like Clifford Wilson and John Weldon (*Close Encounters: A Better Explanation*), although neither of these men are UFO researchers. They use UFOs to promote their view of the impending Christian apocalypse, saying these are the end times, UFOs are demons set loose to bring us to repentance, then Christ will return. I. D. E. Thomas, in his recent book *The Omega Conspiracy: Satan's Last Assault on God's Kingdom*, also takes this approach. He believes UFO abductions, and the sexual activity of aliens, are from the world of fallen angels like those described in Genesis 6:4, that the "sons of God came in to the daughters of men, and they bore children to them." The demonic theory of UFOs has support from serious UFO researchers like John White, and although Budd Hopkins would never align his abduction research with a religious theory, he certainly does not think UFOs are up to any good from our human point of view. Certainly there is much compelling evidence for some kind of demonic theory, whether secular or religious.

But even with this observation about 'much compelling evidence', Downing still prefers the fourth religious possibility, that of angels doing the work of God. He has thought deeply about the matter, and has changed some of his ideas with time (one sign of an intelligent person), hence deserves to have his thoughts carefully considered. The following extended quote summarizes his concept [10].

I am in a denomination which gives strict examinations to those about to be ordained. Once one is ordained, getting someone "unordained" is difficult. It requires a Presbytery trial. But I thought that for my survival in ministry, I would be wise to express my theological UFO research in problematic terms: I think it highly probable that a UFO parted the Red Sea, but I am not sure. My denomination has not made any threats to try me for heresy up to this point, so in that sense my caution has been rewarded.

But if someone had asked me 25 years ago, "What do you really think UFOs are doing?" my answer would probably have been this: I think UFOs carry

the angels of God. I think we are living in a dangerous time, and our scientific world view—bringing about the “death of God theology” which preceded my book—all indicate we need help believing that strange stories like the parting of the Red Sea, and the visibility of angels, are possible. Once everybody comes to believe UFOs are real, then there will be a revival of faith in the Bible. Renewed faith in the Bible will lead to renewed faith in God, and in divinely designed human purpose. We will get rid of much of the agnostic depression that clouds our scientific generation.

But at the present time, unlike my views 25 years ago, I am inclined to think that the main purpose of UFOs is more political than religious. And because of that, I see Exodus as a paradigm of modern UFO strategy. . . . And that paradigm suggests that UFOs are neither moving us toward a Golden New Age, nor toward a Demonic final conflict described in the book of Revelation, but rather, UFOs are simply—in space rocket terms—giving us a course correction. In one of his shortest parables Jesus said, “The kingdom of heaven is like leaven which a woman took and hid in three measures of meal, till it was all leavened.” (Matthew 13:33) This means that basic divine strategy is to carry out invisible or deceptively simple actions in human society which have significant long term consequences.

Let me state my basic assumptions. My most basic one is that what we now call the UFO alien reality, and what the Bible calls the angelic divine reality, are the same reality, what I will call the alien/angelic reality. . . . It is my assumption that the alien/angelic reality was involved in the development of both the Old and New Testaments. . . .

In the Exodus Story, and the Jesus Story, there is a triangle involving an oppressor, a victim, and a liberator. In the Exodus, Pharaoh, and the Egyptian political structure are the oppressors; Moses and the Hebrews are the victims, and the alien/angelic reality is the liberator (present in the “pillar of cloud and of fire”).

In the Jesus Story, the Hebrew religious establishment joins with the Roman political establishment in being the oppressor; Jesus is the victim, and again, the alien/angelic reality is the liberator, raising Jesus from the dead (Matthew 28; Luke 24), and converting the Apostle Paul from a “bright light” on the road to Damascus (Acts 9). A new community is formed of those who believe in the resurrected Jesus, and they undergo a new “Exodus,” driven out from the non-believing Jewish community.

The alien/angelic objective in the Exodus was to form a distinct political/ethnic community, the Jewish people. . . . But the alien/angelic objective in the Jesus Story was to form a community that transcended national boundaries. The Jesus Story was to be preached to all nations (Matthew 28:19).

Consequently, the Christian faith was not involved in an essentially political battle. . .

But this was not the case in Exodus. Exodus is the story of the alien/angelic reality waging a direct war against Pharaoh and the Egyptian political structure. Over a period of time Moses warned Pharaoh of plagues to come—flies, blood, gnats, frogs—and finally Passover. The alien/angelic reality tells Moses to tell his children that the divine reality has “made sport of the Egyptians and what signs I have done among them; that you may know that I am the Lord” (Exodus 10:2). . .

It seems to me that modern alien/angelic strategy has been a direct war against the super powers of the world. . . Our world leaders, like Pharaoh, have been sure it is in their interest to deny the alien/angelic presence and power.

The abduction phenomenon may be primarily a way for the alien/angelic reality to reveal its power to the public at large, and still keep its basic identity secret. We have all these stories that aliens from UFOs can read people’s minds, can take them from their cars or bedrooms without being stopped by the government or anyone else. Instead of being plagued with flies or frogs, we are being plagued with UFO abductions—and the broadcasting of their stories. UFOs are making sport of us, and our scientific culture. . .

In regard to the New Age view, I don’t think the alien/angelic reality is trying to make life better for us. They like us to suffer. The alien/angelic reality put the Jews through all kinds of trials in the wilderness. The Bible gives the alien/angelic reality credit for killing 14,700 Jews with the plague during Korah’s rebellion, not to mention another 250 by fire who were making an unauthorized religious offering (Numbers 16). Jesus encouraged his disciples to take up their cross and follow him. The alien/angelic reality wants us to suffer, they just don’t want us to blow up their world with nuclear weapons, or perhaps bring earth to an environmental death.

So I see Exodus as a paradigm of UFO strategy. It has been necessary for UFOs to attack the political, military and scientific structures of our time in order to preserve the future of human history. Science and technology in the hands of our political leaders have been the “oppressor” of our modern age; all of us living in the shadow of nuclear terror are the “victims”; once again the alien/angelic reality has been the “liberator.”

Down the road, as more UFO evidence comes out—as we follow the pillar of cloud and of fire into our wilderness future—undoubtedly the human race will begin to explore the religious dimension to UFOs. When this happens, almost every world religion will undergo a pretty serious course correction. But right now the UFO leaven in our religious meal is fairly well hidden and

will take time to do its work.

Whitley Strieber, author of the three books *Communion*, *Transformation*, and *Breakthrough*, is also an important source of information. He wrote the first two books after being contacted by (non-human) visitors. He then kept a diary over the next six or eight years, during which there was a number of additional contacts. Whitley is a Catholic, specifically mentioning going to mass in *Breakthrough*. He has also dabbled in what some would call New Age activities. For example, when trying to establish contact with the visitors, he will pray to them, either verbally or by projecting his thoughts. He believes that meditation is helpful in producing a deeper ‘communion’ with his visitors.

Many people wrote to Whitley after *Communion* was published, creating a broader data base than what was previously available. He states [25, Pages 101-106]:

As I opened letter after letter, I was slowly gaining perspective. By learning what people actually remembered of their encounters—so very different from the stories in the press—a remarkable new picture of the visitors emerged. It was not a sweet picture, but neither was it a terrible one. Rather, it was every bit as contradictory and surprising and various as one would expect from real contact.

When we imagine ourselves going to another planet, we visualize sending a few highly trained astronauts and scientists, bound by elaborate and detailed rules and taking infinite care.

My impression is that the visitors are a much more individualistic bunch. I’d be very surprised to find that they had any sort of elaborate government at all. If anything, it appears that we are being contacted by large numbers of familial groups using a plethora of different approaches under the broad general umbrella of a shared ethic of minimal disturbance of our own freedom of choice.

The slowness and secretiveness of the visitors’ approach strongly suggests that they don’t want to overwhelm us. That must be a very real danger, judging from the fact that, individually, we are almost always devastated by encounter.

From the publication of *Communion* in 1987 until September 1994, I received 139,914 letters. Between my wife, myself, and our secretary, we read them all. Personally, I have read about forty thousand pieces of mail. We saved a representative sample of about thirty thousand, eight thousand of which have been retyped and mostly scanned into computer-readable format. This was paid for by the Communion Foundation, which is a private foundation funded by me out of earnings on my books. As far as possible, we answered each person, at least thanking them for their effort.

The letters have not been statistically tabulated or professionally analyzed. . . We have, however, created some rough statistics. Eighty percent of the letters reflect either positive encounters or encounters where the visitors seemed neutral. Sixty percent specifically mention fear. Twenty percent report negative encounters. Three percent specifically mention hypnosis by UFO researchers, and nine out of ten of these perceived their encounters as negative. (This is probably not an outcome of hypnosis. These people sought help because of their bad experiences.) . . .

We found that people were not reporting the scenario of abduction and manhandling that is so often referred to in the media and UFO publications. The script of being approached by odd little beings, taken aboard a UFO, and subjected to bizarre medical intrusions appears to be rare. Far more commonly, people report interactions at a far higher level of strangeness. However, I do not want to belittle the work that has been done by those who feel that the abduction scenario is true. It would be wrong for me to draw such an encompassing conclusion when we are still so ignorant of the actual nature of our contact. Suffice it to say that it may be only one part of a spectrum of relationship so broad as to be presently difficult to full classify.

The majority of my correspondents report a lifetime of experiences of one kind or another, and about 30 percent of encounters involve more than one witness. If one member of a family is in contact, it is likely that others will be, too. There are a number of fantastic new dimensions that have hitherto been little acknowledged. The soul is clearly as central to this experience as it is absent from our current scientific view of reality; more than that, actual meetings with dead relatives are common. Children are deeply involved, and sometimes all of these things combine, often in remarkable ways. . . .

Such are my letters—a totally unexpected outpouring of overwhelming richness, power, beauty, and terror.

The experience refuses to be nailed down. It is neither good nor evil, but like reality, full of twists and turns and moral complications. In general, if there is an overall theme to encounter, it seems to be to chip away at our denial by putting us under pressure. Contact is a high-pressure experience. Many witness, like me, end up with post-traumatic stress syndrome. It's almost as if we simply cannot see the visitors unless they shake us up. I think that contact is a little like being waked up from a heavy sleep.

However, I have no letters about people driven mad or seriously hurt, and only one that discusses a death, and that involved misuse of a gun.

Downing and Strieber make a good case that at least some UFOs have a religious source, and of the religious UFOs, some contain angels and some contain demons. They

both comment on how difficult it is to classify all the UFO observations. Life is never simple!

Regarding our search for the energetic aether, we can either restrict our attention to the CE-II observations (environmental effects) and ignore the CE-III cases (occupants), or argue that even angels and demons use the firmament when they manifest themselves in our three-dimensional space. In either case, we can still discover some important information.

Psychic Phenomena

This concept is that UFOs are a projection of our collective subconscious. If our minds are able to interact without the limitations of spacetime (e.g. intuition, turning around because someone is staring at the back of your head), then many minds thinking about the same concept may be able to make it appear as real. Bearden makes a strong case for this concept in *Excalibur Briefing* [2], including other observations such as the Loch Ness Monster and Sasquatch. The item seen would be like a dream (out of our imagination or subconscious) but would be ‘real’ while visible. That is, it could reflect radar signals, affect electrical circuits, and leave scorched earth patterns while present, but then fade out like a dream sometime later. If UFOs are like dreams, then it would not be too surprising for each one to appear different from all the others, but yet to have some similarity in form and function. We would expect a certain amount of ‘bizarre’ behavior and nonobedience to physical laws. The UFO may even be transparent while forming and dissipating, which appears to have been observed in some photographs.

The main problem with this theory is the unproven existence of a collective subconscious. Such a notion is common in some eastern religions, but is foreign to the Judeo-Christian tradition.

It’s All In Your Head

Yet another explanation is that UFOs are a purely psychological phenomenon. A person thinks he sees something when it is only his imagination. This is similar to the effect of some drugs which cause people to see things that really are not there. The alcoholic may see bugs crawling on him during the latter stages of his alcoholism. The mind is a complex thing, not well understood at all. Many researchers in the UFO field believe this is an important part of the UFO phenomenon. They think that many sightings, especially close encounters with UFO occupants, are entirely a product of our imagination in some as yet unexplained way. The person making the sighting believes he or she saw something out in the atmosphere when really all the action is occurring in the mind.

This explanation could be correct, but does not seem to be able to explain every thing that is observed. It does not explain the medical problems experienced, such as skin burns, eye damage, etc. It does not explain the electrical effects. It does not explain the reactions of animals. Therefore, we will continue examining other possibilities.

Natural But Unknown

Many of the features of appearance and motion can be explained by the UFOs actually being a plasma or a form of ball lightning [15, page 138]. A plasma would be expected to have many shapes, sizes, and colors. Rapid motion and abrupt changes in direction would be possible for a plasma since little mass is involved. Some cases of rapid motion could be explained by the plasma suddenly shrinking in size, which would be interpreted by the eye as movement away from the observer.

The plasma explanation certainly sounds more scientific than some other explanations which might be given. It is not a final answer because we have no idea how the plasma would be formed and what the energy source would be to maintain it during the observation period, which is often several minutes in length.

This leaves the possibility of some other natural phenomenon, such as some activity or movement of the aether or firmament. Ball lightning just does not explain the interruption of electricity in a automobile or house when a UFO comes into the vicinity. There must be something else going on that can prevent power sources from functioning or copper wires from carrying current.

Conclusions

After reviewing this mass of data and the opinions of many authors, I have come to the following conclusions:

1. There is no real scientific support for the extraterrestrial concept. Whatever it is that is being observed, it is not coming from intelligent life on another planet. The ET hypothesis is actually an extraordinary claim, one that requires extraordinary proof, perhaps an event like a UFO open house on the White House lawn and interviews by the major TV commentators, or perhaps regular tours of the home planet by interested people.
2. Likewise, there is no real scientific support for UFOs having a terrestrial origin. If they were coming out of a hole in the earth, or even out from under water, surely someone would have noticed this source by now.

3. On the other hand, there are many observations that do not fit present day science. Therefore, I reject the notion that *all* UFO observations must ultimately fit explanations of present day science. Many observations can be explained by our science, but not all.
4. The spiritual content of UFO observations is quite important. Many of the UFO occupants could be angels or demons. Satan could even be imitating a natural phenomenon, and adding noise and disinformation in the process, in order to keep man from discovering a new energy source.
5. There is no proof for a psychic explanation for UFOs, in the sense that UFOs are a dream of mankind's collective subconscious.
6. It is quite possible that many UFO observations are largely mental in character. There is a physical cause (perhaps activity in the aether), which then causes the mind to develop images of a UFO. This could even result in time lapses and memories that return slowly over a period of time.
7. On the other hand, I believe that many UFO sightings (especially the CE-I and CE-II) are actually observations of the activity of the aether (as opposed to our minds playing tricks on us). This activity of the aether could produce many of the observed physiological effects, such as sunburn and nausea. This implies that those who search for the aether should be careful. There could be unexpected health effects.

The one 'physical' observation that definitely should be extracted from the mass of data on UFOs and included in the model of the energetic aether is that of electrical interruptions in cars and buildings when UFOs are nearby. Something in the aether changes so that a copper wire is unable to carry a current. Perhaps this research will reveal the true nature of current flow.

There are two schools of thought on current flow in any university department of electrical engineering. The Circuit Theorist will proclaim that current and power flow *inside* metallic conductors. Next door, the Electromagnetic Theorist teaches that power actually flows on the *outside* of a conductor in electric and magnetic fields, with any observed current inside the conductor being there just to satisfy boundary conditions with Maxwell's Equations. Both models get the right answers to real world problems, and there seems to be no experiment that will prove one model and disprove the other. Perhaps theoretical work on the aether will reveal a third model, one that will predict a new way of building switches that can interrupt current without physical movement of contacts.

5.4 GRAVITATIONAL ANOMALIES

Gravity is a force well known to all of us in our daily experience. Newton achieved fame by describing it mathematically. Einstein added mathematical complexity with his General Theory of Relativity. Most people would assume that most everything worth knowing about gravity has been known for a long time. But when one starts asking penetrating questions, the answers start becoming vague. For example, the standard assumption is that gravity is a pull. The mass of the sun pulls the mass of the earth towards itself. However, there are a number of people who believe that gravity is a push [28]. They would say that other mass in the universe is pushing the earth toward the sun.

One might argue that high tide always occurs on the side of earth under the moon, therefore the moon must be pulling the water in the oceans towards itself. However, there are two high tides, the other on the side of earth opposite the moon. The facile argument of the gravity-is-a-pull group is that the moon is pulling the earth away from the oceans on the far side. Sometimes the water moves (near side) and sometimes the earth moves (far side). Exactly how the earth and its oceans know which is supposed to move is not explained in detail.

The gravity-is-a-push group says that water is being pushed away from the earth on the far side by the moon, and is being pushed away from the earth on the near side by other matter in the universe. Philosophically, both models explain tides, with no obvious means of identifying the ‘correct’ model without other observations.

Edwin Hubble published a theory in 1929 (based on red shift measurements) that each galaxy in the universe was rushing away from our Milky Way at a velocity which was directly proportional to its distance from the Milky Way. The greater the distance a particular galaxy was from earth, then the greater the speed of that galaxy. The exact value of the Hubble constant is still being determined, but the basic concept of an expanding universe is widely accepted. Note that this is exactly what is predicted by gravity-is-a-push. On the other hand, if gravity-is-a-pull, then why is the universe expanding rather than contracting? The only possible explanation is that the universe was once much smaller and an explosion occurred, which is called the Big Bang. To creationists, the Big Bang theory seems like a much greater leap of faith than believing that *In the beginning, God created the heaven and the earth*, Genesis 1:1. Most creationists have not thought about gravity possibly being a push, but if the push hypothesis is correct, it is another nice argument against the Big Bang theory.

Other arguments for gravity-is-a-push are the asteroid belt which lies between the Jovian and Martian orbits, and the rings of Saturn. If gravity-is-a-push, we would expect these asteroids or ice fragments to remain widely distributed. On the other hand, if gravity-is-a-pull, then it seems logical to expect some clumping or consolidation. Two

fragments moving at similar speeds in nearby orbits should attract each other until they are in the same orbit and then finally join together. I am sure that people can develop other assumptions to explain the lack of clumping, such as the fragments having some minimum charge of the same sign so the electrostatic forces dominate the gravitational forces. But how would the fragments acquire the right amount of charge of the same sign, and maintain that charge over long time periods? Gravity-is-a-push seems to be the simplest way of explaining these phenomena.

For many years, I would tell my classes in electromagnetic theory: “Obviously like masses attract, like currents attract, and like charges repel.” Students would dutifully write the statement down with their usual blank expressions. Perhaps a few would recognize the sarcasm. That is, if like masses attract and like charges repel, there is no pattern and *nothing* is obvious. We just have to learn such things by rote. If like masses repel and like charges repel, then we have a nicer pattern.

The statement about like currents attracting refers to two parallel conductors carrying currents in the same direction. We shall see in Chapter 7 that current elements (short sections of a current carrying conductor) repel other elements in the same straight conductor. This force tries to stretch and even break a conductor if the current is high enough. So perhaps the correct statement is “like masses, like charges, and like current elements in a straight conductor all repel.” Such a statement has a nice symmetry to electromagnetic theorists.

Besides the issue of push versus pull, we really do not know if there are gravity waves, how fast they propagate through space, and how to build detectors for such waves. Antigravity remains an interesting topic to many physicists [29]. It is also of interest to fringe scientists like Charles Fort, as we saw in the early part of this chapter.

Once we can admit to ourselves that we really are not that smart about gravity, we are more receptive to examining some of the strange phenomena that have been reported about gravity and levitation.

One interesting example is that of a parlor game involving partial cancellation of gravity. A Christian friend of mine, a high school chemistry teacher, told me about his personal experience with this game during his college days, with obvious amazement at it actually working. The following is a published account of an English version of the game [14, Page 206].

Children have a game which enables them to demonstrate how it is possible to control the weight of the body – or to moderate ‘gravitational force’; whichever expression is preferred.

Some years ago, when Professor Joad was conducting an ‘Answers’ column for the now defunct *Weekly Dispatch*, a reader wrote to ask him how it was that five small children could lift – and with the tips of their little fingers,

too! – even a heavy adult, provided that actions were synchronized, not only with each other, but with a breathing controlled (as by a musical conductor) by the boy fogleman of this ‘inexplicable’ exercise in coordinated effort. The reader described what happened.

The person to be lifted sits in a hard chair, back straight, chin up, hands on knees, legs together, feet flat on the ground. He must remain unmoving.

Using only the tips of their fingers – one fingertip to a child – the children touch the sitter beneath each elbow, under each knee, while the fifth child (the ‘fogleman’, the ‘conductor’) places a fingertip beneath the chin of the sitter’s head.

As soon as all five fingertips are in position, the ‘conductor’, beating time, as it were, with his free hand, gives the breathing orders: ‘Bre-e-a-athe *i-i-i-i-n*; bre-e-a-athe *ou-u-u-t*; breathe *iiiiin*; breathe *ou-u-u-t...*’ Now comes the third order to ‘breathe in’, but this time the order to ‘breathe out’ comes with a difference. The conductor, as he says ‘Breathe OUT!’, raises his free hand in an upward-sweeping gesture – and all the fingertips go up too, carrying the heavy adult with them. To those who see the sitter sailing aloft at the end of their fingertips it seems as though the sitter weighs nothing. As high as the small arms can reach, the sitter rises – and then, after he has been held, in apparent weightlessness, for a moment or two, the conductor gives the order: ‘Now ... ge-e-ently ... down.’ Five small children, with their fingertips, have lifted a human being weighing, say, 150 pounds, as much as three feet.

‘How is it done?’ the reader asked Joad.

Professor Joad could not explain why five small boys can lift a *seated* grown man, and nor, for that matter, can I. But it should be noted that we *could* do it – and we did not, so far as I remember, invoke the ‘highly practical’ explanation of the ‘division of weight.’ Perhaps, young as we were, we could spot the fallacy inherent in the ‘theory’ at once. The 150 pound weight of a seated man, divided among five boys, works out at 30 pounds a boy – and which of us could lift 30 pounds with the tip of a little finger?

The same author [14, Page 208] reports on a Russian ballet dancer named Nijinsky.

For it was not as Nijinsky leapt up that one saw the oddity – he *was so* obviously a strong man that ‘superhuman’ leaps hardly astonished. It *was as he came down* – ‘like a gull landing’, said Uncle. – that one saw the strangeness: only in dreams could one have realized the possibility of controlling one’s *fall*. Up the Russian had sprung – up and high across; and then the slowing-down, to fall as lightly as a leaf or thistledown.

All the biographies and biographical articles which have been written about Nijinsky or Diaghileff or, indeed, about anyone concerned with the Russian Ballet in the days of its greatest splendour, have mentioned this *apparent* ability of Nijinsky's to do what I have since learned is called 'the slow vault'. I know that I saw him *float down – control and retard the speed of descent*.

Such observations about human control of gravity are not uncommon in New Age or occult literature [9, 8]. Richards [23] starts his book with the following:

Levitation! Is it for real? Students of psychic phenomena have been asking that question for centuries, and not getting many answers. Levitation is a rather unique kind of psychic phenomenon. It is not like astral projection, or psychometry, or precognition. It is the sort of thing Joseph of Cupertino might have done three centuries ago, or that some *mahatma* in India or Tibet might do today. But it is not the kind of thing an ordinary person would expect to do. And certainly not in the Western World.

That is why a lot of eyebrows were raised in mid-1977 when the Maharishi Mahesh Yogi announced that not only could *he* levitate; he could teach *others* to do it, too. After all, the Maharishi Mahesh Yogi is famous for his Transcendental Meditation technique. He has a reputation for methods that are not only simple to teach and easy to learn, but that *work*—and work well.

'Levitation is the most profound of the siddhis yet available,' a TM instructor told me. 'Maharishi says it's all a matter of mind-body coordination. Tell your body to walk and it does it. No problem. But tell it to rise into the air "by mere intention" and it doesn't. Improve your mind-body coordination and you can do that too.'

Richards then gives a number of anecdotes about people levitating, and some of the TM techniques used. He also comments [23, Page 20]:

It is a question of how gravitation works. To say that levitation is possible or impossible on the basis of scientific laws requires a knowledge of gravity's inner workings. And that is something scientists do not have.

Not that they haven't tried. According to Arthur Eddington [11], since Sir Isaac Newton's time there have been about two hundred theories of gravity proposed by as many theorists.

It should be obvious from the above that a completely satisfactory theory of gravity has not yet been developed, and reality may be significantly different from that imagined by Newton or Einstein.

But does gravity have any relationship or interaction with the aether or firmament? It seems possible, based on the first few verses of the Bible. In Genesis 1:2 we read “And the earth was without form, and void; . . .” One interpretation would be that matter had been created first but that the various ‘fields’ (e.g. electromagnetic, gravitational) had not yet been created, so that the matter which would constitute the earth was just sitting there as a formless blob. In verse 3, God created light. I assume that includes the properties of space necessary for the propagation of light, including permittivity. Then on the second day, God created the firmament. The waters were divided, and that which had been without form started to take shape. Therefore the action of the firmament could conceivably include gravity.

This raises the issue of how many different aethers or how many different fields are in existence. Does light require different characteristics of space for propagation from those of gravity? We have trouble even conceiving of electromagnetics without gravity, or gravity without electromagnetics, but that is not proof that gravity and electromagnetics use the same properties of space for demonstrating their effects. The fact that light was created one day and the firmament the next day implies that space might be filled with two structures or substrates, one supporting propagation of light and other electromagnetic fields and the other dealing with other fields, possibly including gravity.

If the two-aether model is valid, it means that we want to extract energy from one aether (the firmament) and express this energy in the electromagnetic aether as electricity. How this might be done is not obvious. Humankind has developed a light-to-electricity convertor (the photovoltaic cell) but does not have a clue about how to build a gravity-to-electricity convertor, at least without all the intermediate steps of gravity to potential energy, potential energy to kinetic energy, etc. That does not mean that such a direct gravity (or aether) convertor is impossible, of course. In the next chapter we will examine some of the thoughts of several men who thought such a convertor was indeed possible (with different explanations for the theory of operation).

It is easy to reject all these strange accounts about fortean phenomena, dowsing, UFOs, and levitation. But what if some of the accounts are accurate? We might be rejecting clues which could lead us to a better understanding of the world around us, and even to a new energy source. For now, a little humility about how little we really know as compared with how much we do not know is definitely in order.

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CHAPTER 6

THE HISTORICAL SEARCH FOR THE ENERGETIC AETHER

I have argued the existence of the firmament or energetic aether in a variety of ways, by scripture and by observations of the world around us that do not seem to fit with what we think we know. Now I turn to the scientific observations of several researchers who have built equipment which apparently does not obey the presently understood laws of physics. It is possible that the machines they built were actually drawing power from the aether. If so, we need to know more about these men and their machines.

6.1 TESLA

Nikola Tesla was born July 9, 1856, in Smiljan, Lika, Serbia. His father was a Serbian Orthodox priest. Tesla became an electrical engineer and went on to invent (or discover) more important devices or concepts than perhaps any other man in history. The idea of the three-phase induction motor came to him while in Budapest, and he built the first model in 1883. He came to the U.S.A. soon after and tried to sell his idea to Thomas Edison. Edison was doing well with his dc system, so was not interested in an ac machine. Tesla soon sold his idea to George Westinghouse. An entire ac system of generators, transformers, transmission lines, and protective devices was developed and has changed life throughout the world.

In addition to inventing the ac power system, Tesla did pioneering work in radio, robotics, amplifiers, and refrigeration. He had 112 U.S. patents and a similar number of patents outside the United States, including 30 in Germany, 14 in Australia, 13 in France, and 11 in Italy. He held patents in 23 countries, including Cuba, India, Japan, Mexico, Rhodesia, and Transvaal. He was selected for the Nobel prize in 1912, but refused the honor because it was to be shared with Thomas Edison, for whom he had little professional respect [13, page 20]. Without question, he was a good engineer.

However, about 1896 Tesla started investigating a number of advanced concepts which were not accepted by the scientific community at the time, and in many cases are still not accepted. This effort eventually caused the loss of his funding from John P. Morgan. He then spent the last years of his life in near poverty before dying in 1943.

The two advanced concepts of particular interest to us are the transmission of energy through space without wires and the extraction of energy from space (or the aether, vacuum, or firmament as you prefer).

Tesla believed that transmission of energy without wires could be accomplished in four ways:

1. One was to use the earth as a conductor and transmit extremely low frequency pulses through the earth at one of the earth's resonant frequencies. The energy would then be collected at a distant point by a properly tuned receiver. He referred to this as a "disturbed charge of ground and air method" [31, Page 29].
2. What might be called the "ionizing ray" method by which he claimed a high tension current could be passed along a ray to the stratosphere.
3. "Teleforce", or the non-dispersive beam method utilizing the particle beam tube to create a conductive path between two points on the earth's surface.
4. "Tele-geodynamics", by which he claimed to transmit mechanical energy to any point on the globe.

None of these methods involve Hertzian waves, the transverse electromagnetic waves which satisfy Maxwell's equations. The Hertzian wave is exclusively used in radio, TV, and other communication circuits today. It can do an excellent job of transmitting information, but is very poor at transmitting energy because of the spreading out of the wavefront. Tesla believed that a longitudinal wave of a fundamentally different character was possible, and that he had observed such a wave in his energy transmission experiments.

In an article prepared for the magazine *Electrical Experimenter*, Tesla stated [32]:

I have been asked by the *Electrical Experimenter* to be quite explicit on this subject so that my young friends among the readers of the magazine will clearly understand the construction and operation of my 'Magnifying Transmitter' and the purposes for which it is intended. Well, then, in the first place, it is a *resonant transformer* with a secondary in which the parts, charged to a high potential, are of considerable area and arranged in space along ideal enveloping surfaces of very large radii of curvature, and at proper distances from one another thereby insuring a *small electric surface density everywhere* so that *no leak can occur even if the conductor is bare*. It is suitable for any frequency, from a few to many thousands of cycles per second, and can be used in the production of currents of tremendous volume and moderate pressure, or of smaller amperage and immense electro-motive force. The maximum electric *tension is merely dependent on the curvature of the surfaces* on which the charged elements are situated and the area of the latter.

Judging from my past experience, as much as 100,000,000 volts are perfectly practicable. On the other hand currents of many thousands of amperes may be obtained in the antenna. A plant of but very moderate dimensions is required for such performances. Theoretically, a terminal of less than 90 feet in diameter is sufficient to develop an electro-motive force of that

magnitude while for antenna currents of from 2,000–4,000 amperes at the usual frequencies it need not be larger than 30 feet in diameter.

In a more restricted meaning this wireless transmitter is one in which the Hertz-wave radiation is an entirely negligible quantity as compared with the whole energy, under which condition the damping factor is extremely small and an enormous charge is stored in the elevated capacity. Such a circuit may then be excited with impulses of any kind, even of low frequency and it will yield sinusoidal and continuous oscillations like those of an alternator.

Taken in the narrowest significance of the term, however, it is a resonant transformer which, besides possessing these qualities, is accurately proportioned to fit the globe and its electrical constants and properties, by virtue of which design it becomes highly efficient and effective in the wireless transmission of energy. Distance is then absolutely eliminated, there being *no diminution in the intensity of the transmitted impulses*. It is even possible to make the actions *increase with the distance from the plant* according to an exact mathematical law.

I also proposed to make demonstrations in the wireless transmission of power on a small scale but sufficient to carry conviction. A plant was built on Long Island with a tower 187 feet high, having a spherical terminal about 68 feet in diameter. These dimensions were adequate for the transmission of virtually any amount of energy. Originally only from 200 to 300 K.W. were provided but I intended to employ later several thousand horsepower. The transmitter was to emit a wave-complex of special characteristics and I had devised a unique method of telephonic control of any amount of energy.

We can see that Tesla is specific about transmitting power (rather than signals) and claimed to have discovered a means whereby power can be transmitted from one point to another with little or no loss by some technique other than the use of a Hertzian wave.

Tesla gives some more details of his system of power transmission through the earth in an article published in the *Telegraph and Telephone Age* [30]:

The chief discovery, which satisfied me thoroughly as to the practicability of my plan, was made in 1899 at Colorado Springs, where I carried on tests with a generator of fifteen hundred kilowatt capacity and ascertained that under certain conditions the current was capable of passing across the entire globe and returning from the antipodes to its origin with undiminished strength. It was a result so unbelievable that the revelation at first almost stunned me. I saw in a flash that by properly organized apparatus at sending and receiving stations, power virtually in unlimited amounts could be conveyed

through the earth at any distance, limited only by the physical dimensions of the globe, with an efficiency as high as ninety-nine and one-half per cent.

The mode of propagation of the currents from my transmitter through the terrestrial globe is most extraordinary considering the spread of the electrification of the surface. The wave starts with a theoretically infinite speed, slowing down first very quickly and afterward at a lesser rate until the distance is about six thousand miles, when it proceeds with the speed of light. From there on it again increases in speed, slowly at first, and then more rapidly, reaching the antipode with approximately infinite velocity. The law of motion can be expressed by stating that the waves on the terrestrial surface sweep in equal intervals of time over equal areas, but it must be understood that the current penetrates deep into the earth and the effects produced on the receivers are the same as if the whole flow was confined to the earth's axis joining the transmitter with the antipode. The mean surface speed is thus about 471,200 kilometers per second—fifty-seven per cent greater than that of the so-called Hertz waves—which should propagate with the velocity of light if they exist. The same constant was found by the noted American astronomer, Capt. J. T. T. See, in his mathematical investigations, for the smallest particles of the ether which he fittingly designates as 'etherons.' But while in the light of his theory this speed is a physical reality, the spread of the currents at the terrestrial surface is much like the passage of the moon's shadow over the globe.

We see that Tesla is still unsure about even the existence of Hertzian waves, but recognizes that their characteristics (such as spreading out and propagating at the speed of light) are significantly different from the characteristics of his longitudinal wave. His wave propagates at variable speeds and does not spread out. And this conclusion is based on *experimental* observations, as opposed to merely theoretical calculations. Most people of this century have either ignored or rejected his results. There have been some attempts to explain some of his conclusions as misinterpretations of the experimental results [7]. For example, if a pulse train is being transmitted and reflected pulses are being observed to determine elapsed time and therefore velocity of propagation, it is easy to assume that the smallest observed time between transmitted and received pulses is the elapsed time. However, the pulse repetition rate may be high enough that two pulses are transmitted before the first pulse is received, which leads to a considerably greater elapsed time and a lower velocity of propagation.

Even allowing for such misinterpretations, it is still evident that Tesla observed some phenomena of waves and propagation that are very unusual, and such observations may help us on the road to the discovery of the energetic aether.

Returning now to the idea that space itself has energy, the following statement by

Tesla to the Institute of Electrical Engineers in London is instructive [31,Page 58].

Ere many generations pass, our machinery will be driven by a power obtainable at any point of the universe. This idea is not novel. Men have been led to it long ago by instinct or reason. It has been expressed in many ways, and in many places, in the history of old and new. We find it in the delightful myth of Antheus, who derives power from the earth, we find it among the subtle speculations of one of your splendid mathematicians, and in many hints and statements of thinkers of the present time. Throughout space there is energy. Is this energy static or kinetic? If static our hopes are in vain, if kinetic—and this we know it is, for certain—then it is a mere question of time when men will succeed in attaching their machinery to the very wheelwork of nature. Of all, living or dead, Crookes came nearest to doing it. His radiometer will turn in the light of day and in the darkness of the night, it will turn everywhere where there is heat, and heat is everywhere. But, unfortunately, this beautiful little machine, while it goes down to posterity as the most interesting, must likewise be put on record as the most inefficient machine ever invented!

Like many other of his ideas, Tesla was not as specific about this kinetic energy in space as we would like. He had two related patents, No. 685,957, *Apparatus for the Utilization of Radiant Energy*, and No. 685,958, *Method of Utilizing Radiant Energy*, both issued Nov. 5, 1901. The basic concept seems to be that this radiant energy would strike one plate of a large capacitor, perhaps causing electrons to be ejected to the surroundings so that the plate would have a net positive charge. This positive charge would then be used to supply a current through various electrical loads.

He shows a single electrode or targetless tube as a possible source for the radiant energy in the patent drawings. He uses the phrase “special form of Roentgen tube”, however the type of tube used by Roentgen in his earliest x-ray experiments was a Crooks-Hittorf Tube containing two internal elements [10, Page 1-74]. We know that x-rays can have adequate energy to eject electrons from metals, so that it is theoretically possible to convert x-rays into electrical power by this method. The efficiency would be low, however. It appears from his later statement that was quoted above, that Tesla did not believe he had invented a machine of the necessary efficiency. But, as he said, “... it is a mere question of time when men will succeed in attaching their machinery to the very wheelwork of nature.” Hopefully this time has now come in our search for the aether and the method of extracting energy from it for the benefit of mankind.

6.2 MORAY

T. Henry Moray (1892-1974) was born about the time Tesla was developing the ac power system. His parents were immigrants, a Swedish mother and an Irish father. His interests were in electricity and electrical engineering, but his formal education past high school was limited to correspondence courses and brief attendance at the University of Upsalla, Sweden, while on a mission for the Church of Jesus Christ of Latter-day Saints in that country.

Moray started his work on a new energy system in 1909. Soon he was able to report [20, page 20]:

During the Christmas Holidays of 1911, I began to fully realize that the energy I was working with was not of a static nature, but of an oscillating nature. Further I realized that the energy was not coming out of the earth, but instead it was coming to the earth from some outside source. These electrical oscillations in the form of waves were not simple oscillations, but were surgings—like the waves of the sea—coming to the earth continually, more in the daytime than at night, but always coming in vibrations from the reservoir of colossal energy out there in space.

Finally in 1925, Moray developed a working model. It was of the size and shape of an AM radio receiver of the day. It required an antenna and ground for operation. One installation used a ground pipe of 1/2 inch water pipe driven about 7 feet into the ground and a wire antenna about 87 feet long [20, page 40]. A rather lengthy tuning process was used, wherein a hand-held magnet was stroked across what appeared to be another magnet mounted on the radiant energy receiver for a period of up to ten minutes. Once tuned into the energy source, the output was used for standard light bulbs, electric irons, fans, and other electrical loads. The receiver was able to deliver several hundred watts for an indefinite period, up to several days in length. The output appeared to be high frequency, rather than dc or 60 Hz.

Moray demonstrated his receiver to many people, and several of the demonstrations were documented by photographs and affidavits. It was demonstrated at his home and laboratory as well as in remote locations selected by the observers. Except for certain proprietary components (possibly semiconducting valves or diodes), the receiver was available for inspection by the observers.

Moray made a total of seven patent applications regarding his Radiant Energy Device. All were rejected by the Patent and Trademark Office. The reasons given were basically that the device did not fit the physics known at that time. For example, part of the application was for a solid state device like a transistor. In 1931, transistors had not been invented and electron flow required a hot cathode in existing devices, so

Moray's device 'obviously' could not work. Also, the Patent Examiner stated "No natural source of electric wave energy is known to the Examiner and proof of the existence of such a source is required." [20, page 162]. That is, it was not enough to develop a device to tap into an unknown source of energy. The source of energy must also be fully described. Moray was not able to do this, so the patents were denied.

An invention of a device to extract free energy from the surroundings would have huge value and would certainly attract the attention of two groups of people: one group that would benefit financially and would therefore want to steal the invention, and a second group that might lose investment on existing energy devices and would therefore want to stop the invention from being developed. This, plus the tendency of most scientists and engineers to reject the whole concept immediately with phrases like 'conservation of energy' and 'perpetuum mobile', could easily result in a scenario such as that described in Moray's book. There seems to be no compelling reason not to believe that the pictures, affidavits, and accounts of witnesses are valid and that T. Henry Moray did indeed stumble upon a device to extract free energy from the surroundings.

The story involves considerable intrigue, including communist agents and people in black sedans shooting at the Moray automobile. Moray was betrayed by a number of 'friends' who were supposedly helping him with his invention. One working model was destroyed by an employee. He was unable to bring his invention to the market, although two of his sons, John and Richard, now operate a company called Cosray Research Institute, with the hope of yet getting Henry Moray's invention to the world. Both sons are physicists [17, Page 38]. John teaches in Salt Lake City and Richard lives on a ranch in Canada.

They claim to have all the laboratory notebooks and could replicate the work of their father if the right financial arrangements were made. It appears to be a classic impasse. The venture capitalists say, "Show us a working model, and we will think about giving you money". The Morays seem to be saying, "Give us money, and we will develop a working model". Whatever the reasons, it is a shame that this work has been in limbo for over half a century!

6.3 NEWMAN

We now move to another individual who claims to have tapped a new energy source, but much more recently than Tesla or Moray. Joseph Westley Newman, an inventor in Lucedale, Mississippi, appeared regularly on the nightly TV news with his energy machine for a period of time. The documentation is slightly better than that of Tesla or Moray in that others have been able to build similar machines. The story of his patent application is a saga of misunderstanding and closed mindedness. Depending on one's

point of view, we have a modern Copernicus being persecuted for disagreeing with the accepted belief system, or a nut who does not deserve the time of day from the scientific establishment. Let us review his case.

Newman had never taken a physics course at the time he was developing his concepts [21, page 5]. This kept him from being blinded to a new way of thinking, but presented difficulty in communicating his concepts to others. The following discussion of his ideas may therefore contain some changes from his style of explanation in an effort to put the concepts in a more standard language.

Newman developed a mechanical model for matter, where subatomic particles consist of large numbers of *gyroscopic particles*. These particles are constantly in motion in a spiral path. The gyroscopic particles move at the speed of light along the longitudinal direction and also move at the speed of light in the circumferential direction. That is, the spiral is moving longitudinally at the speed of light and is also rotating at the speed of light. The gyroscopic particles have a very small mass m . The classical momentum energy of a particle of mass m and speed c is $(1/2)mc^2$. Since the particle is moving both longitudinally and rotationally at speed c , Newman assumed the total energy is $(1/2)mc^2 + (1/2)mc^2 = mc^2$.

This is certainly a simple model for Einstein's equivalence of matter and energy, $E = mc^2$. It does not satisfy the Theory of Special Relativity, which would not allow a mass to travel at the speed of light, but perhaps these subatomic particles operate according to different rules from the larger particles. This model would imply that mass can be converted into energy according to $E = mc^2$ without the mass necessarily being a radioactive material. That is, the mass of copper or some other conductor might be converted directly to electromagnetic energy, one atom at a time, without the necessity of a thermonuclear reaction.

Newman built a number of energy machines which were claimed to utilize such a mass to energy conversion. A typical one [21, page 67] used a coil made of 140 pounds of 30 gauge copper wire, a rotating 14 pound permanent magnet with attached commutator, and a high voltage, low current dc supply V_B . A sketch of the machine is shown in Fig. 6.1. The dc supply is a series connection of one hundred 9-V transistor batteries, with a total nominal voltage of 900 V in this example.

The commutator is a complicated mechanism which connects and disconnects the top of the coil to and from the positive terminal of the battery for several cycles, then reverses the connection so the bottom of the coil is connected to the positive terminal for the next several cycles. In earlier versions the firing sequence was actually (1) connect the coil to the battery, (2) open circuit the coil, and (3) short the coil ends together. In later versions, shorting the coil ends together was not done [21, page 69], [11, page 4].

The physical explanation given by Newman is as follows [21, page 62]:

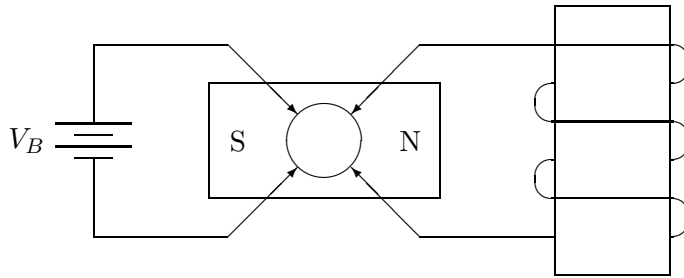


Figure 6.1: Sketch of Newman Machine

The brushes connected to the copper coil make contact with the FIRING SEGMENT position on the commutator. At that precise moment, current (in the form of gyroscopic particles) flows from the atoms of the battery's materials into the copper-coil conductor as the result of the 'hydraulic effect' [voltage]. As a 'catalytic effect,' such current-flow from the battery causes some of the atoms (within the copper-coil conductor) to align and release a minute portion of their electromagnetic configuration (in the form of gyroscopic particles) to generate an expanding magnetic field. As a result, some of these gyroscopic particles (within the expanding magnetic field) mechanically collide with a portion of the gyroscopic particles comprising other atoms within the copper-coil conductor. Some of these gyroscopic particles collide at a right angle, and those that do subsequently move at a right angle to that right-angular force. Such right-angular motion results in electrical current (consisting of gyroscopic particles) which moves in a direction opposite to the 'catalytic' input current (gyroscopic particles) from the battery source. The electrical current (gyroscopic particles) generated by the above-mentioned, right-angular collisions essentially 'traps' and prevents the battery current from completing the circuit. [Note: This right-angular motion of the gyroscopic particles occurs as an 'after-the-fact' reaction, i.e., the right-angular motion occurs *after* the gyroscopic particles (comprising the expanding, magnetic field) collide with those gyroscopic particles remaining within the atoms of the conductor.]

At the next instant in the rotation of the commutator, the brushes—connected to the copper coil—move off the FIRING SEGMENT and pass onto the BLANK SEGMENT (or 'dead-spot' position.) This new position breaks the 'hydraulic effect' (input voltage) from the battery and thereby causes the atoms of the copper-coil conductor to unalign. Such atomic unalignment results in a collapsing, magnetic field and represents an attempt on the part

of the gyroscopic particles (comprising the magnetic field) to return into the atoms from which they originally emanated. When this occurs, some of these gyroscopic particles comprising the collapsing magnetic field then collide at a right angle with some of the gyroscopic particles remaining within the atoms of the conductor. This right-angular collision occurs in a direction opposite to the right-angular collision which originally occurred when the magnetic field was *expanding*. As a result of the second collision, additional electrical current (in the form of moving gyroscopic particles) is produced in the conductor. Such current is now moving in the same direction as the original, ‘catalytic’ input current (gyroscopic particles) from the battery.

The basic concept therefore is that the battery current serves as a catalyst to convert part of the mass of the copper coil into energy, by a rapid alignment and unalignment of the gyroscopic particles which form the atoms of the copper. The power to mass ratio of the early prototypes was so low that it would take centuries to convert enough of the mass into energy to be able to measure the mass difference. Therefore it has been difficult to prove (or disprove) this concept by direct measurements of mass before and after a period of operation.

This particular coil (140 pounds of 30 gauge copper wire) had a resistance of about 50,000 ohms. A similar coil was measured to have an inductance of 2500 henries by the National Bureau of Standards [11, page 6]. Interwinding capacitance becomes important at about 100 Hz for this size of coil, so the series RL model for an inductor only applies at frequencies below 100 Hz. Between 100 and 1000 Hz, the coil exhibits rather complicated phase behavior, and then becomes a capacitor at frequencies above 1000 Hz. Newman did not specify the number of turns, but this would be on the order of 225,000 turns for a 2500 henry inductor of this dimension.

Newman put a nonlinear resistor across the coil in the form of four fluorescent bulbs connected in series. The commutator in this example had 28 firing segment—gap sequences. When one hundred 9-V batteries in series were placed across the commutator, the magnet rotated at 105 rpm. The frequency being applied to the coil would then be $(105/60)(28) = 49$ Hz, well within the low frequency model limit for the inductor. The average current was measured as 1.6 milliamps. The power supplied from a battery is the battery voltage times the average current, or $P = 960(0.0016) = 1.5$ Watts (for new, fully charged batteries). There would not be a phase angle or power factor associated with the battery as there would be for an ac source. This input power was adequate to drive the rotating magnet, supply rotational and resistive losses, and cause all four fluorescent bulbs to emit useful light but not at full brightness. The sum of the losses, mechanical power output, and electrical power output would appear to be significantly greater than the 1.5 W input.

The machine was operated for several hours at a time, with the final battery voltage

as high or even higher than when the test began. Presumably, the batteries would eventually run down. Newman argues that the fact that batteries are necessary to the operation of the machine keeps it from being a perpetual motion machine, although some people who examine his machine continue to call it a perpetual motion machine (and use that name to prove that his machine is impossible and therefore should not be examined further).

Also, Newman and his advisors apparently did not realize the distinction between *efficiency* and *coefficient of performance* in the engineering language, as I discussed in Chapter 1. Roger Hastings, a physicist who has examined several of Newman's machines, wrote [21, page 315],

On September 19, 1985 the motor was operated at 1,000 and 2,000 volts battery input, with output powers of 50 and 200 Watts respectively. Input power in these tests were 7 and 14 Watts, yielding efficiencies of 700 percent and 1,400 percent respectively.

Most engineers would quit reading after the last sentence because of the absurdity of *efficiency* being greater than one hundred percent. If Hastings had used the term *coefficient of performance*, COP, however, which is what he apparently meant, at least some engineers would have continued reading with interest. A simple change of wording might have saved them considerable difficulty.

The Newman machine has one obvious energy source, the battery pack. It possibly has a second energy source, what we might call a new energy source. Newman believes it is due to the conversion of the mass of copper atoms into energy. Whether it is the copper atoms, the vacuum, the aether, or something else, is not critical to the calculation of coefficient of performance. The machine has some losses, including the bearing friction and windage losses of the rotor and the ohmic losses in the copper wire. There are probably also some eddy current and hysteresis losses in the permanent magnet due to the time changing magnetic field from the copper coil. The output would be the electrical power delivered to the fluorescent bulbs connected across the copper coil and any mechanical power extracted from the rotor.

As I said, it appears that the 700 percent and 1,400 percent figures quoted above actually apply to the coefficient of performance. Newman and his associates have measured the battery power input, then measured or estimated the various losses plus the electrical output into any fluorescent bulbs, and have taken the ratio. If careful measurement shows this ratio to be greater than unity, then Newman has made an important discovery. Of course, such tests would need to be verified in independent testing laboratories.

As a part of the long running conflict between Newman and the Patent and Trademark Office, Newman actually sent a machine to the National Bureau of Standards for

such testing [11]. It was tested by Robert Hebner (Ph.D. in Physics), Gerard Stenbakken (M.S. in Physics), and David Hillhouse (M.S. in Electrical Engineering). They correctly commented that the low power, high voltage, and relatively high frequency measurements required by the Newman Machine are difficult to perform. The measurements which they performed seemed to be adequately done, using appropriate equipment and techniques. Unfortunately, they measured the wrong parameters.

Hastings made the following comments about their tests [21, page 317]:

While the reporters display fine credentials and demonstrate the use of precision equipment, they obviously did not test the Newman motor. Instead they measured the power consumed in resistors placed in parallel with the Newman motor, and called this power the motor output. In layman's terms, this is equivalent to stating that the output of an electric motor plugged into a wall socket is given by the power used by a lightbulb in the next room which is on a parallel circuit. The measurement of power consumed by these parallel resistors is clearly irrelevant to the efficiency of the Newman motor. The actual input power to the Newman motor (battery input minus power consumed by their resistors) is referred to in the report as 'internal losses.' No attempt was made to measure the mechanical output of the Newman motor. Nor was any measurement made of heat generated in the motor winding . . . Their measurements are therefore irrelevant to the actual functioning of the Newman device. These results reflect a total lack of communication between the N.B.S. and Newman or any other expert on Newman's technology. Considering the importance of Newman's Machine and its potential applications, this waste of N.B.S. resources and misrepresentation of Newman's device is an insult to those seriously interested in the machine and to those who may benefit by its future applications.

The N.B.S. testing group measured efficiency, as defined by an electrical power output over the battery power input, but did not measure or estimate COP, as was desired by Newman. Their measurements ranged from 27 to 67 percent, depending on the value of the parallel resistor. The difference between the battery power input and the electrical power into the resistor ranged from 2.2 to 4.9 W. If there is no new energy source, then this power difference must provide all the rotational and ohmic losses. It appears unlikely that a 14 pound permanent magnet can be rotated in a relatively crude bearing system by this small power, but the only way of determining this mechanical loss is by actual measurement. Therefore the N.B.S. tests did not accomplish anything useful.

Newman provided enough information that others could replicate his machine, and several have attempted to do so, myself included. None have succeeded. We are either

missing some key parameter (permanent magnet size and strength, mass of copper, frequency, waveshape, voltage, etc.) or this is not a good method of developing a new energy machine.

This account illustrates the importance of developing a quantitative model for the aether and perhaps for matter as well. The concept of copper atoms being formed of gyroscopic particles is an interesting one, but more details are necessary before the model can be fully useful. It may be like Faraday and his intuitive view of fields and field lines. Maxwell had to add equations to the model before there was predictive value (specifically the prediction of time-varying transverse electromagnetic waves).

We also need a key experiment. If we had a Newman machine that would produce significant amounts of power for an extended period of time, his hypothesis could be tested by simply weighing the copper in the circuit before and after the test. If the mass decreased, then his hypothesis has strong support. If the mass remained the same, then the alternative hypothesis that energy can be extracted from the energetic aether would have support. It is not enough to build a single working model. An entire theory must also be developed.

6.4 BEARDEN

Thomas E. Bearden has been perhaps the most important leader in the area of ‘free energy’ for the last decade or more. He has written several books in the area. He has a good technical background (MS in Nuclear Engineering) and a good military background (Lieutenant Colonel, U.S. Army, Retired). He speaks widely at meetings of free energy enthusiasts. He attempts to compress some of his theories in the Introduction to the Second Edition of his book *Excalibur Briefing* [3]:

A separate new field of physics is beginning to emerge... This new, extended electromagnetics—electrogravitation—I have dubbed **scalar electromagnetics**. The key to it is to let the EM force fields fight themselves to a ‘cancellation,’ forming a vector zero. If we do this in a nonlinear medium (modulator), the summing/multiplying EM vector forces are locked together and remain as an infolded EM system inside the EM vector zero. This now is a gravitational system. By merely varying (in phase) the summing EM components, one varies the local energy density of vacuum. Rigorously that is a gravitational wave. Further, it is a very powerful G-wave, for we are utilizing EM forces some 10^{42} times as strong as the normal weak G-force.

Classical EM has taught us to simply discard the components in the zero vector summation, replacing the system of opposing EM forces with a vector EM zero. This of course makes all vector EM zeros equal. However, it

totally ignores the space-time/vacuum stress of the summed forces, and the resulting gravitational implications. Therefore we have been taught to ignore any gravitational aspects of normal EM circuits, and indeed we proceed to release the G-stress effects in the circuits when we build them as we have been taught...

Two bucking transformers can make a B-field vector-zero a little bit. More complex circuits can easily be designed to sum (or multiply) force fields to zero very well. When we do this zero summation, we also get an amazing gain as follows: Consider two electrons in free space. As is well known, the electric field force (repulsion) between them is about 10^{42} times as strong as the gravitational field force (attraction) between them. So the electric force is so very much stronger that the comparatively weak gravitational force can be entirely neglected, in most applications. However, if we ‘strangle’ that electric field force by zero summation, all the opposing electric forces are converted directly into gravitational potential!

Interference of two such potentials can directly generate gravitational forces. So, if we could zero-sum their E-fields perfectly, we could instantly amplify the gravitational force between the two electrons by a factor of 10^{42} . With such a gravitational force amplification factor, our altered ‘electrical’ circuits would actually become powerful electrogravitational circuits. Further, appreciable gravity effects would now be experienced by any mass, object, or device exposed to the action of the circuits. This is the fundamental secret that Nikola Tesla discovered, one which he never openly revealed. . .

Let me be more specific. When you zero sum a group of EM force vectors, you place those component vectors ‘inside the zero,’ so to speak. In modern language you have placed ordered patterns directly inside the violent flux of virtual particles comprising the vacuum. The modern concept of the vacuum is that it is like a seething plasma or gas. However, it’s a very strange gas, for each particle arises spontaneously out of nowhere (according to quantum mechanics), and almost immediately turns into something else and/or disappears. Thus the vacuum plasma or gas is rather peculiar, the particles comprising it appear and disappear so rapidly that they cannot individually be detected. However, while a virtual particle exists, it is in motion, and so a violent flux of these ‘phantom particles’ comprises the vacuum/spacetime. . .

It can readily be seen that, in the ordinary view, the occurrence of these quantum changes is totally statistical. And indeed it is, so long as the virtual particle flux is randomized. However, with zero vector summation (or multiplication) we have produced deterministic patterns in the flux—and hence in the cohering and collecting of this flux on observable charged particles. Therefore, these deterministic ‘virtual state’ ordered patterns will result

in the appearance of deterministic patterns in the occurrence of observable quantum changes. . .

One can also make a practical ‘free energy’ device by setting up a standing scalar wave resonance in a localized region or device. From the ‘high stress’ point to the ‘low stress’ region of vacuum formed by such a standing scalar wave, a literal ‘river of energy’ is flowing in the vacuum itself. Once the river is established, only the ‘leakage’ need be replenished. Hence, if one builds a special sort of ‘paddle wheel’ to react with the river and turn in it, one obtains shaft power freely from the localized curvature of spacetime. In that case, an ordinary generator can be driven by the shaft torque to provide very cheap, or ‘free,’ electrical energy.

Bearden obviously speaks the language of science. He has developed a basic structure of a model. His concept of ‘virtual photons’ sounds a little like the ‘gyroscopic particles’ of Newman. But he has not yet published the details, whereby others can build machines that use his concepts. He sounds a bit like Tesla in giving an overview without publishing details that would prevent a later grant of a patent. Such is still possible since he wrote in the same introduction [3]:

Several inventors—three of whom I work with in one respect or another—now have demonstration models of such machines, which take diverse forms.

Bearden wrote the above introduction in December, 1987. More than eight years have elapsed and still there have been no public demonstrations of the ‘free energy’ devices of which he spoke. Was Bearden being overly optimistic about the status of these ‘free energy’ devices? Perhaps, but there are many other possibilities:

1. Devices that worked at one time in one location may not work at another time or in another location, due to some unknown variation of the aether with time or space. The aether might vary with temperature, humidity, or air pressure, for example. There may also be unknown or unrecognized outside influences.
2. Inventors may not have the scientific or engineering skills necessary to take a crude breadboard version and make it into a well-engineered demonstration unit.
3. Inventors may have run out of time and money to do further development work.

Therefore, those working on ‘free energy’ machines should not be intimidated by reports that others have been first to invent. These machines may take many different forms, and the market is large enough to support a number of ‘free energy’ manufacturers.

6.5 OTHER RESEARCHERS

Many others could be named as investigators of phenomena related to a new energy source. The following list generally excludes the area of cold fusion, which may also be extracting power from the energetic aether. This is rapidly becoming a large area in its own right, and is well documented elsewhere [16].

Harold Aspden [1] studied at Cambridge in England. His Ph. D. research involved the investigation of anomalous energy activity in the reaction which occurs when ferromagnetic cores are magnetized using a.c. He is now retired from his teaching position and is spending full time investigating the necessary magnetics of a new energy source. In talking about the energy stored in the vacuum, he made the following comment [2, Page 2]:

We are curious about the history of the universe and its creation, for surely it was created! It needed energy for that to come about and I, for one, am not in any way impressed by the scientists who tell us it all began at an instant when everything exploded from a point in space in a so-called ‘Big Bang’.

His attitude is an encouraging step away from scientists either ignoring or denying God in their papers.

John Bedini [4] built a ‘free energy generator’ with a 12-V battery, a dc motor, and a controller, similar to Newman’s work.

T. T. Brown’s work [6] that supposedly established a link between electrostatics and gravity is well known in the new energy research community. Brown observed that a capacitor charged to a high voltage tended to move in the direction of the positive plate. The problem is that voltages high enough to produce the effect also cause corona, such that it is very difficult to experimentally sort out the electrogravitational effects from more mundane electrostatic effects.

Bruce DePalma has built several Faraday generators capable of operating at very high currents and low voltages that appear to be a new energy source [8]. The abstract of this paper reads as follows:

The key to understanding and explaining the baffling situation of anomalous excess electrical energy generation in free energy machines, lies in a re-interpretation of magnetism as not being a property of the magnet, but of space itself. The spatial distortion induced into the homogeneous Primordial Energy Field by the anisotropy of the magnet is what we call magnetism. It is the thesis of this paper that the distortion of the PEF occasioned by

the magnet is the operative principle in the class of machinery known as induction machines. The PEF is also distorted as a consequence of the spatial reaction to the centripetal force field existing within the *rotating* magnetized conductor.

Based upon an effect first discovered by Michael Faraday in 1831, the N machine/Space Power Generator is an electrical machine which has the possibility of producing electrical energy with significantly less mechanical power input than the presently employed induction machines.

Lester J. Hendershot (1898-1961) build a device in the 1920s that would run a table top radio and a standard 120 V lightbulb at the same time. His theory was that it was interacting with the earth's magnetic field. He was not an engineer and did not know how to duplicate the device or scale it up. Tuning or activation was apparently quite critical. His son Mark is attempting to do further development on this device [12].

John Ernst Worrell Keely (1827-1898) was a musician who built a number of interesting machines, including a device that tunneled through rock by dissolving the stone [17, Page 32]. He did not speak the language of science, but rather used musical terms and his own terminology to describe more than forty of what he called fundamental laws of nature. His foremost interpreter of the present day is Dale Pond [23].

Moray King [14] (no relation to T. Henry Moray) has written extensively about the new energy source, which he calls Zero-Point Energy. He is a theoretical physicist, occasionally sounding a little like Tom Bearden. Moray likes Caduceus coils, a sort of double winding that cancels the fields interior to the coil, but not the stress on the vacuum.

Stefan Marinov [18] publishes the journal *Deutsche Physik* in Austria and has been a gadfly to establishment scientists for many years. He recently purchased an advertisement in the March 28, 1996 issue of *Nature* which included the following assertions:

1. The principle of relativity is wrong.
2. The principle of equivalence is wrong.
3. The energy conservation law is wrong.
4. the Lorentz equation is wrong.
5. the angular momentum conservation law is wrong.

He then went on to explain his reasoning for these assertions. He has some good ideas, but tends to be confrontational in his approach.

Stanley Meyer has several patents on the separation of water into hydrogen and oxygen by high frequency pulses, and then burning the gases as a motor fuel [19].

P. T. Pappas [22] in Greece has done some very interesting work with anomalous energy production in electrical sparks. He is also active in developing the proper force equations between current elements, which we shall consider in the next chapter.

Hal Puthoff is a physicist at the Institute for Advanced Studies at Austin (Texas) and has been a strong advocate of what he calls the vacuum zero-point energy (ZPE) or what is called the energetic aether in this book. He has access to the higher levels of oil companies such as Pennzoil, Texaco, Tenneco, Marathon Oil, and Coastal Oil [27]. He has thrown out a classic ‘One Watt’ challenge to the New Energy community where the output of a prototype new energy device is connected back to the input, and which, once the device is started, will deliver a net power of at least one watt to an external load for an indefinite time period. He publishes his research results in the mainline physics literature [25, 24, 26]. More people of his caliber are needed in this search for a new energy source.

Walter Russell (1871-1963) was an acclaimed artist, musician, philosopher, and author [17, Page 35]. In 1926 he predicted the existence and characteristics of tritium, deuterium, neptunium, plutonium, and other elements that were not discovered until decades later. Three of the researchers that are trying to continue his work are Timothy Binder [5], Toby Grotz [9], and Ron Kovac [15]. This team has found evidence of transmutation of elements, and also the production of an unknown element of atomic mass 5.

Viktor Schauberger (1885-1958) was a forester in Austria who built machines based on his observations of water in cold mountain streams. He used a principle of *implosion* (inward spiraling movements) rather than *explosion* [28].

Ken Shoulders has invented [29] a device that produces a discrete, contained, bundle of charged particles which are predominantly electrons. This is a high density state of matter that appears to be produced by the application of a high electrical field between a cathode and anode. Electrical energy output may be obtained from a device resembling a traveling wave tube.

Thomas Valone [32] has done considerable work on the Faraday or Homopolar Generator, electrogravitics, Tesla history, scalar potentials, and other new energy topics.

Several of the above group experienced significant difficulties in bringing their devices to the marketplace. Hendershot was found dead of a supposed suicide only an hour after a phone call from a man promising financing. There is also an account of an electrical injury received while at the Patent Office and being paid to suspend research efforts for a twenty year period while recovering from that injury [17, Page 41].

Keely was apparently ruined by unethical speculators and even spent some time in prison [17, Page 34].

Russell and his wife worked with the North American Air Defense Command (NORAD) in developing their generator and turned what they claimed was a working device over to NORAD in 1961. That was the last time anyone heard of it [17, Page 36].

Viktor Schauberger and his son Walter were persuaded to come to the United State in 1958 to discuss the manufacture of Viktor's energy devices. As the story goes, they were forced to sign over all their rights to the invention and agree to not even speak of it before they would be allowed to return to Europe [17, Page 43]. Viktor died five days after returning home.

Others still living have had similar problems, ranging from rejection of patent applications to confiscation of equipment and prison time. Not everyone experiences such problems, of course, but the percentage seems higher than would be expected for a randomly selected sample of society. The search for a new energy source is not a good activity for those who tend to worry a lot!

Many others could be named who have contributed theoretically or experimentally to this search for a new energy source. These include James and Kenneth Corum, Richard Hull, John Hutchison, Wingate Lambertson, Wilhelm Reich, John Searl, Floyd Sweet, Paramahansa Tewari, and Charles Yost. With so many people looking for a new energy source, it would appear to be only a matter of time before the key discovery is made. In fact, it is a puzzle why it has not happened already. One reviewer commented, and I agree, that it will not happen until it is God's timing. At the right time, no one will be able to stop the deployment of new energy devices. Until then, the challenges and difficulties will continue.

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CHAPTER 7

QUESTIONS OF ELECTROMAGNETIC THEORY

The notion of a new energy source is a mind-boggling concept, and our scientific minds immediately race to develop arguments why another source is impossible. We are in the equivalent position of scientists of a century or more ago, in receiving a forecast of nuclear power. If Faraday had been told in 1850 that one element could be transmuted into another element, and give off energy far in excess of normal chemical reactions in the process (e.g. uranium being changed to barium and krypton plus energy $E = mc^2$), he would have been tempted to make an unkind remark about alchemists and return to his ‘legitimate’ research in his laboratory. Of course, Faraday had enough humility and enough curiosity that he probably would have reserved judgment on the matter until he had carefully examined the evidence.

If there is an energetic aether, then some hallowed equations of electromagnetic theory will probably need modification. Or we may need a new theory which is applicable in certain conditions, like very high fields. It may be like the addition of quantum mechanics to Newtonian mechanics. Newtonian mechanics work very well for macroscopic particles, but fail at the quantum level. Quantum mechanics did not invalidate Newtonian mechanics, but rather completed the picture.

Are there any ‘cracks’ in the foundations of electromagnetic theory? Should theoreticians be looking for new theories? It may be surprising for a theory that has done well for many years, but the answer seems to be yes. There are actually dozens of issues that are still matters of debate, of which we will mention only a few.

The questions that will be mentioned certainly do not prove the existence of another energy source. Rather, they point out that the foundations of electromagnetics are surprisingly weak and raise the possibility that appropriate modifications to electromagnetic theory may predict a new energy source.

It will be difficult to understand the material in this chapter without at least a first course in electromagnetic theory. The reader who feels overwhelmed should skip to the following chapter.

7.1 FIELDS, AETHER, OR ACTION-AT-A-DISTANCE

We observe gravitational, electric, and magnetic forces between particles without any visible connection between them. How are these forces transferred from one particle to the other? Historically, there have been two possibilities, far-action (also known as action-at-a-distance) and contact-action. Each possibility has then been explained in various ways. I will list three proposed answers to this question of force transmission:

1. Simultaneous far-action.
2. Contact-action using one of many proposed aether models.
3. Contact-action using electromagnetic fields.

The last item in the above list is intended to represent the majority view of twentieth century science. In this view, every charged particle is assigned its own ‘field’ which extends off to infinity. Fields then interact to produce forces. The energy in a system of charges would be stored in the fields. Energy flows at the speed of light.

The aether model is philosophically quite close to the field model. The total collection of all electric, magnetic, and gravitational fields can be considered to be an aether. However, most aether models have some sort of mechanical basis which appears different from a system of fields, and the discussion is somewhat simplified when this distinction is made, so I will do so.

In an aether, vacuum or space is assumed to have some structure such that a force could leave one electric charge, (or mass, or magnetic pole), perturb or modify this structure, and move through the structure (aether) to the other charge. The energy received from an external source in moving two like charges toward each other would be stored in the aether, the same place as for the field models. Only the exact mechanism is different.

On the other hand, simultaneous far-action assumes that forces between charges are an integral part of the charges. Questions about what lies between charges are considered irrelevant. Energy is stored in the charged particles themselves, rather than in the intervening space.

With that brief introduction, let us examine what the Bible has to say about mass, electromagnetics, and aethers. We will then explore the human history of these concepts in more detail.

The first things that God created were time, space, and mass.

In the beginning (time) God created the heaven (space) and the earth (mass).
Genesis 1:1.

The next thing created was light, also on the first day of creation.

And God said, Let there be light: and there was light. Genesis 1:3.

This implies that whatever was necessary for electromagnetic waves (of which light is an example) was created at that time. If light requires an aether for propagation,

then it was created here. The fact that mass and light were created separately imply that neither is a subset of the other. That is, electromagnetic waves can propagate independently of matter, and matter is not a simple form of ‘congealed light’. (Once both matter and light were created, they could interact with each other, of course.)

Then on the second day, the firmament or what I have referred to as the energetic aether was created.

And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters. And God made the firmament, and divided the waters which were under the firmament from the waters which were above the firmament: and it was so. Genesis 1:6,7.

When was gravity created? Was it with mass in verse 1, with light in verse 3, or with the firmament in verse 6? There have been many efforts to show that gravity has an electromagnetic basis, but none has been persuasive to me. It appears that the gravity force is different in character than, say, the Coulomb force, so I would argue that gravity was not created as a part of the creation of light.

Most people would say that gravity was created as an integral part of mass. They would say that a person standing on the earth (in the dark) after verse 1 would experience the same gravitational forces that we experience today. This may well be the case, but I would point out that the first mention of anything gravitational occurs on the second day when waters were lifted up. There is therefore a possibility that the firmament performs the gravitational function.

If gravity is an integral part of mass, then it will be difficult or even impossible to develop an anti-gravity system. If gravity is a function of the energetic aether, on the other hand, then we have more hope of shielding against gravity and even reversing gravity.

I suggest for a working hypothesis the following grouping of things created the first two days of Creation Week:

1. Mass (probably without gravity).
2. Light (electric fields, magnetic fields, any structure necessary to support the propagation of electromagnetic waves).
3. Firmament or energetic aether (probably gravity, definitely energy).

Light has always been important to mankind. However, led by men like Coulomb, Ampère, Faraday, and Maxwell, we discovered how to *really* utilize ‘light’ for our benefit

only within the past two centuries. The capability has been here from the beginning, but we had to learn how to control electricity in wires and space for power and communications. Similarly, I believe that the firmament has always been important to mankind but that we have not discovered how to fully utilize it. In exploring the firmament, we are about at the position of Ben Franklin and his kite in developing electricity. A few people are looking at the problem but there is a long way to go. Further, I believe that harnessing the firmament will have as much impact on mankind in the next century as harnessing electricity (light) has had in the past century.

I predict that matter, light, and the firmament all interact with each other. Just as hot matter can produce light, and light can exert a force on matter, we will discover ways of levitating matter by action of the firmament, and will be able to use the firmament to produce conventional electrical power.

Returning to our historical overview, for much of human history, the response to a question about the mechanism of gravity would probably have something about God (or gods) in the answer. (Why does an arrow fall? The gods made it fall.) After the New Testament was written, someone might quote the following statement by the Apostle Paul:

For by Him (Jesus) all things were created, both in the heavens and on earth, visible and invisible, whether thrones or dominions or rulers or authorities—all things have been created by Him and for Him. And He is before all things, and in Him all things hold together. Colossians 1:16,17. (New American Standard)

(Why does an atomic nucleus not fly apart? Jesus holds it together.) I would put such answers into the simultaneous far-action camp. God would presumably not need any intervening space or a finite propagation time in order to ‘hold things together’.

While God may be the ultimate explanation, those of us with a scientific bent like to express the mechanism for forces observed at a distance in ‘scientific’ terms. Aristotle (384–322 B.C.) was one of the first to do so. His explanation was contact-action rather than far-action. He laid down four axioms [11, Page 17]:

1. There are no voids in the universe.
2. Every motion has a moving cause.
3. The mover must be in contact with the thing moved.
4. For every motion there is an unmoved first mover.

In a world that has no vacuum spaces, every object would be, in the words of Aristotle, pushed, pulled, carried, or twirled by whatever was in contact with it. Therefore, if a body was seen to move, something else provided the driving force and stayed in contact with it.

Others tried to quantify and improve the aether model of Aristotle throughout the centuries. One of the more famous was the French mathematician and philosopher René Descartes (1596–1650), whose name is a part of the term “Cartesian coordinates”. According to Peter and Neal Graneau [11, Page 22]:

René Descartes used only mechanical principles to formulate a new model of the world. Although the Cartesian philosophy displaced that of Aristotle, as far as the unmoved first mover (God) was concerned, it retained the preference for contact action over distant action. All parts of the Cartesian universe were mechanically interconnected to form a gigantic machine. Animals and humans were also supposed to function like mechanisms. In the Cartesian world matter was moved by pressure, collisions, and impulse. The medium which transmitted the contact action was a subtile fluid, called ether, which filled the void between particles, bodies, and stars. The swirling ether created many whirlpools which were the gearwheels of the cosmic machine. In this universe there was no need for forces. Although René Descartes was the founder of analytical geometry, his physics lacked mathematical structure and was altogether more qualitative than quantitative. It became the last of the non-mathematical cosmologies. Its appeal was that it embraced everything. In this sense it was a forerunner of the grand unified theory which is the dream of modern physicists.

Then in 1687, Isaac Newton (1642–1727) published his famous work, the *Principia*, which included his theory of universal gravitation and much more. At the time, it was the most important book in the international scientific literature.

The important point for our discussion is that his theory of gravity was based on far-action. To explain this requires us to remember that aether theories before Newton had been quite unproductive. Newton rejected all such theories when he developed his law. His law was far-action or action-at-a-distance, with mutual (simultaneous) interaction between masses. The interaction required both masses. One mass with a gravitational field was not a part of his theory. All the energy was located in the masses and none in the intervening space. There was no need to even describe the intervening space, since only the distance between masses was of interest. He suggested that the earth and moon attract each other without any participation of the intervening space. There is only one interaction force involved and it affects both bodies equally. Each body has full knowledge of the size and whereabouts of its partner, simultaneously. There was no notion of ‘propagation’ of gravity in Newton’s theory.

At least part of Newton's reasoning was that only forces on masses and their resulting motions could be observed. The aether, if there was one, could not be detected or measured with any instruments available to him. (Three centuries later, we still cannot directly and unambiguously detect the aether.) Hence why should he bother with speculations about something which could not be observed or tested? If the equation describing a physical phenomenon is acceptably accurate, who cares about what might be happening in the space between masses?

Others who joined Newton in the far-action camp included Coulomb, Ampère, Neumann, Weber, and even Voltaire. Far-action was a theory which enabled them to do good science. Coulomb's force law between charged particles, Ampère's force law between current elements, and Newton's gravitational force law between masses were all developed as simultaneous far-action laws.

The fact that far-action theories worked, and worked very well, did not mean that contact-action was dead. There were always those who preferred aether theories, even through the lifetimes of Newton and Ampère. An aether always held promise of explaining the observed phenomena, while far-action seemed somewhat mysterious. (In fact, Einstein thought that far-action was 'spooky').

Then came Michael Faraday (1791–1867), a gifted experimental physicist, who was one of the first people to describe the action of fields. He initiated a dramatic reversal of the philosophy of science from far-action back toward contact-action.

James Clerk Maxwell (1831–1879) put Faraday's concepts into mathematical format. At the very end of his treatise, he defends the idea of an aether against the far-action advocates Clausius, C. Neumann, Bernhard Riemann, and Professor Betti of Pisa, Italy [15, Art. 865]:

There appears to be, in the minds of these eminent men, some prejudice, or *a priori* objection, against the hypotheses of a medium in which the phenomena of radiation of light and heat and the electric actions at a distance take place. It is true that at one time those who speculated as to the causes of physical phenomena were in the habit of accounting for each kind of action at a distance by means of a special aethereal fluid, whose function and property it was to produce these actions. They filled all space three and four times over with aethers of different kinds, the properties of which were invented merely to 'save appearances,' so that more rational enquirers were willing rather to accept not only Newton's definite law of attraction at a distance, but even the dogma of Cotes, that action at a distance is one of the primary properties of matter, and that no explanation can be more intelligible than this fact. Hence the undulatory theory of light has met with much opposition, directed not against its failure to explain the phenomena, but against its assumption of the existence of a medium in which light is propagated.

On the next page of his treatise, Maxwell talks about energy in space [15, Art. 866]:

But in all of these theories the question naturally occurs:—If something is transmitted from one particle to another at a distance, what is its condition after it has left the one particle and before it has reached the other? If this something is the potential energy of the two particles, as in Neumann's theory, how are we to conceive this energy as existing in a point of space, coinciding neither with the one particle nor with the other? In fact, whenever energy is transmitted from one body to another in time, there must be a medium or substance in which the energy exists after it leaves one body and before it reaches the other, for energy, as Torricelli remarked, 'is a quintessence of so subtile a nature that it cannot be contained in any vessel except the inmost substance of material things.' Hence all these theories lead to the conception of a medium in which the propagation takes place, and if we admit this medium as an hypothesis, I think it ought to occupy a prominent place in our investigations, and that we ought to endeavour to construct a mental representation of all the details of its action, and this has been my constant aim in this treatise.

Maxwell's argument is well made. However, the far-action establishment had been in place almost two centuries and had produced great advances in science. Hence, it is not surprising that the contact-action concepts of Faraday and Maxwell met resistance from scientists on the continent, as mentioned by Maxwell in his quote above. Not until the experiments of Hertz, over a decade later, was Maxwell's theory accepted.

But, partly as a result of the failure to define a consistent model of the aether and partly as a result of a failed experiment to find the aether, Maxwell's concept of a classical aether was soon replaced with the field contact-action model. That is, rather than the aether being the seat of energy between transmitter and receiver, the fields were considered to contain energy directly. Therefore, no separate medium was required.

This failed experiment was performed by Albert A. Michelson (1852-1931) and Edward Williams Morley (1838-1923), who assumed that light propagated in the aether at a fixed speed. An observer moving in the same direction as the aether should therefore measure a different speed of light than one moving in the opposite direction. They also assumed that the earth was moving through the aether by rotating about its axis and revolving about the sun. (Others had assumed that the earth dragged the aether along with it in its travels.) Their experiment in 1887 was one of the more famous 'failures' in history. They found that the speed of light was the same in all directions! Einstein used this observation in developing his Special Theory of Relativity (SRT), which has no need for an aether separate from the fields themselves.

The experimental apparatus of the Michelson-Morley experiment is discussed in most introductory physics books. Bouw [3] has a nice historical treatment with some interesting interpretations of the results.

But, even after Einstein's SRT and Maxwell's equations had received nearly universal acceptance, the concept of an aether refused to die. Whittaker made the following remark in 1951 [33, Preface]:

As everyone knows, the aether played a great part in the physics of the nineteenth century; but in the first decade of the twentieth, chiefly as a result of the failure of attempts to observe the earth's motion relative to the aether, and the acceptance of the principle that such attempts must always fail, the word 'aether' fell out of favour, and it became customary to refer to the interplanetary spaces as 'vacuous'; the vacuum being conceived as mere emptiness, having no properties except that of propagating electromagnetic waves. But with the development of quantum electrodynamics, the vacuum has come to be regarded as the seat of the 'zero-point' oscillations of the electromagnetic field, of the 'zero-point' fluctuations of electric charge and current, and of a 'polarisation' corresponding to a dielectric constant different from unity. It seems absurd to retain the name 'vacuum' for an entity so rich in physical properties, and the historical word 'aether' may fitly be retained.

We have gone from far-action (God) to contact-action (Aristotle) to far-action (Newton) to contact-action/aether (Maxwell) to contact-action/fields (Einstein) to contact-action/fields plus an aether (Whittaker). This has been just the main stream of science. There have always been a significant minority that have taken other positions.

One such position is the compromise between simultaneous far-action and contact-action, called retarded far-action. This concept was published by the distinguished theorists Moon and Spencer (a husband and wife team) in 1959 [21] in an attempt to explain inertia. Another effort in this vein was published by G. Burniston Brown in his book in 1982 [4]. Peter and Neal Graneau discuss the history of this position in their book [11, Pages 82-101]. Retarded far-action leads to results that violate Newton's Third Law. (Contact-action theories do also, as we shall see in the next section). For whatever reason, their work was largely ignored by the Physics community and now gets little more than a footnote in the history of science.

What can we conclude from this history of far-action and contact-action? One reasonable conclusion is that we are not as smart as we think we are. A little humility is in order. As Tesla put it [29, Page 149]:

[Your letter] has brought painfully to my mind the greatness of early expectations, the quick flight of time, and alas! the smallness of realizations.

Another conclusion is that we need to get back to our experimental roots. Our theories should reflect the reality of the laboratory. When an experimental result cannot be predicted by the pertinent equation, the equation needs to be fixed or discarded, regardless of how long it has been in service.

I will give two examples of such equations that have been questioned by recent experiments. The equation for forces between two current elements that has been in use since 1845 has been shown to be incorrect by a variety of experiments in the past two decades. The other equation is the Lorentz force equation for the force on a charged particle moving in electric and magnetic fields, the validity of which has been shaken by the Aharanov-Bohm experiment.

7.2 AMPÈRE'S FORCE LAW

Consider the case of two charges Q_1 and Q_2 , separated a distance r , as shown in Fig. 7.1. We are interested in the force \mathbf{F}_2 on Q_2 due to Q_1 . There are four possibilities [18]:

1. constant Q_1 , no relative motion.
2. constant Q_1 , uniform relative motion (charges moving toward each other or away from each other at a constant rate of speed).
3. constant Q_1 , accelerated motion (charges separating or coming together at an ever-increasing or ever-decreasing rate of speed).
4. Q_1 a function of time (no motion, but amount of charge is varying).

Condition 1 gives the Coulomb force. There is no universal agreement on the men's names associated with the other conditions, but we shall conform to Moon and Spencer [18] in calling them the Ampère force, Weber force, and Maxwell force, respectively. The primary interest in this section is the Ampère force law.

The Ampère force law is not to be confused with Ampère's circuital law (one of Maxwell's equations), which states that the closed line integral of magnetic intensity \mathbf{H} is equal to the current enclosed.

The force between charges with uniform relative motion, or by extension, the force between current elements, is named in various ways in electromagnetic theory textbooks. A few will call this force the Ampère force, a majority will call it the Biot-Savart force, and a few will leave it unnamed, deriving it from the Biot-Savart law for the magnetic field of a current element. Historically, the last group is more nearly correct than the others. Actually it should be called the Grassmann force law, as we shall see shortly.

The force law between two current elements that is consistently printed in textbooks is *not* the force law developed by Ampère. It appears from modern experimental evidence that Grassmann's force law is *not* correct, and that Ampère's original law is the proper one. It also appears that the correct force law *cannot* be derived from Coulomb's law and special relativity. This constitutes a significant objection to one of the fundamental laws of modern field theory. Before looking at the equations, we shall examine some of the historical background.

Hans Christian Oersted (1777-1851) discovered the link between electricity and magnetism and prepared a paper on his discovery dated July 21, 1820 [10, Page 1]. André Marie Ampère (1775-1836) saw a demonstration of this discovery at the French Academy in Paris on September 11, 1820. He immediately set to work on his electrostatics. One week later, Ampère reported to the Academy that parallel wires carrying electric currents flowing in the same direction attract each other, but repel when the two currents flow in opposite directions. He continued his research such that his theory of electrostatics was basically completed by 1823.

Ampère based his work on four null experiments [15, Art. 503-527], [10, Pages 7-22]. These might be called the opposing current, bent wire, wire arc, and three circle experiments. (A null experiment is one where the geometry requires zero force or movement in a particular current element, regardless of current amplitude. This was obviously the best kind of experiment in a time period where it was very difficult to accurately measure or control the actual current flow.)

Ampère also used the postulate that the force acts along the line of centers (Newton's Third Law). From these he deduced an equation for the force between current elements (shown in Fig. 7.2) [16, Page 312], [17, Page 121], [19, Page 298]:

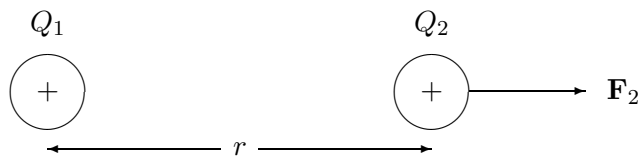


Figure 7.1: Force On A Charge Due To Another Charge

$$d^2\mathbf{F}_2 = \mathbf{a}_r \frac{\mu |I_1| |I_2| ds_1 ds_2}{4\pi r^2} [2 \sin \theta_1 \sin \theta_2 \cos \eta - \cos \theta_1 \cos \theta_2] \quad (7.1)$$

where I_1 and I_2 are currents in elementary conductors ds_1 and ds_2 , and μ is the permeability of space (henrys/m). The force is in newtons (N). The distance between elements is r , the angle between ds_1 and the unit vector \mathbf{a}_r directed from ds_2 to ds_1 is called θ_1 , and the angle between ds_2 and \mathbf{a}_r is θ_2 . The vectors \mathbf{a}_r and ds_1 determine a plane, which makes an angle η with the plane determined by \mathbf{a}_r and ds_2 . Of the two complimentary angles between the planes, η is that angle through which the plane containing ds_2 would have to be turned in order to make the components of the current elements which are perpendicular to the unit vector \mathbf{a}_r point in the same direction. The total force \mathbf{F}_2 on the complete circuit No. 2 due to the other complete circuit (No. 1) is determined by a double integration of $d^2\mathbf{F}_2$ over both circuits.

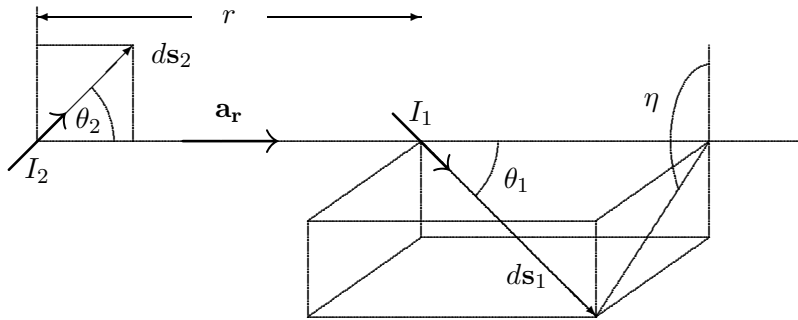


Figure 7.2: Current Elements for Ampère's Force Law

For the special case of parallel current elements, $\theta_1 = \theta_2 = 90^\circ$, and $\eta = 0$, so the term in square brackets in Eqn. 7.1 is positive and the force is attractive. Parallel current elements with currents in the same direction attract, and repel if the currents are in opposite directions. This rule can always be used as a check for the proper signs in the force equation.

The other special case of interest is that of colinear current elements, for which $\theta_1 = \theta_2 = 0$. This gives a negative quantity inside the square brackets, indicating that colinear current elements repel each other. This implies that a current carrying conductor should be stretched as current flows in it.

The force equation can also be expressed as [24, Page 190]:

$$d^2\mathbf{F}_2 = \mathbf{a}_r \frac{\mu |I_1| |I_2|}{4\pi r^2} [2ds_1 \cdot ds_2 - 3(ds_1 \cdot \mathbf{a}_r)(ds_2 \cdot \mathbf{a}_r)] \quad (7.2)$$

The signs for both versions of the force equation are for the case of \mathbf{a}_r directed from element 2 to element 1. The second equation better shows the symmetry between $d\mathbf{s}_1$ and $d\mathbf{s}_2$, such that

$$d^2\mathbf{F}_2 = -d^2\mathbf{F}_1 \quad (7.3)$$

The force between current elements is, of course, not identical with the force between charges. However, a direct current can be considered to be a set of charges drifting at uniform velocity, so Eqns. 7.1 or 7.2 can be translated into an equation for force between charges. This was done by Gauss in 1835, but not published until 1867. Gauss' equation is [16, 18, 17].

$$\mathbf{F}_2 = -\mathbf{a}_r \left[\frac{Q_1 Q_2}{4\pi\epsilon r^2} \right] [1 + (v/c)^2 (1 - (3/2) \cos^2 \theta)] \quad (7.4)$$

where v is the magnitude of the relative velocity \mathbf{v} of Q_2 with respect to Q_1 , and θ is the angle between \mathbf{v} and \mathbf{a}_r . The first term represents the Coulomb force, while the remainder of the equation represents the Ampère force. The direction of forces in these two equations can be interpreted according to the usual rules. Like charges repel while unlike charges attract each other. The force on a charge Q_2 is less than the Coulomb force when Q_2 is moving toward Q_1 ($\theta = 0$) or away from Q_1 ($\theta = 180^\circ$), and greater when Q_2 is moving by Q_1 on a perpendicular path ($\theta = 90^\circ$).

Jean-Baptiste Biot (1774-1862) was another French scientist who was present at the French Academy of September 11, 1820, and, like Ampère, he too rushed back to his laboratory. With his assistant Félix Savart he set up a current in a long vertical wire and measured the magnetic field strength around the wire, using the fact that the frequency of mechanical oscillation of a compass needle is a measure of the field strength in which the needle is found. They derived the equation for the magnetic field around a long wire,

$$H = \frac{I}{2\pi r} \quad (7.5)$$

where H has units of A/m. They reported their results to the French Academy on October 30, 1820.

The law that is actually given their name was apparently derived from the above equation by Laplace, who never claimed credit for it [10, Page 5]. A modern expression of the law is

$$d\mathbf{H} = \frac{I d\mathbf{s} \times \mathbf{a}_r}{4\pi r^2} \quad (7.6)$$

The direction of $d\mathbf{H}$ is determined by the cross product. That is, the right hand is located at the observation point P with the fingers straight in the direction of $d\mathbf{s}$. When the fingers are curled toward the direction of \mathbf{a}_r , the thumb points in the direction of $d\mathbf{H}$.

The force equation that is often given the name of Biot-Savart was actually proposed by Grassmann in 1845 [10, Page 45]. A typical version of it is

$$d^2\mathbf{F}_2 = \frac{\mu|I_1||I_2|}{4\pi r^2} d\mathbf{s}_2 \times (d\mathbf{s}_1 \times \mathbf{a}_{r12}) \quad (7.7)$$

According to this law, a pair of current elements do not necessarily attract or repel each other, but each experiences a force perpendicular to itself which has its cause in the existence of the other. By the force not acting along the line between the elements, the equation violates Newton's Third Law of motion. It can be shown [10, Page 47] that when the Grassmann force is summed over all the elements of a complete circuit, the resulting force does satisfy Newton's Third Law. The same total force is obtained from an application of Ampère's force law. This explains why the field theory of electric machines and devices has no problems with Newton's Third Law. The difference is within the circuit itself. The Ampère force law predicts a repulsive force between two adjacent current elements in a conductor while the Grassmann force law predicts no force at all.

No relativistic correction is usually applied to the Grassmann law because the average velocity of charge flow in a conductor is many orders of magnitude below the speed of light. If a relativistic correction is made, then the Grassmann law does show a repulsive longitudinal force, but the magnitude is different from that predicted by the Ampère force law.

So we have two competing force laws, the Ampère force law for current elements in Eqns. 7.1 or 7.2, and the Grassmann force law for current elements in Eqn. 7.7. Ampère's force law has been virtually unknown since 1845 while Grassmann's force law is in all the electromagnetic theory textbooks. Ampère's force law predicts a tension in a current-carrying conductor. Grassmann's force law does not. Ampère's force law satisfies Newton's Third Law while Grassmann's does not. Since the experimental predictions are different, it should be a simple matter to perform an experiment and determine which law is correct. This has been done, not once, but in over a dozen experimental configurations, and by several different researchers. Ampère's force law is found to be the correct version.

The leader in this effort to find the correct force law is Peter Graneau, joined in recent years by his son Neal [11, 12]. One of his experiments [10] is the fragmentation of wires carrying large currents, sometimes called exploding wires. A wire is suspended so the ends are free to move, perhaps in a mercury filled trough. At one level of current

the wire will break one or two times toward the center of the wire. At higher levels of current, the wire will break in more places. An arc will form at each break so that current is maintained while additional breaks are occurring.

Therefore we have experimental proof that a fundamental law of electromagnetics, having been used religiously since 1845, is wrong. There are, of course, other suggestions for the cause of the exploding wires. Ternan [28] points out that a longitudinal standing wave of stress will be generated by the thermal expansion of a wire while a high current is flowing. This stress wave may lead to tensile fracture if the heating rate is high enough. Whitney [31] discusses the possibility of a pinch effect on the moving electrons. The moving electrons within a stationary positive metal matrix might behave as a sort of plasma, with pinch effects similar to those observed in plasmas. She states, however, that such pinch effects may be what Ampère observed as longitudinal forces. That is, Ampère's force law is an empirical law, and says nothing about any underlying physics. Pinch effects may be a way of explaining the longitudinal forces in Ampère's force law rather than an argument against the law.

There has also been an objection raised to Graneau's assertion that the Ampère and Grassmann force laws are different. Ternan [27] and Christodoulides [6, 5, 7] have elegantly shown that the net force on a current element must be perpendicular to the element when the differential forces of all the other current elements are integrated over the entire circuit. This integral equivalence of the two laws has been known at least since the time of Maxwell. Their interpretation, however, is that since there is no net longitudinal force on a current element, there can be no tension force in the element, and there must be some other explanation for exploding wires.

Graneau [9] and Whitney [32] then patiently explain why this argument is incorrect. It is well known experimentally that a closed circuit will not rotate or translate itself by forces from its own current. This would be violated if the net longitudinal force was different from zero. A closed circuit may be stretched (or compressed), however. A stretched loop will have a net transverse force (in opposite directions on opposite sides of the loop), but the longitudinal forces on any short section will be equal and opposite in direction. These opposing longitudinal forces produce the tension force, but cannot be determined by integration over the entire circuit. One has to get the longitudinal force in one direction by integrating over approximately half the circuit, and the longitudinal force in the other direction by integrating over the remainder of the circuit. There seems to be no elegant analytic method of doing this, so one has to resort to numerical analysis on a case-by-case basis. It therefore appears that Graneau has not been proven wrong even though several recent papers claim to have done so.

Phipps [26] has performed another experiment that shows Ampère's force law to be the correct one. His configuration is shown in Fig. 7.3.

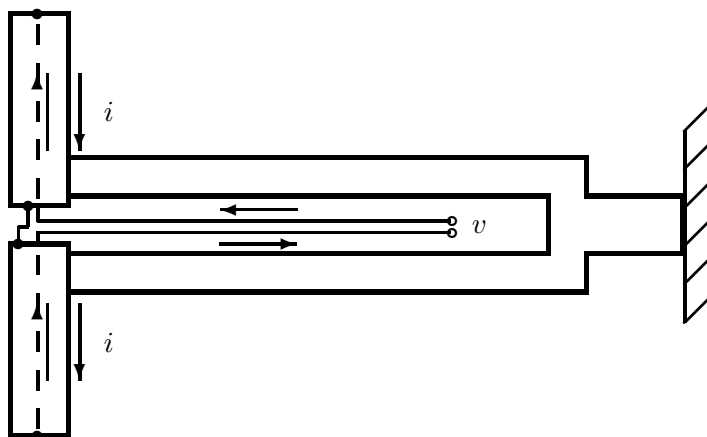


Figure 7.3: Noninductive Current Elements Driving a Tuning Fork

He uses a tuning fork as a sensitive detector of Ampère forces. The closed end of the fork is rigidly mounted, as in the right side of Fig. 7.3. The hollow current elements are attached to the ends of the two arms with epoxy, and are shown in a vertical position at the left side of Fig. 7.3. A variable-frequency source v is applied to a twisted pair of wires. The twisted pair and the wires inside the current elements are very fine and light, and connected ‘loosely’ so as to not interfere with the mechanical vibration of the tuning fork. The current elements are metal tubes (copper or aluminum) of convenient size. (Phipps mentions 1.6 mm outside diameter and 7 cm length in one test, with other sizes also giving acceptable results.) The gap between current elements is small, on the order of 1 mm. The gap is electrically shorted with another fine wire, looped to apply minimal mechanical constraints. The tubes are electrically insulated from the tuning fork arms.

Only a small current (less than 0.5 A) is applied, to eliminate the possibility of thermal effects. A current of this size flowing in heavy wall metal tubes will produce only a negligible electric field. The connection method where current flows one direction inside the tubes and in the opposite direction in the tube walls is a *noninductive* connection which produces a zero magnetic field outside the tubes.

The experimental observation is that the tuning fork will vibrate when driven at its resonant frequency. The amplitude of vibration is directly proportional to the square of the driving current. This can only be explained by Ampère’s force law being the correct one.

Another example is that of Neumann, who had a classroom demonstration consisting of two copper bridges floating in three mercury filled troughs [10, Page 138]. The copper bridges would move apart when a moderate current was passed through the circuit.

Another one of Graneau's experiments [10, Page 115] was of a quarter inch diameter copper rod cut into 50 pieces, each 2 cm long. The pieces were reassembled in a vertical glass tube and pressed together with a spring. When a current pulse of sufficient amplitude was passed along the assembled copper pieces, they all separated by a small distance and arcs formed across the cuts, as shown by an open shutter photograph.

The last experiment that I will mention is the one by Pappas [24]. His experiment involved a three-sided rectangular loop suspended by thin threads, as shown in Fig. 7.4. The two ends of the loop were allowed to touch two small cups filled with mercury. This configuration is actually a variant of one of the original Ampère experiments. As expected, the loop would swing in the direction of the closed end when a current was passed through the loop, in the direction of the vector marked 'force'.

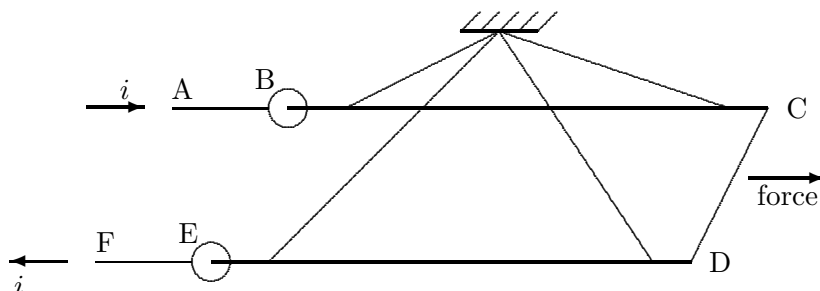


Figure 7.4: Pappas Experiment

There are actually two explanations for this effect, as noted by Maxwell [15, Art. 687]. According to Ampère, the fixed conductor AB exerts a force on the movable conductor BC, and likewise FE on DE. Most of the action occurs near the mercury cups B and E. According to Grassmann, however, the current in conductors BC and DE produces a magnetic field, directed down in the space between BD and DE for the current direction shown. This magnetic field interacts with the current flowing in CD to produce a force on the conductor CD. Grassmann says the π -shaped wire is pulled to the right by the closed end. Ampère says the π -shaped wire is pushed to the right by the open end. Maxwell then comments:

This experiment is sometimes adduced to prove that two elements of a current in the same straight line repel one another, and thus to shew that Ampère's formula, which indicates such a repulsion of collinear elements, is more correct than that of Grassmann, which gives no action between two elements in the same straight line; Art. 526.

But it is manifest that since the formulae both of Ampère and of Grassmann give the same results for closed circuits, and since we have in the experiment

only a closed circuit, no result of the experiment can favour one more than the other of these theories.

Maxwell was quite correct, both in his understanding of the competing formulas and in the fact that this experiment could not distinguish between them. Pappas then modified the experiment as shown in Fig. 7.5.

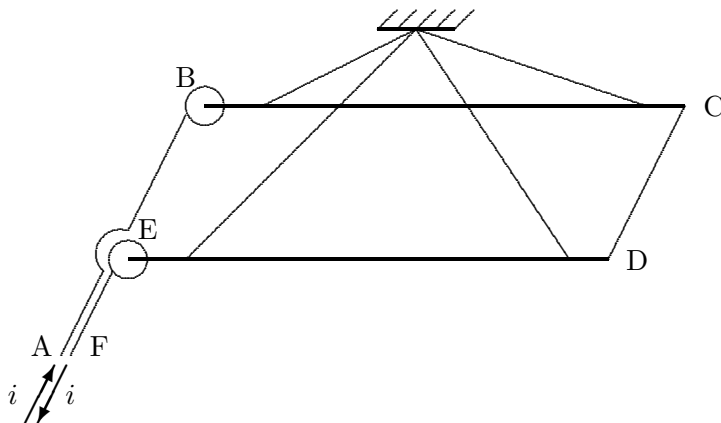


Figure 7.5: Modified Pappas Experiment

The wires AB and FE are close together (a twisted pair) up to mercury cup E, hence produce a negligible magnetic field for that part of the circuit. This gives us what appears to be a closed circuit where the π -shaped segment BCDE is free to move with respect to the fixed segment EB. The force predicted by the Grassmann force law is in the same direction and of a similar order of magnitude as before, so it predicts the π -shaped segment will be pulled to the right by CD. The segments BC and DE repel each other (oppositely directed currents in parallel conductors) according to both Ampère and Grassmann. These Grassmann predicted forces are shown in Fig. 7.6, a top view of Fig. 7.5.

Each of the current elements BC, DE, and EB produces a force on element CD. These forces f_{BC} , f_{DE} , and f_{EB} are perpendicular to CD, as shown. The summation of the three forces is the total force pulling the π -shaped segment to the right. The other three sides also have three forces each, shown in the figure as a composite force. The force f_{EB} will be the smallest because of the $1/r^2$ variation.

Ampère also predicts a force on segment CD from each of the segments BC, DE, and EB. The difference, as shown in Fig. 7.7, is that the force on each current element in CD from each current element in BC, for example, is directed along the line between elements. The general direction (down and to the right for f_{BC}) remains the same for

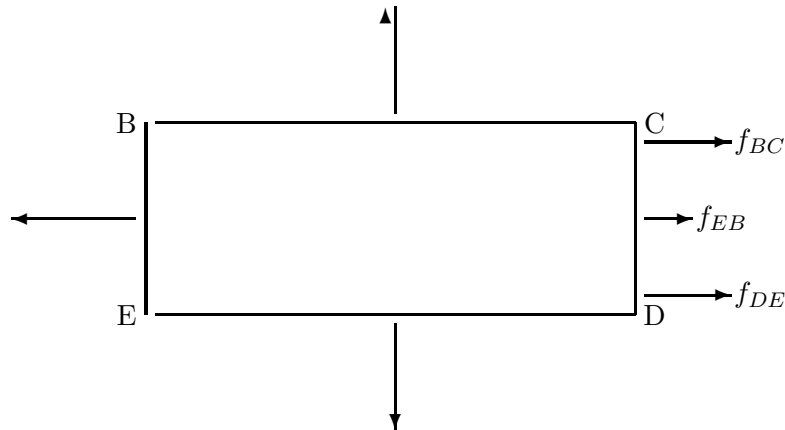


Figure 7.6: Grassmann Predicted Forces in Modified Pappas Experiment

every pair of elements in BC and CD, but the orientation changes from almost parallel to almost perpendicular to CD. The forces f_{BC} and f_{DE} produce a compression in CD, which slightly reduces the tension forces generated between adjacent current elements in CD by the current i .

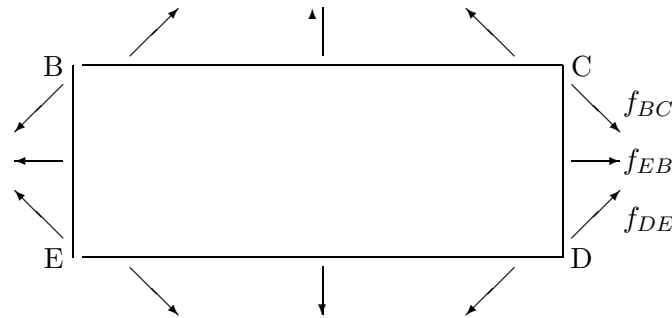


Figure 7.7: Ampère Predicted Forces in Modified Pappas Experiment

It is difficult to tell from the figures what the magnitudes of the forces are. A numerical analysis is necessary. Such an analysis will show that Grassmann will predict about the same force to the right for both Fig. 7.4 and Fig. 7.5 since most of the action occurs near segment CD in the Grassmann formulation. Ampère, on the other hand, predicts a much smaller force to the right in Fig. 7.7 since the colinear segments AB and FE are no longer present. There is no longer any ‘push’ from the left. We can now experimentally distinguish between the two competing theories. If the π -shaped section experiences little or no motion for Fig. 7.5 as compared with Fig. 7.4, then Ampère’s force law is the correct one.

Pappas observed that both of the free ends resting in the mercury cups experienced a small force directed away from the twisted pair AF. This might have been due to a lack of perfect cancellation in the twisted pair or to the current flow patterns in the mercury cups. There was no force observed to the right (no pull by CD). Therefore, Ampère is the winner.

Pappas also calculated the electromagnetic reaction and momentum forces predicted by the Biot-Savart law, and concluded that they were at least two orders of magnitude too small to explain the observed swing. His conclusion is strongly worded:

Evidently, the Biot-Savart law, or the Lorentz force for this case, belong to science fiction.

We thus have the situation where an equation that has been universally accepted for over a century (the Grassman or Biot-Savart force law) does not correctly predict experimental observations. Theoretical and experimental research on Ampère's longitudinal forces may or may not provide the needed clues to a new energy source. The main point is that a respected equation of electromagnetic theory was found to be inadequate by new experiments.

7.3 AHARONOV-BOHM

Another experiment which raises questions about the character of electromagnetic fields is the Aharonov-Bohm effect. This effect involves the Lorentz force equation

$$\mathbf{F} = q(\mathbf{E} + \mathbf{v} \times \mathbf{B}) \quad (7.8)$$

The experimental set-up is basically as shown in Fig. 7.8. A well-collimated electron beam is coherently split into two beams [13]. In (a), the partial beam *I* is sent through a solenoidal *B* field produced by a tightly wound long solenoid or a long permanent magnet, and the partial beam *II* is sent around this field. The Lorentz force causes the phase of beam *I* to lead that of beam *II*. In (b) the same experiment is performed with a symmetrically placed beam (*III*) on the opposite side of the solenoidal field. Beam *III* will lead beam *I*. The same experiment is performed again in (c) with beams *II* and *III*. Since beam *III* leads beam *I*, and beam *I* leads beam *II*, beam *III* will lead beam *II* by twice this amount, even though neither beam feels a magnetic force.

The electron beams pass through a region where the electric field \mathbf{E} and the magnetic flux density \mathbf{B} are zero. From the Lorentz force equation the force on the electrons should be zero. Yet the electrons experience a force. The Lorentz force equation for

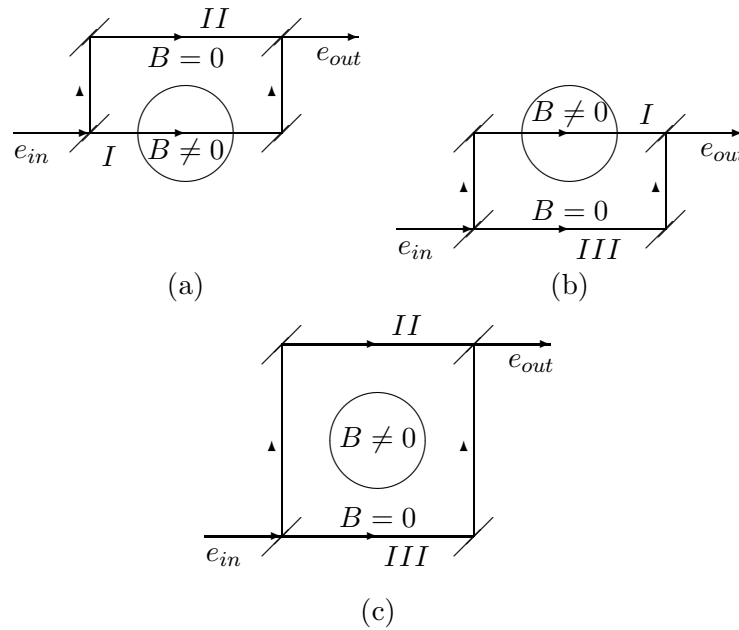


Figure 7.8: The Aharonov-Bohm Experiment

moving charges (the counterpart of the Grassmann (Biot-Savart) force law for current elements) has served electromagnetics flawlessly for many decades, but here is experimental evidence that it is inadequate in at least one situation. A fundamental law like the Lorentz force equation that is found to have an apparent flaw draws the attention of many physicists. Olariu and Popescu [23] published an exhaustive 98 page paper on the subject in the *Reviews of Modern Physics*. Dea [8] has a nice summary comparing the classical electromagnetics and the quantum electrodynamics of the problem. A detailed discussion is beyond the scope of this overview, so only a few general remarks will be made.

One difference between classical electromagnetics and quantum electrodynamics is that the former considers fields rather than potentials to be ‘primary’, while the latter assigns importance to potentials, as in Schrodinger’s equation. Even though the magnetic flux density B is zero outside the long solenoid of Fig. 7.8, there is a nonzero vector magnetic potential A . By making some plausible assumptions and performing some line integrals over certain paths, it is possible to mathematically arrive at the experimental results using the vector magnetic potential.

At this point, the temptation is to breathe a sigh of relief, and assign the Aharonov-Bohm effect to that large collection of electromagnetic paradoxes [20] which yield dif-

ferent answers with different, all apparently valid, mathematical approaches. Students just have to be taught, in a rote fashion, which equations to apply in which situation. This approach works very well if the primary objective is to pass an examination. However, it leaves something to be desired in a search for an unknown energy source, where curiosity and a questioning spirit are essential.

We really do need to know if fields or potentials should be the starting place in our calculations. The vector magnetic potential A is usually considered to be a mathematical construction without physical reality in most electromagnetic theory texts. If it should turn out to have physical reality, then our equations will have to deal with arbitrary constants, and who knows what surprises will be lurking in these constants?

7.4 THE MAGNETIC FIELD—A FICTION?

It is hard to think of a theory such as Maxwell's theory (with energy in the field) that has been more productive in human history. It seems almost like heresy to question the field energy concept or to even ask if another aether theory or another explanation of the seat of energy could be useful. But there are still those who question the entire concept of 'fields'. Moon and Spencer made the point in the introduction of the first of a series of papers on the subject [16, 18, 17, 19, 20].

Early developments in electromagnetic theory were based on the force between charged particles. The classical experiments of Coulomb on the force between stationary charges were reported in 1785 and led to the well-known Coulomb equation. Gauss (1835) extended the equation to include the effect of *motion* of the charges. Grassmann (1845), Weber (1846), Helmholtz (1873), Riemann (1875), and others made contributions in the same spirit. Ampère's equation (1823) for the force between current elements is likewise free of the field concept. All this work was founded directly on experimental data, without the introduction of a magnetic field.

The early formulations were superseded by the Faraday-Maxwell idea of electric and magnetic fields, and so successful were the Maxwell equations that the older formulation in terms of moving electric charges was almost forgotten. But the field equations encounter certain logical difficulties. In the first place, they violate the classical principle that absolute velocities are meaningless. In Maxwell's formulation, motion is referred to a 'stationary' aether, c is a velocity with respect to the aether, and the presence or absence of a magnetic field depends on motion with respect to the aether.

Einstein's famous paper of 1905, *Zur Elektrodynamik bewegter Körper*, which enunciated the theory of special relativity, was an attempt to remedy this

non-relativistic aspect of electromagnetic theory. Looking back from the vantage point of present knowledge, we may wonder if Einstein's work was not directed up a blind alley. Instead of adding an imposing facade to the shaky structure of Maxwell's theory, might it not have been better to examine the insecure foundations of the theory itself?

In most engineering applications, Maxwell's equations are perfectly satisfactory, but there are occasional ambiguities that have never been resolved. Thus there is a growing feeling that electromagnetic theory should be re-examined from the beginning.

Moon and Spencer document their ideas very carefully in this series of papers, listing the original papers and other papers supporting their position. It may be of some interest to note that this series of papers was met with indifference. In a sample of over a dozen electromagnetic theory textbooks written since that time, only one mentioned one of the papers. Only one of the two textbooks written by these authors mentioned these papers, and then only in passing [22, pages 278-280]. Their mature (or was it expedient?) position was [22, Pages 45-46]:

The average textbook gives a completely erroneous idea of the logical perfection of scientific theories. Physics is built up of pieces, each theory being laboriously developed to cover a restricted set of facts. Usually, these separate pieces do not fit together to form a logical whole. A consistent electrodynamics, for example, is yet to be developed. The system given in these pages has its weaknesses, but it does cover the usual engineering applications in a simple and effective way, while alternatives appear to be both more complicated and more inconsistent.

Moon and Spencer comment more about magnetic fields [17]:

Without question, Faraday's visualization of magnetic phenomena has been a fruitful one in engineering practice, yet the whole concept of a magnetic field is a fiction. What is the magnetic field about a moving electron, for instance, and why does that field disappear when the observer moves with the electron? The observed quantities are *forces* (or emf's, which are integrated forces per unit charge)—not magnetic flux lines or flux densities. The pre-Maxwellian approach is on this phenomenological plane. It deals with *forces on particles*, starting with Coulomb's equation and adding terms to include velocity and acceleration of the charges.

The point of these statements is that we do *not* directly observe a field. Rather, we observe the behavior of a mass, including electrons (or, more accurately, collections of

electrons). An antenna has a terminal voltage, from which we infer a certain pattern of electric and magnetic fields. The concept of fields has certainly been useful, even if we cannot directly measure or prove their existence. However, there may be another description of the link between cause and effect, between transmitter and receiver, that more closely represents reality. Such a description must explain the accepted experimental data collected by physicists over the centuries and predict new phenomena as well.

We observe magnetic effects near a permanent magnet and infer that there is a magnetic ‘field’. We typically further assume that the field is produced by spinning electrons in the molecules of the ferromagnetic material. This implies that each electron has its own magnetic field as well as its own electric field.

A possible test for this concept will now be presented. Consider a coil of wire near one pole of a permanent magnet. The coil moving linearly past the pole at a given velocity will yield the same voltage variation as if the pole is moved linearly past the coil. An observer sitting on the coil will ‘see’ the magnet pole move past him in both cases and will observe the same voltage in both cases. This particular notion of relativity appears to have had virtually universal acceptance for centuries.

Suppose now we consider rotating systems. No satisfactory electromagnetic theory has been developed for rotating or accelerating systems, so we cannot state that some result disagrees with established theory. At the same time, our intuition would lead us to believe there should be an analogy in low speed rotating magnetic systems to the linear coil and magnet movement just mentioned.

Consider the Faraday generator, consisting of a copper disk that is free to rotate, located next to a short, thick permanent magnet with field B that is also free to rotate, as shown in Fig. 7.9. First we spin the copper disk while the magnet is held stationary. The observed voltage between rim and axis is $V = (1/2)a^2\omega B$, where a is the radius and ω is the angular velocity.

The voltage produced is not large. A large disk of 0.2 m radius turning at a relatively high speed of 3600 rpm ($\omega = 377$ rad/sec) in a strong field of 1 T produces a voltage of only 7.54 V. To get significant power production then requires currents of hundreds or thousands of amperes. It is not possible to efficiently convert dc power from this low-voltage, high-current generator into ac power with present technology, so this type of generator has been used primarily as a research tool to investigate magnetic phenomena.

Next we rotate the magnet while holding the disk stationary. The measured voltage on the disk is zero! Finally, we rotate both the disk and the magnet at the same speed, so the relative velocity is zero. We get the same result as if the magnet was stationary! Therefore, relative rotational velocity does not work the same as relative linear velocity. This was known at least as early as 1915 [14], but it is certainly not well documented

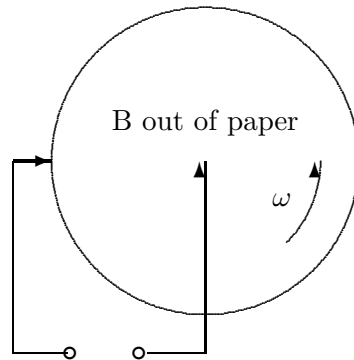


Figure 7.9: Faraday Generator

in modern texts.

The magnetic flux does not appear to rotate with the magnet. If magnetic flux is produced by electron spin, then it would seem reasonable that the flux would move with the electron which produces it. If, on the other hand, a permanent magnet acts as a sort of wave guide or concentrator of magnetic flux due to a macroscopic rather than a microscopic effect, then rotating the magnet would be like rotating a bucket of water. If the friction between bucket and water is low, the bucket can rotate while the water remains stationary.

Perhaps a permanent magnet (or an electromagnet) acts to focus or concentrate the aether or firmament in its vicinity. The aether might be static or it might actually be flowing through the magnet. Such concepts may help us think the proper thoughts to make the scientific breakthrough on a new energy source that the world so desperately needs [15].

7.5 OTHER QUESTIONS

In addition to concerns about the very concepts of ‘fields’ and the validity of Maxwell’s equations, there are entire technical journals dedicated to the attack of Einstein’s theories. The Editorial Policy of one such journal starts in the following way:

Galilean Electrodynamics aims to publish high-quality scientific papers based on experimental evidence even if their interpretation of it runs counter to the conventional orthodoxy. In particular, it publishes papers supporting the position that Einstein’s interpretation of the Relativity Principle is unrec-

essarily complicated, has been confirmed only in a narrow sector of physics, leads to logical contradictions, and is unable to derive results that must be postulated, though they are derivable by classical methods.

The journals *Speculations in Science and Technology* and *Foundations of Physics* were also created to break the stranglehold which the physics establishment has on the publication of papers which disagree with relativity theory and related topics of electromagnetic theory and quantum electrodynamics. Some of these journals have been in existence more than twenty years and have published the work of many distinguished engineers and scientists.

There are also books written to propose changes to Maxwell's equations and SRT. One of the more important of these is the one by Phipps [25], with the unlikely title of *Heretical Verities: Mathematical Themes in Physical Description*. He is quite erudite — one needs to keep a dictionary at hand. He also has a talent for clever insults, which keeps the book entertaining as well as educational.

Maxwell's equations are not invariant under Galilean transformations, which was a major reason for Einstein to develop SRT. Phipps points out that Hertz was the first to modify Maxwell's equations so that they were truly invariant, in 1892. Hertz did this by replacing partial time derivatives with total time derivatives wherever they appear in Maxwell's equations. This allowed for the case of a moving detector (or observer). Phipps comments [25, Page 104-5]:

The result is an instant cure of the problem of Galilean noninvariance of Maxwell's equations. Hertz's equations become rigorously invariant under Galilean transformation, just as Newton's equations are. So, for the first time optics and mechanics get into harness with each other: that is, they share the same invariance group properties. The beautiful part of it is that Maxwell's equations are not lost but are rigorously contained as a special case (the case $v_d = 0$) within Hertz's equations. That is, Hertz's theory is a *covering theory* of Maxwell's. Every physical prediction of Maxwell's theory is replicated by Hertz's. . .

With victory in his grasp and the correct (to first order in all velocities) mathematical theory of electromagnetism before him, Hertz threw it all away. How could this happen? Well, we need to realize three things: (1) Testable physics is not mathematics alone; it mathematics plus interpretation. It is — as we shall see in a number of instances throughout this book — even easier to fail through interpretation than through formalism. This is one reason to distrust the modern hyper-mathematical approach to physics. (2) Even the greatest of physicists — which I think Hertz was — is the plaything of his times. That is, each of us adopts unconsciously the fixations of the day

— which, indeed, it is the effect, if not the prime purpose, of education to inculcate. The most difficult accomplishment in life is to outgrow one's education. (3) When all generalities have been noted, individual temperament still has its role in the history of science.

In Hertz's day the universal fixation among electromagnetic theorists was "ether". Instead of reasoning as above — that his use of a total time derivative eliminated frame velocity v from the equations of electromagnetism, hence eliminated the need for an ether — Hertz reasoned that the appearance of a new velocity-dimensioned parameter v_d in his equations provided him with the means to *describe the velocity of an ether*. So, he took a fatally wrong turn of interpretation. It is humbling to reflect that a man of Hertz's intellectual stature could be blinded by a quirk of fashion. The application of this thought to the physics of our own time needs no elaboration.

With this interpretation, Hertz made a prediction that the motion of a dielectric in the laboratory would create a magnetic field detectable by an instrument at rest in the lab. A later experiment disconfirmed the prediction and Hertz's theory was junked, rather than another interpretation being found. As Phipps put it [25, Page 107]:

The ideal of genuinely invariant formulations of the laws of physics sank into oblivion — to join Hertz, honor, integrity, and other medievalisms.

Another author that should be mentioned is Harold Aspden [2, 1]. While doing his Ph.D. in magnetics at Cambridge, he became aware of experimental results that could not be predicted by theory. His search for a new energy source has spanned his entire career.

I believe that I have established the fact that many well trained and highly intelligent scientists believe that Maxwell's equations and Einstein's SRT are inadequate at best, and need a major revision. From this will hopefully come the mathematical basis for the new energy source.

It seems appropriate to end this section with a quote from Tesla on the subject of E and B as conceived in transverse electromagnetic, or Hertzian, waves [30]:

The Hertz wave theory of wireless transmission may be kept up for a while, but I do not hesitate to say that in a short time it will be recognized as one of the most remarkable and inexplicable aberrations of the scientific mind which has ever been recorded in history.

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CHAPTER 8

FUTURE DEVELOPMENT

I have attempted to show in this book that there is yet another source of energy to be discovered. I believe that this source is both abundant and widespread. It will make present methods of electrical generation obsolete. We will no longer need to build nuclear power plants or to burn coal, oil, or natural gas to make electricity. The cost of electricity will be substantially less than what we now pay, and there will be essentially no pollution.

I have also attempted to show that this energy source was placed here by the creator God for the benefit of His creation. Discovery and development of this source should obviously proceed on God's timetable, according to God's principles and wisdom. The next step is to try to discern God's wisdom in the details. What should be done to encourage the discovery and development of this energy source? Some thoughts on this topic will follow.

8.1 GENERATOR SIZES

First we need to discuss the possible sizes of equipment and make some back-of-the-envelope estimates on costs. In very general terms there are three distinct sizes or size ranges for new-energy devices that are capable of generating 60-Hz electricity.

1. Home size, 2–50 kW.
2. Substation size, 100–10,000 kW.
3. Central generator size, 100,000–1,000,000 kW (100–1000 MW).

The home-size unit would be located on the customer side of the utility distribution transformer. The substation-size unit would be located at a substation where high voltages from the utility are transformed down to distribution voltages for distribution to homes and businesses. A substation may supply from several hundred to several thousand homes. A central generating plant is usually in a remote location, and supplies power to a large geographical area at voltages from 115,000 V to 345,000 V or more.

It is quite possible, even probable, that the characteristics of the new-energy source will favor some sizes over others. The effect may only be a laboratory curiosity until some threshold size is reached, effectively eliminating the household sized unit, for example. On the other hand, the aether might be able to give up a few kW at a home without any noticeable side effects, but have unacceptable consequences in larger sizes.

For example, there might be an associated vortex in the surrounding air, with the vortex size and speed proportional to the power extracted. This could be a minor nuisance in small sizes but could spawn destructive tornados in larger sizes. Or if power extraction from the aether is accompanied by a temperature drop in the surrounding air, a central plant may continually experience cloud cover and rain or snow. We should therefore not plan on mass production of a particular size until considerably more research is done.

If we assume that new-energy generators can be built in any size, then some general comments can be made about the advantages and disadvantages of each size, from both a home owner and a utility perspective. There are two disadvantages to the home-size unit, cost and safety. Then there are two aspects of the safety issue. One is that we will not know of any long term negative health effects of new-energy generators for possibly many years. A prudent course of action would be to not install a new-energy generator within, say, 30 m of a dwelling, which would obviously favor substation, central plant, or farm installations.

The other safety concern is that of utility personnel. When a tree limb falls on a distribution line and a utility truck shows up for repairs, the first course of action by the crew is to open the utility switch to the line, so the line can be repaired without danger of electrocution. If there are new-energy generators scattered around the neighborhood, they may be able to supply the load when the switch is opened (perhaps at voltages high or low enough to damage connected equipment if protective circuits are not properly designed). The lineman may then be surprised by an energized line.

There are technical solutions to this problem, of course. New-energy generators can be built so they stop operation when the utility is not connected, or when line frequency or voltage stray outside the proper range. Such protective circuits increase the cost and can be expected to occasionally fail, which again puts the lineman in danger. Reasonable safety is assured if the lineman performs the extra task of installing a temporary shorting strap between conductors on both sides of the repair section.

The cost of electrical equipment on a dollars per unit of rating basis decreases significantly with size. For example, the electrical portion of a 10-kW wind turbine may cost \$500/kW while the same section of a 1-MW wind turbine may cost only \$200/kW. If we use these numbers for illustrations on new-energy generators, a 10-kW generator would cost \$5000 installed in a home while a 1-MW generator would cost \$200,000 installed at a substation. I suspect that the size and complexity of the home-sized unit will at least equal that of a high-efficiency furnace and air conditioning unit, so it is difficult for me to imagine an installed cost of significantly less than \$5000.

To continue this illustration, assume that the \$5000 is borrowed from a bank for a 10 year period at 10% interest. The yearly mortgage payment using standard equations [3, Page 336] is \$813.81. If the yearly electrical energy consumption of the house is 10,000 kWh, the effective cost of electricity produced by the new-energy generator is

about 8 cents/kWh plus any maintenance costs plus the fees charged by the utility to maintain power lines to the house and to provide emergency backup. The total cost would probably exceed 10 cents/kWh. This is somewhat greater than the present average retail cost of electricity in the United States, hence there is little economic incentive to install home sized units at this price. If the home electrical consumption is well above average, at say 20,000 kWh/year, or if the cost of utility supplied electricity is above 10 cents/kWh, then a different conclusion might be reached.

The mortgage payment for the substation-sized unit for the same terms of 10 years and 10% interest would be \$32,550 per year. If the generator operated at a plant factor of 50%, equivalent to producing full power during the day when demand is high and being turned off at night when demand is lower, the yearly energy produced would be 4,380,000 kWh. The cost of these kWh would be about 0.74 cents/kWh. The cost of electricity produced by a substation-sized generator is an order of magnitude smaller than the cost produced by a home-sized unit. The utility can make a handsome profit by charging 5 cents/kWh and the home owner pays only half (5 instead of 10 cents/kWh) of what he would otherwise pay if he owned and maintained a small new-energy generator.

A similar economic argument explains why one rarely sees an operating home-sized wind electric generator in windy Kansas. The economies of scale of capital costs, operation, and maintenance are such that the utility can always provide electricity to the home at less cost and with less hassle than the home owner can provide his own electricity. This rule applies where the utility distribution lines are nearby and the utility has adequate generation. Situations like a remote vacation home or a third world village may easily yield a different economic decision.

I do not mean to imply that all decisions will (or even should) be made only on the basis of economics. I have pointed out to people inquiring about the feasibility of installing wind turbines that there are at least four human desires that affect our decision making:

1. The desire to make (or save) money.
2. The desire to be the first kid on the block with a new toy, such as a motor boat, a camper, or a four-wheel drive vehicle. If such items were purchased only on the basis of economics, their sales would be greatly reduced.
3. The desire to be independent of the utility. I have met one farmer who never connected to the utility grid, instead using three wind turbine electric generators and a battery bank.
4. The desire to save the world by recycling, reducing pollution, and the like.

Except for the rare individual like the farmer mentioned above, wind turbine owners in the United States would always be connected to the utility grid for backup during

those times when the wind would not blow. The energy source being discussed here would presumably be available all the time, so we have the real possibility of actually being disconnected from the utility. There may need to be some minor adjustments to our lifestyles, such as not running the air conditioner, the electric stove, and the clothes dryer all at the same time in order to stay within the power rating of our home generator. We may also have to make plans for emergency backup in case our generator fails, but these can be handled in a rational fashion. This capability for true independence may increase the U.S. domestic market to a significant level.

Returning to the economic argument, I would note that the net cost of energy to society is minimized by taking advantage of economies of scale. Fewer total dollars invested in electrical generation equipment means that more dollars are available for investment in factories, highways, hospitals, churches, etc. Even if significant numbers of people are willing to pay extra for electricity in order to have energy independence, it does not necessarily follow that all of society should do likewise.

The cost difference between a substation and a central-generation sized unit is not nearly as pronounced. A 100-MW unit would be only slightly less expensive than a 1-MW unit, in dollars per kWh. The central plant requires large transmission lines to get the power out to the surrounding region. These lines are expensive to install and have significant opposition because no one wants a power line in their back yard. At approximately the same overall cost, most utilities would strongly prefer the substation-sized generator.

Therefore, even if any size is technically feasible, I would expect only two sizes to actually be developed. A 10-kW size will be sold to a relatively small U.S. domestic market and to a potentially large export market, while a 1000-kW unit will be developed for sale to the utilities. The development timetable should be shorter for the smaller unit. In fact, sales of the smaller unit should help with the cash flow while the 1000-kW size is being developed.

8.2 DEVELOPMENT TIMETABLES

How long will it take to do the engineering development work and have 10-kW and 1000-kW generators ready for market? An honest answer would be something like “A long time if all goes well, even longer otherwise”. I hope we can beat the nuclear fusion industry who started off by asking for 40 years and a few billion dollars. Forty years later they came back asking for another 40 years and even more money, and we still have not seen the first net kWh of electrical production.

A development timetable with which I am more familiar is that of wind-electric generators. We started learning about and building these generators at the turn of

the century. There was a large market for home sized units in rural America. Over 6 million water pumping wind turbines had been installed on American farms starting about 1880, so there was considerable experience with wind technology, and an active sales and maintenance infrastructure. The small wind-electric generator was perfected by the 1930s and many thousands installed. With proper maintenance some of these machines lasted more than half a century.

There were two disadvantages of these small machines. The economies of scale mentioned in the previous section meant that the effective cost of the generated electricity was higher than the electricity generated by the local utility. And there was the ‘hassle’ factor, the problem of dealing with installation, maintenance, and outages. The Rural Electrification Act of 1936 made it possible for almost every farm in America to be connected to a central utility by 1955. Lower cost electricity supplied with less hassle quickly drove the small wind-electric wind turbines into extinction.

The development timetable for these small machines was not extensive. From the time that electrical generators and batteries were available, and centrally generated electricity was in common use in the homes of the city cousins, it was only a decade or so before small wind-electric generators were in wide use. Of course, very few new theories or new materials were needed.

The technological success of the small machines encouraged engineers to build utility scale wind turbines, with the hope of breaking the economic barriers. The first large generator of this class, the Smith-Putnam turbine, was installed in Vermont in 1941. It was rated at 1250 kW, was designed with slide rules, and was built with pre-war technology. It lasted four years before a blade broke off and the turbine was scraped as being economically uncompetitive.

The wind turbine industry was then dormant until the oil embargo of 1973. By then we had powerful computers, better materials, and considerable experience in designing and fabricating large metal structures like jet aircraft. It appeared to be a simple matter to hire the best aerospace firms and develop commercial (utility scale) wind turbines in a short time, perhaps 4-6 years. We sent our best into battle and they returned wounded and bleeding. The results would have been funny if they were not so pathetic. The time to the first major failure of the first turbine, the MOD-0, was closer to four weeks than to the four years of the Smith-Putnam machine. Large aerospace firms built a single MOD-0 (100 kW), four MOD-0As (200 kW), a MOD-1 (2000 kW), and five MOD-2s (2500 kW). None showed any promise of being reliable and economic producers of electricity and all were sent to the scrap heap as soon as possible. If it were not for all the things we learned that would not work, the whole operation would have to be considered a miserable failure.

In the meantime, a number of underfunded small companies were patiently learning how to build smaller wind turbines (50–100 kW). It took them 10 to 15 years to learn

to build a respectable turbine. Even after development times of 20 years or more, significant changes are still being made in an effort to further improve reliability and reduce costs. Sizes are being increased to take advantages of economies of scale, so turbines presently available are in the range of 300–1000 kW. These changes in size and technology sometimes result in short-lived components, which then require (typically expensive) field modifications.

Based on these observations, it is safe to say that the business of designing and manufacturing new-energy generators is not for the ‘Get Rich Quick’ people. It has taken more than 20 years to develop a *good* 1000-kW wind turbine, starting with substantial government funding and a worldview where everyone knew that it could be done with only incremental advances in materials and computer codes for blades and towers. Relatively speaking, much more needs to be done to extract power from the energetic aether. A workable theory needs to be developed, which will help swing the majority worldview into believing that it can be done. This may require substantial basic research, something not essential to developing large wind turbines. We could easily be looking at time periods of 20 to 40 years before 1000-kW new-energy generators are being routinely installed at utility substations.

Sometimes it is helpful to think through the steps that will be involved in developing a new-energy electrical generator. This allows us to estimate the time and money that will be required. There are claims of such generators operating [1, Page 22]. I have personally not seen such units, but let us assume that a unit has been produced in a crude or breadboard model, perhaps in the 2–10 kW range. This original unit needs to be preserved as an eventual museum piece, and also to allow comparisons with new versions. Several new units need to be fabricated, differing slightly in some feature, and tested in an effort to find out what materials or design features are critical.

Parallel work needs to proceed in developing a theory or hypothesis of why and how the unit works. This step should not be underestimated. It could easily take decades for the best theoreticians to put together a comprehensive theory of the energetic aether.

Once a reasonably robust working unit has been developed at the 2–10 kW power level, work can start on larger units. Until we know what the thresholds are for any new effects, the steps should be small. That is, once a 5-kW unit is working, the next size might be 10 kW, followed by 20 kW, then 50 kW, and so on. The time required to get from the first breadboard version to a robust 5-kW unit that one would consider building an assembly line to manufacture could easily be five years. The time from a robust 5-kW unit to the first breadboard version of a 1000-kW generator is probably a minimum of five more years. After proof-of-concept on this breadboard version, we design what we hope is the final product, and build several by hand. These are placed at substations of cooperative utilities and monitored closely. New problems are always discovered at this stage. Components such as cooling fans and lightning protection will be redesigned. A manufacturing plant is then built and tooling acquired to fabricate

these 1000-kW generators. They are built at a relatively slow rate at first to allow time for new problems to surface, that need to be repaired under warranty. Under ideal conditions, the factory should be operating to capacity at the end of the third 5-year period.

The first 5-year period requires a relatively small staff, with staff and facility requirements increasing with time. An order of magnitude guess on the finances required would be 5 million dollars for the first 5 years, 50 million for the second 5 years, and 500 million for the third 5 years. Breakeven, when sales of equipment and electricity equal the total accumulative investment, will probably not occur before 20 years have elapsed after the first working breadboard unit was built. One large wind turbine manufacturer with which I am somewhat familiar, Kenetech, formerly known as U. S. Windpower, spent more money than the above, over a similar time period, and ran out of money before turning the financial corner. The need is for very committed and very deep pockets.

Is it worthwhile to spend this much time and money on a new-energy source? I really believe mankind has no choice. Billions of people on this earth are living in misery because of inadequate energy at an acceptable price. The only way to relieve their misery (and make the world a nicer place for all of us) is to develop this energy source which is available everywhere 24 hours a day, creates no pollution, and poses no balance-of-payments problems.

8.3 OWNERSHIP

A scientific principle cannot be patented, any more than a river can be patented. However, it is likely that some of the equipment that will be developed to capture this energy will be patentable. Such patents could be extremely valuable, worth many millions of dollars. It is therefore of interest to consider the question of ownership of the patents, and the related question of appropriate rewards to the inventors involved.

Who should own these valuable patents? The inventor? The investors? The public? The answer will depend on a person's worldview. I will list some of the advantages and disadvantages of several possibilities.

1. **THE INVENTOR.** It is unlikely that the lone inventor will have the necessary business skills to guide a large manufacturing company. It may therefore be unwise for the inventor to maintain ownership for any extended period of time. The inventor should be rewarded handsomely and established in a nice laboratory for making additional discoveries, but should not be expected to be a long term leader in the manufacturing business.

2. **THE INVESTOR.** A philosophical and ethical question is whether we should

allow any person or group to develop great personal wealth from this discovery, just because they happened to have money that they were willing to invest. The past decade reveals that many investors would have little or no commitment to the global benefits of low-cost, low-pollution electricity, but would immediately and continually be thinking about leveraged buyouts and golden parachutes. I believe that the owners should have a long-term commitment, with other motives operating in addition to basic greed.

If the investors are not the owners, this means that investments are regarded as debt rather than equity. The owners could issue bonds at an attractive interest rate, with principle and interest to be paid from royalties on the sale of electricity. This would provide incentive to bring the discovery to market, with minimal impact on cash flows in the early critical years.

3. **THE U.S. GOVERNMENT.** Our government already owns a large fraction of the Western United States, which is administered supposedly for the good of the whole. There is a question about how effective that administration has actually been in recent years. Also, the oil industry has had considerable influence on government actions, and the discovery of a new-energy source would be viewed as a threat by the oil companies. Therefore, at best, there would be a question of competence and a possible conflict of interest with government ownership.

Government ownership could also lead to effective nationalization of the utility industry. The sale of electricity could be a very attractive revenue source for a government with a big deficit and an appetite for spending. We could have the equivalent of another Post Office, not exactly well known for efficient operation. Other reasons could be given, but I think it is obvious to most people that the government would not be the optimum owner of such a discovery.

4. **A FOUNDATION.** A charitable foundation would be one way of assuring that the benefits of long-term ownership would go to benefit mankind, rather than go to taxes and the establishment of a financial dynasty. This worked rather well for Hughes Aircraft after Howard Hughes died, until a judge decided the foundation was not giving away enough money, and forced it to convert Hughes into a publicly owned corporation. This idea is certainly worthy of more discussion. We must recognize that a new foundation does not have the money or expertise to bring a new-energy source to the market, and an old, wealthy foundation may not have the interest or the flexibility to do it.

5. **A CHURCH.** Why has the new-energy source not been developed in the last century? Tesla was close to the discovery. Moray apparently had a working system. A number of people have worked on the problem in the past 20 or 30 years, without success. It would seem that someone would have done it by now. Greed is certainly a factor, causing people to keep secrets in the hope of future reward, and then the people die before the secrets are transmitted to others.

But it seems that more than greed is involved. There seems to be a sort of blindness, where engineers will look at some new effect but not see the implications. It seems quite possible that the reason for the lack of discovery is that it is just not God's timing yet. Surely God wants the new-energy source to be used for His glory and the welfare of His creation. Perhaps He has not found a man or organization that He can trust with the discovery.

If God is looking for the right organization, then a church would be logical for ownership. Two possibilities come to mind, the Roman Catholic and the Latter Day Saints (LDS or Mormon). Both have a large membership (although the Roman Catholic is by far the largest), a large investment portfolio, and the centralized leadership that might be able to accomplish the task.

Both churches experience considerable jealousy and animosity from the remainder of Christianity. This would only get worse if one of them became owners of this discovery and used the resulting power and money to pursue their own agenda. Even if a church was selected that everybody liked (Mennonites?), the increased influence could easily destroy the character of the church. A church should be careful to consider such hazards before seeking ownership of this discovery. As mentioned in Chapter 6, the Mormons have apparently already rejected the opportunity once, when they turned down Moray's offer of his discovery. Perhaps they were showing true wisdom at that time.

At the other extreme of size would be a very small church denomination, or even a commune, with a new-energy focus. A commune called Methernitha was established near Linden, Switzerland about 1960 which had a strong interest in alternative-energy technology [5, Page 146]. They have apparently developed a new-energy generator called the Thesta-Distatika which supplies part of the power requirements of the commune. They stopped receiving visitors and giving out information on the generator about a decade ago, saying they were afraid of the possibility of misuse from the 'weapon-industry', and that the world was not yet ready for the discovery. If Methernitha has been doing engineering development work for this entire time period, they would be in a good position to manufacture and market a home-sized unit when (or if) God tells them to do so. Other communes might be established around new-energy inventors to provide them with the necessary support and security.

6. ISRAEL. Israel has always had a place in God's plan. Who knows but what the plan includes ownership of the new-energy source? It is possible that some construction details of the generators could be maintained as a trade secret, which would extend the useful life of ownership indefinitely, rather than the 17-year life of a patent. The Israeli Army is probably the best in the world at maintaining security around any key manufacturing sites. This idea is worthy of careful consideration.

7. EPRI. The Electric Power Research Institute would be an obvious candidate for ownership. They understand the concept of supplying reliable and inexpensive

electricity. They have the engineers and the licensing experience necessary to bringing these new generators to the marketplace. The question is whether they have the will to overcome the political opposition that they would experience. A related question is whether they would be able to extract adequate funding from their utility supporters in the face of the upcoming utility deregulation.

8. A LARGE CORPORATION. Companies like General Electric, Westinghouse, or Boeing have the engineers, the manufacturing plants, and the financial resources to develop new-energy generators. The question is whether they have the vision that is required. It seems that most large companies of today have vision that extends only to the bottom line of the next quarterly report. Anything that is guaranteed to reduce that bottom line for the next 20 years is likely to be rejected, regardless of the potential income after that time.

9. A SMALL CORPORATION. The dream of most inventors is to form a small corporation that will grow to become a Hughes Aircraft, with the inventor remaining as sole shareholder. Vision is not a problem and development costs might be lower in a small, lean operation than in a typical large corporation. The small corporation would grow to become large. One problem is in finding investors who are willing to provide debt rather than equity financing.

10. THE EMPLOYEES. Many companies are moving toward employee ownership, partly because it makes good sense and partly as protection against leveraged buyouts. This spreads out the wealth and prevents the formation of financial empires. That is, the original owner (perhaps the inventor) guides the company for a few years and then sells it to his employees. Again, this arrangement would be possible only if investors could be found that would supply debt money rather than equity.

There may be other possibilities besides these ten. The options seem almost limitless at the present time. The primary requirement is to have or be able to raise half a billion dollars. Whoever is willing to invest this much money over the next 15 years is very likely to own a large fraction of the new-energy business.

8.4 FUNDING SOURCES

Where will the money come from that is necessary to do the required research and development for the desired new-energy source, assuming that some very deep pocket investor does not appear soon? At some point the lone inventor working in his garage will simply not have the resources necessary to do the essential construction and testing. Where does he go?

One obvious suggestion is the federal government, which has a long history of funding research and development activities. The National Science Foundation, Department of

Energy, and Department of Defense all come to mind. Even small amounts of funding would send the message that the search for a new-energy source is a legitimate scholarly activity. This would relieve some of the burden of young researchers that must ‘publish or perish’. Also the government does not demand ownership, especially while basic research is being done.

Government funding is strongly controlled by a peer-review system, i.e., ‘Truth is determined by majority vote’. As long as the majority of engineers and scientists believe a new-energy source is impossible, we should not expect substantial government funding. Of course, the people who control funding often have small amounts in the budget for discretionary purposes. That is, they can grant, say, \$10,000 to a project on their own authority, without going through a peer-review process. These funds are usually used for travel grants, conference support, or preliminary research into very high risk areas. Free-energy researchers who need amounts less than \$50,000 should be alert to this possibility.

My own experience with government funding in another emerging energy area (wind energy) has not been very good, so I would urge caution in looking to the government as savior in this area. Unlike the new-energy source being proposed in this book, wind energy has a long history of usefulness to mankind. No one doubts that one can get mechanical or electrical power from the wind. But research and development funding was needed to produce prototypes with acceptable reliability and costs. The energy source (wind) is free, but the equipment to extract power from the wind is not. The mortgage payment for the equipment and salaries for operating personnel must come from the sale of energy. These costs must be less than the equivalent costs of competing energy sources (e.g. photovoltaic) or there is no incentive to invest.

The government had a choice of research groups to fund. They could fund large corporations or small start-up companies. The large corporations had large engineering staffs, big computers, manufacturing capability, strong lobby groups, and proposal writers and accountants familiar with government funding requirements, as I mentioned in Section 8.2. The small companies had the good ideas and the ‘fire in the belly’. That is, they were led by people enthusiastic about wind power, and who had no competing research activities.

The government systematically chose the large corporations, which then built large wind turbines with very short lifetimes and the equivalent of very high mortgage payments. When government funding dried up, these large corporations moved on to other topics for which funding was available, forgetting about wind power. In the meantime, the small companies struggled along with inadequate funding, eventually producing a number of respectable turbines. Government funding of the large corporations was non-productive, and even counterproductive because of the wasted investment of the small companies in writing proposals that were doomed to failure.

Another factor in receiving government funding is the intimidating amount of paperwork involved. The lone inventor and his technician will probably need to hire someone, at least part-time, to make sure that accounting standards, safety standards, employment standards, etc., are met.

A non-trivial concern is that the government typically demands a non-exclusive license to use patents or other results of the research. This is certainly reasonable in cases like hot fusion where the government has invested many billions of dollars over a forty year period. However, a license to use technology of a new-energy system could be worth billions to the government, and granting of such a license for a one-time grant of a few thousand dollars to a new-energy researcher hardly seems fair. The government needs to waive this requirement for small grants, or perhaps to limit the requirement in some way. For example, the researcher might give the government license to use, without royalty, one kW of installed new-energy equipment for some given amount of grant money.

Of course, there are other governments besides the United States, some of which appear to be much more open to the idea of a new source of energy. Manning [5] mentions Japan, China, and India as examples of such governments.

Another possibility for a funding source is the Electric Power Research Institute (EPRI). EPRI was established by the electric utilities to solve existing technology problems and to develop new technologies for generating, transmitting, and distributing electricity. They certainly have the size, the engineering talent, and the mandate for carefully investigating a new-energy source. As mentioned earlier, however, the utility industry is now in the process of deregulation, somewhat similar to that experienced by the airlines and the Bell Telephone System some years ago. This has shifted the focus of many utilities and EPRI from long-term planning to short-term survival. Even if EPRI management could be convinced of the importance of new-energy research, the prospects for stable, long-term funding from this source have to be considered poor.

Foundations can also be considered as funding sources. There are thousands of foundations in the United States, many of which can give money to scientific research. Several foundations have been involved with some of the organizations described in Chapter 1, usually with very little publicity. Finding the right foundation and convincing the right people will be the problem.

Venture capitalists are an obvious source of funding. They usually do not get involved in basic research, preferring to come in when a prototype is working, hopefully after a patent has been granted. They typically ask for a large fraction of the rewards in return for a smaller fraction of investment. One has the question of ownership discussed in an earlier section. And one also has the question of their staying power and the depth of their pockets in bringing a new-energy device to widespread use. The attitude of ‘make a quick buck and get out’ is *not* what is best in getting this clean

energy source deployed.

Churches or para-church groups would be an interesting source of funds. The selling concept might be that the new-energy device would help provide pure water and refrigeration in third world villages, thus relieving much preventable human misery. Why build a hospital to treat water-borne diseases when a pump and water treatment plant could be built, perhaps for less cost, but certainly with less sickness in the first place? These new-energy devices could raise the standard of living in these third world villages, helping to slow the exodus to the over-crowded cities. The churches could be granted a non-exclusive license for the new-energy devices, at the rate of one kW for some amount of dollars, or could even receive part of the ownership of the technology.

Selling stock is a traditional source of funds. Many people are willing to believe in a new-energy technology that has been described here, and are willing to invest a few thousand dollars. The emphasis in selling is usually greed, with investors being told they will receive a many-fold return. When the research and development takes longer and costs more than originally planned, the investors are usually disappointed. The inventor's friends and neighbors that have invested in the project become angry. I would suggest that potential investors be warned about the very real possibility that all investments will be lost, and that stocks not be sold to anyone that cannot afford to lose the investment.

A slightly different way of raising money is to sell dealerships. For \$10,000, a person gets the right to sell new-energy devices in a given geographical territory. This assumes that the devices will be sized and priced to fit in a home, and that problems such as noise, vibration, and health hazards are of no consequence. In one case of my knowledge where dealerships were sold, the inventor has spent some time in jail, and many of his dealers wish they had their money back.

One can see that there is no perfect source of funding. Spending money to develop a new-energy device, whether one's own or someone else's money, should be considered a sacred trust. Mistakes and resultant losses are inevitable, but promises and research activities should be made with the highest integrity. Greed should be de-emphasized, replaced by a goal to help mankind and improve the environment.

8.5 PATENTS

An integral part of the question of ownership and funding is the matter of patents. The patent system has been very important to the technological development of the United States. An inventor can have ownership of his invention for a period of at least 17 years, in return for publishing the details of the invention. This gives him time to receive a reward for his creativeness, and his company incentive to invest in

production equipment, knowing that they have protection against competitors. The alternative of placing the information in the public domain means that the inventor is unlikely to receive any significant reward, thereby removing his incentive. It also makes it less attractive for companies to invest in manufacturing equipment since many other companies may be doing likewise. The competition may make it difficult or impossible to get a fair return on one's investment.

Even though the patent system has worked well in most cases, there are some significant hurdles to the lone inventor getting a patent on a free-energy machine and receiving an appropriate reward:

1. The inventor must hire a patent lawyer and spend several thousand dollars in order to make application. As a practical matter, application for and maintenance of a single patent will be a financial challenge to most individual inventors.
2. The Patent Office has guidelines which prevent it from issuing patents which even appear to violate the Law of Conservation of Energy. Perpetual-motion machines, cold-fusion devices, and free-energy equipment are all rejected out-of-hand, even if they appear to work (e.g. Moray and Newman).
3. A patent application can be declared to be in the interests of national security, classified, and the inventor warned to be quiet about the invention under threat of jail or worse. Manning mentions Adam Trombly as one example [5, Page 161].
4. Being granted a patent does not guarantee long term ownership. Other people can file challenging lawsuits, with or without justification. The real ownership is then determined by the courts. These cases can drag on for years and cost enormous amounts of money. A classic case is the original patents for radio granted to Marconi. The Supreme Court decided in 1943 that Tesla had actually preceded Marconi in some key ideas, and that radio was actually invented by Tesla. This was, of course, many years after the original patents were issued, and both Marconi and Tesla were dead.
5. A patent does not guarantee that all users will pay for the use of the ideas. Other companies will often pirate the concepts, and pay a fair royalty only if the inventor catches them, sues them, and wins the lawsuit. Or a company may sign a royalty agreement and then not pay, requiring more lawsuits. A lone inventor without a deep pocket is definitely a lamb among wolves in this environment.

There are many pitfalls for the patent owner. I was once asked to serve as an expert witness in a lawsuit which shows yet another possible problem. A young engineer (a former student of mine) invented and patented a device for use in the medical industry. He formed a corporation, raised venture capital, and did the development work on the

device. Rather than build his own manufacturing facility, he entered into a joint venture with a company in another city to build the device. This other company did not build the device on schedule, but instead sued this young engineer for thirty million dollars, claiming that the development work and engineering manuals were inadequate and that the other company would have to invest considerable effort to produce a properly engineered device. The young engineer told me that the other company's plan was to take his corporation's assets, including the patent, if the other company won the suit, since the young engineer obviously did not have even a small fraction of thirty million dollars. In the meantime, he was involved in very expensive litigation, with the introduction of his product into the marketplace on hold.

The lone inventor has almost zero chance of keeping his patent in such an environment. It will eventually be owned by someone with deep pockets.

One alternative to this depressing situation is to maintain some critical aspect of the technology as a trade secret. The inventor and a circle of trusted associates would then have full control as long as the secret was held. For continuity past the death of the inventor, there would need to be a religious commune or perhaps a large family. The inventor would need worry only about two problems: reverse-engineering and theft. The technology may be so advanced that reverse-engineering is simply not feasible. For example, if Moray had developed a working transistor in the 1930s, competitors would have had great difficulty in replicating the device just by physical testing. They would have quickly found that the primary ingredient was germanium or silicon, for example, but would not have realized (without a detailed theory) that impurities at levels of less than one part in a thousand were critical to its operation. Theft would seem to be the more difficult problem, but probably not insurmountable.

8.6 REWARDS TO INVENTORS

Regardless of ownership or funding source, it is only fair to reward the inventors for developing this discovery. The discovery is worth many millions of dollars, but having this much money could easily cause more problems than it is worth for most inventors. I would propose, as a minimum, a comfortable retirement income, adequate to leave a modest inheritance to the inventor's children. This should be set in terms of some readily obtained benchmark rather than a specific dollar amount at the time of discovery, to allow for inflation and other factors. Possibilities include paying the same retirement pay as received by a Colonel in the U.S. Military retiring with 25 years experience, or the average retirement pay of a full professor from the College of Engineering of a Land Grant University, or the median engineering salary as published by the National Society of Professional Engineers. This should be for the life of the inventor and spouse, perhaps even for the life of their children.

I would suggest this retirement be paid from a royalty on each kWh produced by the new-energy source. A royalty of 0.3 cents/kWh would be a reasonable amount at the beginning. The percentage could be lowered after all the retirement benefits are fully funded. The inventor would hopefully be salaried from other sources at least until energy sales were adequate to fund his retirement. This method of funding retirement provides incentive to the inventor to keep making improvements to his system until it is commercially available, and also prevents cash flow problems during the critical early years.

Should only the final inventor receive this reward, or should earlier or contemporary workers be rewarded also? We have a ‘winner take all’ mentality in regard to inventions, which may not be fair in this case, and may also be counterproductive. We are more likely to make the discovery as a team, but we are not inclined to share all our data openly if it might reduce our chances of receiving a reward. A classic example is that of Henry Moray, who apparently had a working free energy system in the 1930s. He and his sons have invested a fortune and much of their lives in this search, and their book has encouraged many others to start the search. They deserve some kind of return on their investment. Also, if Henry’s sons, John and Richard, were convinced that they would receive a fair reward by joining a group or team of researchers, they might share some key piece of data that would send the remainder of the team in the right direction.

But how do we develop or encourage such teamwork? There is already considerable informal networking that is taking place, but perhaps even more could be done with a more formal system. One possibility would be for two inventors to sign a formal agreement including the following clauses:

1. Neither inventor will disclose any proprietary information made available by the other inventor.
2. Each inventor is allowed to visit the laboratory and library of the other.
3. Each inventor will make available specialized equipment as time and resources allow.
4. Each inventor will attempt to replicate experiments of the other.
5. If one inventor is successful in bringing a new-energy device to the marketplace, then after his retirement is fully funded from royalty payments, he will use the royalty payments to fund the retirement of the other inventor.

Agreements similar to this could be used to put together teams of researchers. A team might include theoretical physicists, engineers, and technicians. It would be nice if all the team members lived within a days drive of each other so that face-to-face sessions could be conducted periodically. Such teams should have a better chance of success than the lone inventor trying to be theoretician, engineer, *and* technician.

8.7 RESEARCH ACTIVITIES

If we assume that a new-energy source exists, whether it be called the aether, the vacuum, or the firmament, then we must decide how to characterize and develop this source. A theoretical understanding needs to be developed. Devices that use this source must be brought to the market. What are some rational research activities that have promise in fulfilling these needs?

This energy may be available in at least three ways: heat, mechanical rotation, and direct electrical output. Those performing successful cold-fusion experiments may have tapped into the aether. Certainly, a large fraction of our energy requirements are used for heating household space and water so the cold fusion activity needs to be encouraged. Cold fusion is not accepted by the majority of scientists, but has much greater acceptance than the new-energy concepts presented in this book. Even wider acceptance and significant funding are likely in the near future. My suggestions on research activities will therefore be restricted to the mechanical and electrical outputs.

Until the source is fully characterized, we should assume that any or all of the following parameters may affect performance of a new-energy device:

1. Location on the earth (latitude and longitude)
2. Elevation above mean sea level
3. Air temperature
4. Air pressure
5. Humidity
6. Solar storms
7. Time of day
8. Time of year
9. Weather conditions
10. Immediate environment of new-energy device (open air, wood-frame building, metal-skin building, etc.)
11. Electrical grounding features
12. Purity of materials
13. Composition of materials

14. Techniques of circuit construction
15. Orientation of device with respect to vertical, magnetic north, etc.
16. Frequency of oscillation or speed of rotation
17. Presence of harmonics or pulses
18. Presence of high electric and/or high magnetic fields, not necessarily inside the device.

There have been a number of experimenters who have assembled coils, transformers, Tesla coils, batteries, and capacitors on an intuitive basis and have observed anomalous effects. In many cases these experimenters are not scientifically trained and are unable to write detailed technical documents that would allow replication of their results. One research activity that may have great value would be to send one or more engineers into the workshops of these experimenters to hopefully observe the effects, and to document the experimental apparatus along with the other items on the list above.

There are several engineers in the new-energy area that have been very productive with very limited resources. A large corporation with vision would be wise to retain one of these people as a full-time consultant with a minimum of a five-year contract, give him a reasonable budget for travel and components, and let him do his own thing. That was one of the better decisions that General Electric made around the turn of the century, when they hired Steinmetz, put him in a nice laboratory, hired the best engineers as his assistants, and gave him free rein in his research interests. GE then owned the patents to his inventions which allowed them to become one of the largest corporations in the world.

A large corporation hiring a consultant could afford to apply for patents, and would have a reasonable chance of protecting the patents against lawsuits. It would be only fair to reward the consultant with a percentage of the royalties from his patents.

But what about specific activities that EPRI, NSF, or some other foundation or institute might want to fund? Many of the reported new-energy devices have permanent magnets, coils (often in unusual configurations), batteries, and rotating components. There may be resonance involved, often reported to be in the range of 30 to 500 kHz. High voltages or high currents might be involved. Large transients are common. It is likely that a component that is linear under normal operating conditions becomes non-linear under these unusual operating conditions. There may be entirely new phenomena waiting to be discovered under the right conditions of voltage, current, frequency, and materials, similar to the discovery of superconductivity. This will be another case of theory following experimental discovery.

At the start, there is a need for specialized equipment and experimental protocols so different groups can measure phenomena in a consistent manner. Some items that need to be developed, or made available at much lower cost include:

1. A voltmeter (or electric field meter) that will measure voltages in the range of 100 V to 10 MV, in the frequency range of 30 to 500 kHz, without significant loading of the circuit.
2. Function generators (or amplifiers) like the standard small laboratory function generator (10 V, 100 mA), but that will supply several amps at several hundred volts, at frequencies up to at least 1 MHz.
3. A wattmeter accurate to within a few percent on magnitude that also indicates direction of power flow, that will work on low power factor and non-sinusoidal or pulsed waveforms at frequencies from dc to several hundred kHz.
4. An instrument that will rapidly characterize magnetic materials, including permeability and hysteresis and eddy current losses, as a function of frequency and amplitude of the external magnetic field.

One obvious research activity that would impact many of the new-energy researchers would be to update Terman's material on inductors [7, Pages 47-109]. Experimental results for bucking coils and other new configurations should be given, including resonant frequencies. Empirical formulas for inductance of these new types of coils should be developed as a function of dimensions and number of turns. Computer methods of calculating self and mutual inductance should be included [2].

There needs to be greater effort to replicate anomalous findings of other researchers. Some of these experiments may be simple to perform, but may yield important clues about the aether. They may also show up poor experimental technique on the part of some researchers. For example, Don Kelly reported [4] that permanent magnets fell at a rate up to 60% slower than unmagnetized blocks of the same mass at his test site in Florida. Magnets will experience a rotational force to align them with the earth's magnetic field while falling (quite noticeable in the laboratory), but should fall at the same rate as unmagnetized blocks of the same material. This made a nice undergraduate laboratory experiment, so I had a student set up a plastic fiber-optic system to sense passage of a block with a reflective strip on it. He dropped magnetized and unmagnetized blocks and read elapsed time on a scope. He could not detect any difference in fall rates. Another engineer, Richard Hull, did a similar experiment in Virginia, with the same negative result. Richard and I suspect that Don's experimental technique was faulty. However, there is always a nagging fear that the effect is real but dependent on location, the composition of the magnetic material, etc. If even small amounts of research funding were available, Richard could be hired as a consultant to take his test

equipment to Florida and check the drop rates with different instrumentation. If the effect was real, then the same magnets could be checked at another location, or different magnets at the same location, in an effort to discover the critical variables.

This example illustrates that some interesting experiments may be done in a short time frame for minimal amounts of money.

Without getting more specific, we need to be looking for new phenomena in situations involving high voltages and/or high currents in the frequency range of 30 to 500 kHz, in circuits including inductors and permanent magnets. The preferred place to start is in the workshops of the researchers reporting strange phenomena.

Certainly the several flaws or paradoxes in electromagnetic theory that were listed in the previous chapter need additional experimental and theoretical work. Ampère's original force law between current elements needs more experimental verification to make sure the constants and the angular variation are indeed as he said. The similarity between Faraday's law for a coil around an iron core, and the Aharonov-Bohm effect, needs to be theoretically explored. Theorists need to consider why magnetic flux, supposedly produced by electron spin in an atom, does not appear to rotate with the bulk material of a permanent magnet.

It would be nice to have several well-equipped laboratories scattered across the country that would be available to experimenters operating on a nearly zero budget. One should be at high elevation, at least as high as Colorado Springs and perhaps as high as Leadville, Colorado (10,000 ft). The others would be at convenient locations, say East Coast, Midwest, and West Coast. An experimenter would write a proposal to the funding agency. Upon acceptance, the experimenter would be paid travel expenses and perhaps a consulting fee to take his apparatus to the laboratory. The experimenter and laboratory personnel would work together to characterize and test the apparatus, and write appropriate reports and technical papers. Publication can always be delayed for a year or two if there is any possibility of applying for a patent. Several of the Tesla coil and new-energy researchers have personal laboratories that would be adequate to the task, and would probably be made available for a reasonable consulting fee. Such an open laboratory would eliminate some of the measurement errors being reported and also improve communication among researchers that tend to be isolated.

Many other activities could be listed, but these give some idea of what could and should be done.

8.8 WHAT NEXT?

I have outlined many of the difficulties facing the development of new-energy generators. In the present climate, it appears that the lone inventor does not have the resources to

do the necessary engineering development and bring a generator into full commercial production. It also appears that the people with the resources do not have the vision, leaving us at an impasse.

There are many people working on the discovery of a new-energy source (with limited resources) so it is conceivable some theoretical and experimental progress will be made without adequate funding. I believe this source will eventually be discovered, even without extramural research funding, but it may take another century. Adequate research funding could speed up the process considerably, however.

As mentioned earlier, what is really lacking is God's blessing. When God says "The time is here" it will be like the Berlin Wall falling. Major funding sources will suddenly be available. The Patent Office will expeditiously approve related patents. Activities will move faster than anyone thought possible.

In the meantime, we need to do our homework and be ready for a major paradigm shift. Experimenters need to carefully document anomalous results and encourage others to replicate them. Theoreticians need to develop mathematical models for the unexplained observations in this book.

When we consider that over a billion people around the earth do not have access to electricity in their villages, we should sense some urgency about this research process. Villages lie in poverty and hopelessness. City slums are perceived to be a better place to live, with massive migrations of people. The third-world country becomes more unstable and ripe for revolution as this process continues. It can be argued [6] that the real costs to a developing country and even to the world community of nations is greater if these basic energy needs are not met than if they are met. An improving standard of living in the rural areas would relieve a great deal of human misery and also improve the political stability of the world. As I. H. Usmani, Senior Energy Advisor, United Nations Environmental Programme, once said: "These villagers must have energy, not at a price, but at any price."

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