

THE
NEW
PARADIGM

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Among them was Larry Dossey, a doctor who specialized in alternative medicines; Rustum Roy, a metallurgist with ideas about new thinking; Peter Sturrock, an astro physicist who was the one who created the Society for Scientific Exploration; and Savel Savva, a pioneer in medical approaches outside those supported by the FDA. The chapters describing novel work have all been subjected to comment by specialists in the various fields.

So, I wrote this book. It discusses mostly the work of others. If I have put anything into it of my own self, it is more in my ability (as a physical chemist) to jump out of the straight jacket of my peers and prefer to come out with what seems to be true, - even if it means howls of protest.

Some things described in the book will strain readers' acceptance. I ask only for an open mind. The truth about the present science is that it is simply inconsistent with many undisputed facts. So, what if some disputed facts are true, too? Should we not give them a hearing, unbound by what we were taught at the university?

For many of the "impossible" things seem to be turning out (experimentally) to be possible. The thing we need is a New Paradigm to make the new results acceptable.

John O'M. Bockris
College Station, Texas, 2004

Foreword to

The New Paradigm

by John O'M. Bockris

Larry Dossey, MD

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It wasn't supposed to turn out this way — a distinguished professor at the top of his field censored by his colleagues for exploring a new idea in the physical sciences. But as Professor John O'M. Bockris discovered, there is a shadow side of science that often lies in wait for those who stray too far from its accepted canons.

This may sound shocking to laypersons who regard science as an exercise in unfettered thinking. Yet in all areas of cultural endeavor, including science, there is a conservative vector that can erupt unpredictably into a pernicious, inquisitorial exercise — as it did toward Professor Bockris when he and his colleagues began experimenting with a novel source of energy, as he explains in the pages that follow.

Conservatism in science is a valuable, self-correcting influence that helps researchers stay on track by adhering to time-honored methodologies and codes of conduct. Yet there is a point beyond which conservatism inhibits creativity and is actually traitorous to the lofty ideals of science. Alfred North Whitehead, the great mathematician-philosopher, lamented this situation. In 1948, in words that still apply, he observed, "The Universe is vast. Nothing is more curious than the self-satisfied dogmatism with which mankind at each period of its history cherishes the delusion of the finality of its existing modes of knowledge. Sceptics and believers are all alike. At this moment scientists and sceptics are the leading dogmatists. Advance in detail is admitted: fundamental novelty is barred. This dogmatic common sense is the death of philosophical adventure. The Universe is vast."¹

I have often wondered why some scientists appear so fearful of new ideas, and why they expend huge amounts of energy attacking those who represent them. Clues may lie in the distant past.

Philosopher Karen Armstrong describes, in her landmark book *The Battle for God*,² how human beings have evolved two main ways of knowing, which scholars call *mythos* and *logos*. Both methods were essential, and neither was complete without the other. *Mythos* was considered timeless and unchanging, and was the foundation for religion and spirituality. Its special area of competence was not practicality but *meaning*. It shed light on human origins, the purpose of life, the origins of culture, and human destiny following death. Its contribution to human welfare was absolutely essential. Modern research confirms that without an adequate source of meaning, humans fall into despair and often sicken and die. *Mythos* was a sustaining corrective to this tendency; it lent a depth and richness to life by directing one's inner gaze to the eternal and the universal.

In contrast, *logos* was concerned not with meaning but with practicality. It prized reason, intellectuality, analysis, and the human talent for problem solving. It converted the literal lessons of *mythos* into metaphor, and sought to understand the workings of the world outside of a religious context. Beginning in the 1600s, *logos* evolved into what we now call science, while *mythos* continued to be anchored as always in religion, revelation, and mystical experience. Following the European Enlightenment, *logos* became the dominant way of knowing for millions of Westerners, who were convinced that *mythos* had served its purpose and could be safely retired:

But although the ancient myths were dismissed, the human need for meaning did not disappear. Hungering for a new source of meaning, modern humans invented new myths to sustain them, as humans have always done. One of these is the belief that science is a sufficient explanation for all there is. This often involves *scientism*, which is the cloaking of one's personal views in the robes of science in an attempt to justify one's personal convictions about how the world *ought* to work. Those who adhere to scientism know in advance how the universe should behave, and they are impatient with any scientist who produces evidence that says otherwise. This gambit, of course, is not science, which is value-neutral and was never intended to answer questions of meaning and purpose. But the dogmas of scientism have become all too common in many areas of science, as Professor Bockris explains.

A major sticking point in modern science concerns the evidence that consciousness may act remotely beyond the confines of the brain and body, and possibly outside the present. This possibility has been raised by several studies in remote healing and

intercessory prayer.³ Many other studies suggest that humans may acquire health-relevant information in dreams and visions, in ways that transcend our current understanding of the brain.³ To those who adhere to a purely brain-based definition of consciousness, these findings reek of *mythos*, not *logos*, and are anathema. Some think they should be dismissed without a hearing. As one scientist said of this general area of investigation, "This is the sort of thing I would not believe, even if it were true."⁴ But as Professor Bockris describes in the pages that follow, many controversial ideas such as these are buttressed by impressive scientific evidence.

Can the ancient complementarity between *logos* and *mythos* be recovered? If so, this would go far in resolving the intellectual indigestion many scientists experience when cutting-edge ideas that seem *mythos*-linked surface in science, such as the nonlocal operations of consciousness seen in remote healing experiments. The plain fact is that science has never been able to sanitize itself of *mythos* although it has tried heroically to do so. As many scholars have noted, scientific breakthroughs have often taken place during *mythos*-like states of dreaming and reverie when the muscular efforts of *logos* are temporarily set aside.^{5, 6} Maybe we have had it wrong; perhaps *mythos* and *logos* were not fundamentally opposed to begin with. It is important to examine this possibility, because the assumption that *logos* and *mythos* are incompatible fuels the militant opposition toward certain lines of evidence discussed in this book.

Philosopher Jacob Needleman in his book *A Sense of the Cosmos*⁷ describes the earliest days of science, when this fledgling way of knowing was just forming, before it was even called "science." The first generation of scientists, Needleman states, wanted a first-hand, personal confrontation with reality that was unmediated by anyone else. At that time in history the Church was the middle man who interpreted the world for everyone. The earliest scientists, however, wishing to by-pass all intermediaries, went to "the wall of truth," in Needleman's graphic words, through their new empirical approaches. Here lies a profound connection between *logos*-based science and *mythos*-based religion and spirituality. In the esoteric side of all religions there exists a thread called *mysticism*, whose practitioners, the mystics, also seek an unmediated confrontation with truth. Seen from this perspective, authentic science and genuine mysticism share an identical passion: a vivid, personal knowledge of the Real. This is not to say that the *methods* of mystics and scientists are the same, only that the thirst for knowledge seems to flow from a common urge.

This linkage between mysticism and science, between *mythos* and *logos*, was not to last, however. Needleman describes how succeeding generations of scientists quickly lost their awareness of this golden connection and began to reify the formalisms of scientific

method over the pursuit of unmediated truth. The result was that science quickly became the *only* legitimate way of acquiring knowledge. As the old link was forgotten, *logos* was elevated to the position once occupied by *mythos*—the source of meaning and the answers to all of the Great Questions: the origin of the universe and of life, and the nature of mind, thought, and behavior.

Perhaps the ascent of science was inevitable. Having dethroned *mythos* and consigned it to the dustbin of history, a new source of meaning had to be found — we cannot live without it — and the next-best candidate was science.

Science is a hard path. It requires that those who follow it set aside their egos and biases and let nature speak for itself. This is exceedingly difficult to do, because everyone, including scientists, harbors personal views about how nature should behave, even when put to the test in empirical experiments. *The New Paradigm* challenges scientists to do exactly that, however — to set all prejudices aside and resist the temptation to censor science and scientists when nature does not conform to their expectations.

How did science could become so polarized against the phenomena discussed in this book? How, for instance, can scientists in the field of parapsychology believe that consciousness manifests remotely in space and time, while scientists in areas such as chemistry and physics deny that such things are possible? One reason is that scientists do science differently. As a result, they often come to different conclusions, especially where the operations of consciousness are concerned.

One major area of difference is the reliance on “blind” or “double-blind” ways of doing experiments. In a typical double-blind, controlled medical experiment, for example, two groups of subjects are involved. One is given the treatment that is being evaluated — a new drug, say — while the other group, the “controls,” are not. In a blind study, the subjects are not aware of which group they are in; and in a double-blind experiment, neither the experimenter nor the subjects knows this information. The double-blind design prevents the researcher from inserting his or her bias into the experiment and seeing what s/he wants to see.

Medical researchers have painfully learned that even the most diligent experimenter is capable of grossly misinterpreting an experiment. That is why controlled studies have become the gold standard in clinical research. However, this is not the case in most areas of science, and this has contributed to major discrepancies in the world views of scientists working in different areas.

In a review of 1,548 papers submitted to high-status science journals, British biologist Rupert Sheldrake found that zero percent of papers in the physical sciences of physics and chemistry used blinded or double-blind research methods; in the biological sciences only 0.8 percent used such; in psychology and animal behavior, 4.9 percent did so; in the medical sciences, 24.2 percent used them; and in parapsychology, 85.2 percent employed such. This is a telling rebuttal to the critics of parapsychology, which is one of the areas discussed by Professor Bockris. Far from being a *mythos*-dominated field, its research standards are some of the most precise within all of science.

The need to guard against self-deception is poorly understood within many areas of science. In his study, Sheldrake states, "When academic scientists were interviewed for this survey, some did not know what was meant by the term 'blind methodology.' Most were aware of blind techniques, but thought that they were necessary only in clinical research or psychology. They believed that the principle purpose of these methods was to avoid biases introduced by human subjects, rather than by experimenters. The most common view expressed by physical and biological scientists was that blind methodologies are unnecessary outside psychology and medicine because 'nature itself is blind,' as one professor put it. Some admitted the theoretical possibility of bias by experimenters, but thought it of little importance in practice. One chemist added, 'science is difficult enough as it is without making it even harder by not knowing what you are working on.'"⁸

According to the scientific ideal, all scientists should arrive at a uniform picture of the world by using similar methodologies. Yet, as Sheldrake showed, they do *not* use similar methods. The result is a confused picture of the world reminiscent of the parable of the blind men feeling the elephant — a mixture of opinions of what an elephant actually is, and the temptation to substitute personal half-truths for objective whole ones.

Scientists need elbow room to explore, because it is on the fringes of science that the most exciting breakthroughs often happen. This means that scientists need the freedom to be wrong. But isn't “being wrong” a vanishing species in science? The heady messages from science these days suggest that we are closing in on a TOE, a Theory of Everything, that will condense all scientific knowing into a concise theory or formula. This fantastic increase in knowledge should constrain scientists and help them focus on what really matters, preventing wild flights of fancy and being wrong.

Another view, however, suggests that the situation is not so sunny. As cosmologist Stephen Hawking concedes, “We have no idea how the world really is. All we do is build up models which seem to prove our theories.”⁹ And as legendary physician Lewis Thomas,

former director of research at Memorial Sloan-Kettering Cancer Center said, "The only solid piece of scientific truth about which I feel totally confident is that we are profoundly ignorant about nature.... It is this sudden confrontation with the depth and scope of ignorance that represents the most significant contribution of twentieth-century science to the human intellect."¹⁰

Tolerance for new ideas, even for those that don't fit in, is desperately required if science is to retain its claim as a valid way of knowing. Although he was not a friend of many of the areas discussed in this book, astronomer Carl Sagan hit the right note in his 1991 UCLA commencement address. "It is the responsibility of scientists," he said, "never to suppress knowledge, no matter how awkward that knowledge is, no matter how it may bother those in power. We are not smart enough to decide which pieces of knowledge are permissible and which are not."¹¹

This book is important for everyone. The decisions scientists make about what is acceptable to investigate and what is not will shape our destiny for centuries, and may even determine the fate of humankind and our planet.

To Professor John O'M. Bockris and his courageous defense of the free pursuit of knowledge, I bow deeply.

Larry Dossey, MD

Author: *Healing Beyond the Body*, *Reinventing Medicine*, and *Healing Words*

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REFEREEING OF CHAPTERS NEW PARADIGM

I have received advice in writing this book from a large number of colleagues unmentioned here and herewith I thank them.

I also asked colleagues whom I regarded as specializing in a specific area to "referee" Chapters 3-10.¹ I detail their names and express my thanks below. Sometimes, the referee wanted changes which I have made. On the other hand, if I had what I considered a good reason, I stuck to my original version. Therefore, in thanking these colleagues for the work they did in reading and commenting upon my material, I nevertheless take responsibility for material which may be judged by some to be in error.

I am well aware that I record phenomena here which are not only impossible in terms of present Science (telepathy, for example) but sometimes of a type which will strain acceptance by the broadest mind (Sai-Baba's "Miracles"). I have been careful to state the origin of what I relate. The skeptical reader must then consider the experience and record of the author I am quoting. Recall "Cold Fusion." It took fifteen years for the "impossible" statements of its investigators to gain a government re-investigation.

Chapter 3 is the longest chapter in the book and contains a description of weaknesses in five principal areas of Science. Ron Bryan, Professor in the Physics Department of Texas A&M University, gave me a very thorough examination of the Physics sections of the chapter. Richard Matzner, Professor in the Physics Department, University of Texas, gave me a 14 page evaluation of my presentation of Einstein's contributions to Relativity. Brian Conway, - Professor Emeritus from the University of Ottawa, - wrote me several pages of comments on the Relativity section, too. Detailed answers to a number of questions here were received from Dr. A. Hey (co-author of the book, Einstein's Mirror) from the University of Southampton, England.

I profited much from the evaluation of the Quantum Theory and Relativity section made by David Bergman, author of Common Sense Science. Paul Marmet, Professor of Physics at the University of Ottawa, taught me alternatives to present Relativity Physics by discussion (and from his papers). I learned much from three remarkable editions of the Infinite Energy Magazine (Vol. 7, Issues 38 and 39, 2001; and Vol. 8, Issue 39, 2002) where a series of authors gathered by Dr. Gene Mallove, the magazine's Editor, - in

¹ There is little that is controversial in Chapter 1 and in Chapter 2. I feel experienced enough in thirty years of work to maintain my own judgments.

discussions of Einstein's contributions to Relativity and a critical evaluation of the Big Bang idea in Cosmology. Dr. Rey Sidik (University of Cleveland) made a detailed evaluation of my Relativity section. Michael Behe, Professor of Biology at the Lehigh University, told me what he thought needed change in my section on Darwin's "Chance" Theory of Evolution. Halton Arp, of the Max Planck Institute of Astronomy in Garching, Germany, commented critically on my presentation of Cosmology.

I found difficulty in encouraging an expert in the Origin of Life field to give me his views: I was influenced by the views of many authors here but particularly by those of Paul Davies, Professor of Theoretical Physics at the University of Queensland.

Chapter 4 was not refereed formally, but gained from comments of Brian Conway and the broad collection of anomalies made by William Corliss.

Chapter 5 on ESP (telepathy, far-viewing and precognition) was knowledgeably commented on by Dr. Dean Radin, now Senior Scientist at the Institute of Noetic Sciences.

Chapter 6 received comments from Erlendur Haraldsson, Professor of Psychiatry at the University of Iceland and by the late Montague Keen who, until his recent death, has been active in descriptions of Physical Phenomena manifested by a group in England.

The chapter (No. 7) on Out of the Body and Near Death Experiences, was evaluated by Arvin Gibson, an author in that field, whose books have impressed me. I also had two encouraging letters from the most well known author in the field, Kenneth Ring, formerly Professor of Psychiatry at the University of Connecticut.

Chapter 8, on Survival, was read and commented on broadly by Dr. Carl B. Becker of the Kyoto University and by the late Montague Keen. I was most happy to receive comments on the chapter, - and particularly on the Reincarnation Evidence, - by Emeritus Professor Ian Stevenson, University of Virginia Health System, undoubtedly the leader in gathering evidence of a high scientific standard for Reincarnation.

Chapter 9 on Consciousness, was criticized by Bernard Haisch, Many One Networks, Inc.

The last chapter (10 - A New Paradigm?) has not been refereed in the sense of a formal evaluation, but I have received valuable comments and help in its composition by Savely Savva of the Monterey Institute for the Study of Alternative Healing Arts.

I am aware that these acknowledgments are insufficient and that I should cite and thank others. Let this be assumed.

CHAPTER 1

SCIENCE IS THE RELIGION OF THE WEST

1.1 THE WEST

Up to the time of Columbus, "the West" comprised, essentially, Europe. The borderline to the East at present runs from Turkey in the South, through Greece and the Balkan states, up through Poland and finally Finland. Yugoslavia was a country in which East and West met but one can see a touch of the East even in Austria (Fig. 1.1, West in Medieval times). The West has been largely influenced by the Christian religion, whereas the East has been under the influence of Hinduism, Buddhism, Islam, and, in Russia, the so-called Orthodox version of Catholic Christianity.

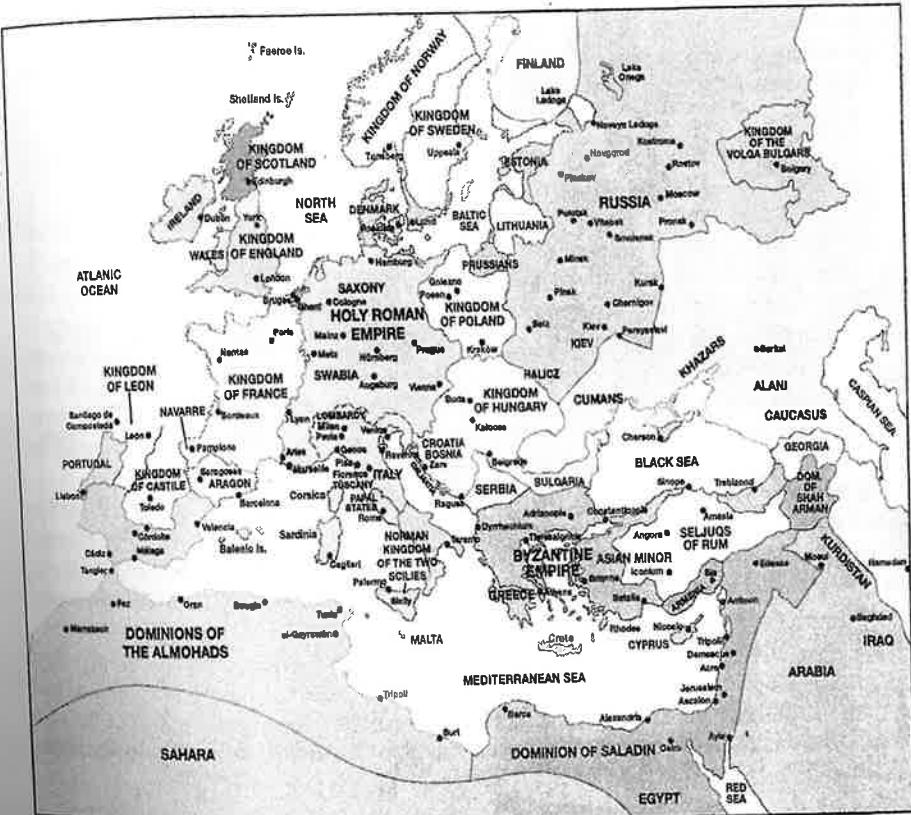
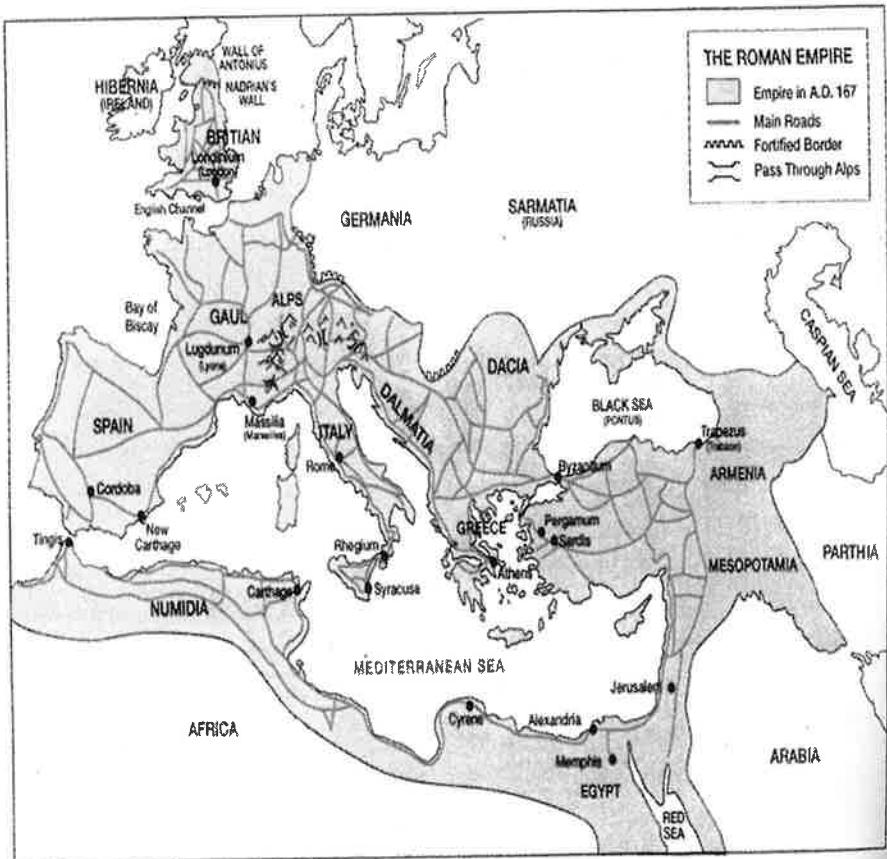


Figure 1.1 The West in the 12th Century. Reprinted with permission from *Europe and the Mediterranean about 1190*, from W. Shepherd, Historical Atlas, Barnes and Noble, New York, 1964.

The West became defined firstly by the extent of the Roman Empire there was a vast land mass, westward, between Europe and Asia. The Americas greatly expanded the Western world and became about half of it. Other areas in which Western thought has

been for long predominant, are in lands discovered and developed by European explorers, - some parts of Africa, all of Australia, and New Zealand. Western knowledge, and eventually technology, spread throughout this world, and with it, Western attitudes.



(Fig.1. 2). Columbus and his peers, - in particular Magellan, - found that Fig.1.2 The Roman Empire at Greatest Extent. Reprinted with permission from *The Story of Man's Past*, by Dr. Edith W. Ware, p. 286, 1969, Ginn and Company, Boston, MA 02117. Publisher extinct.

The West has had a distinctive culture and until the 20th Century (cf. Nietzsche 1844-1900) was strongly nurtured by Christianity. The surprisingly rapid spread of this religion, from the parables of a village preacher to the largest of the world's religions,

¹ was greatly helped from around AD 300 by the edict of the Emperor Constantine (1) that Christianity should be the religion of the Roman Empire.

The most significant product of the West, spreading to the people in the 19th and 20th centuries, has been the discovery (in the 17th century) of the scientific method, and the resulting technology which started to develop in the 18th century. Such a development was encouraged by the eschatological concepts of Christianity: Heaven or Hell upon the end of a *single* life, rather than the timeless religions of the East in which (for Hinduism and Buddhism) God waits patiently for sufficient development of the individual through an undetermined number of reincarnations.

1.2 PARADIGMS OF THE WEST

1.2.1 General

This book is about the development of a new paradigm, i.e., the dominating attitude characteristic of an epoch. Thus, the Greek poets describe to us a culture which existed from about 1000 B.C. and much can be inferred from the famous narrative sagas i.e., *The Odyssey* and *the Iliad*, which were written by Homer around 800 B.C..

1.2.2 1000 BC to 0 CE

What can we say about the culture, - the paradigm, of this time, that time of the cradle of the West? *The Odyssey* and *the Iliad* tell us much about how people lived, - thought and reacted, - in those times. The poems tell of the triumphs and frustrations of life. Advice-giving, loving, confrontations, anger: all are presented, - the human interactions of today, - and are lavishly described. However, there is one radical and important addition to life, which has been lost to us in recent times: the gods. In Greek and Roman times, people were constantly in contact with "the gods", whose interactions with people and among each other adds a parallel dimension to the description of the life of people.

Achilles, Ajax, Hector, Menelaus, these are names of some of the Greek heroes which have lasted from their epic sources right into our own time, when they become names given, appropriately, to British warships. A strange phenomenon was a part of that earlier Western life. Thus, the major figures from Greek life were described as *glowing*, recalling in modern times the descriptions of figures alleged to have been seen by those who have undergone Near Death Experiences (Chapter 7). *The Odyssey and the Iliad* tell of heroes who were the first Archetypes of literature and their lives and doings allow us to name the paradigm of the epoch.

The consuming thought, then, was that of heroic action in battle. Men had to fight, sword-to-sword, to protect their women and maintain a safe nest for their children.

¹ Christians had been horribly persecuted by official Rome. They practiced in secret and used coded signs to communicate. On the eve of a decisive battle, Constantine had a dream in which he saw the Christian sign on the battle flag of his legions. He won the battle and decreed that, henceforth, the legions' banners should indeed contain the Christian's sign and, moreover, that the religion of the Empire should be Christianity. Up to this point, Christianity had been developed, outside Judea, in the Hellenic world and along the northern Mediterranean coast towns. Constantine's edict spread it to all parts of the then known West.

Their task was to beat back the ever present enemy, and their rank was decided by their prowess in man-to-man battle. *Heroism* was the paradigm of this earlier epoch.

The Aeneid (Virgil, written between 29-19 BC) represents a Roman counterpart to Homer's Greek works. In it, the hero, Aeneas, flees from Troy, which has been sacked by the Greeks. Inspired by the gods, he knows his destiny is to found a Great City in the West. After many adventures (told in the books) he reaches Italy and founds Lavinium, the parent city of Rome.

Although written some 800 years after *The Odyssey* and *The Iliad*, the stress is also on adventurism, exploration, fighting and triumphing. The paradigm is still heroic conduct of the individual man.

1.2.3 The Roman Empire BC 1000 - AD 500

This remarkable period of development, - from which we still have echoes, - above all the Roman Catholic Church, - lasted from BC 1000 to AD 500. It was based upon laws which brought stability to the great city of Rome; upon advanced engineering (well-designed houses, some with air cooling, plumbing and sewage disposal); and widespread sea transportation. The stable Capital encouraged the development of a large and well trained army and the proud spirit of the people encouraged its activity as conqueror and civilizer. Most of what is now Europe was brought from a primitive to a civilized state by the Roman legions and their imposition of Roman ways.

All the Romans did was performed in communion with the gods, - before images of whom rituals were performed to promote good crops, etc. (2). Victorious legions paraded before, and paid tribute to their gods. The conversion of the Roman Empire to Christianity in 300 introduced logically a lessened martial spirit: Rome fell in AD 410, the victim of persistent assaults from non-Christian German armies (who, however, brought soap and the wearing of trousers to the fallen city).

There is no doubt how one should characterize the paradigm of the Romans. It still retained the pulse of battle, though now this no longer was focused upon individual combat, but more on generalship of armies in battle. But to the Greek ideal of protection of the family had been added its descendent: creation of peaceful groups of people. Civilizing was the paradigm, the leading idea of the people of the Roman Empire.

Thus, the individual Roman's wish for an Empire was tempered by the intellectual and civilizing attitude of the more sophisticated Greek population.

1.2.4 The Holy Roman Empire, 801-1500

The fall of Rome in the 5th century CE left the Roman church exposed. It needed a strong temporal power on its side and this was brilliantly created by Pope Leo III who strode towards an unsuspecting Charlemagne (at that time, King of the Franks) at mass (Fig. 1.2. Holy Roman Empire) in 801 and placed a crown upon his head (3).

Thus began an Empire in the West, which to some degree filled the vacuum left by Rome's demise. The central lands of this Empire were Italy, Hungary, Austria and Germany. It began slowly to erode in the later 13th century and was in disarray by 1500.

Belief in the spiritual power of God and the Church was the paradigm of the West in the time 800-1650. Rome's power continued after 410 because the Roman Church was believed to hold the keys to Heaven, and a life in Eternity. The Pope was mightier than the Holy Roman Emperor, though he depended on him for military defense.

The struggle between the temporal power of the kings and the spiritual pressure of the popes came to a head in the reigns of Pope Nicholas II (1059-1061) and Gregory VII (1073-1085) in their opposition to King Henry IV (4). Henry was ultimately driven by a revolt among the German nobles to make peace with the Pope and appeared before Gregory in January, 1077, at Canossa. Dressed as a penitent, the emperor stood barefoot in the snow for three days and begged forgiveness until, in Gregory's words: "We loosed the chain of the anathema and at length received him into the favor of communion and into the lap of the Holy Mother Church."

1.3 PHILOSOPHICAL AND SCIENTIFIC THOUGHT IN THE WEST TILL 1600

In this brief account of the climate of thought before the introduction of modern science in the 17th century, one can only look at the highest peaks. Two of these, the philosophers Plato and Aristotle, made original contributions of such significance that their thoughts still strongly influence philosophy in the 21st century.

Plato (428-348 BC) looked back to a Master, Socrates, who left no written record. Socrates is the archetype of the philosopher in the Western sense. He was the first on record who portrayed the art of disinterested inquiry. Plato, in some of his writings, put what he thought into the mouth of Socrates, demonstrated the expression of his logical, questioning mind against the parrying of juniors, who are portrayed as those he accidentally met in his walks through Athens. ("Now, Sir, is it better to be poor and honest, or dishonest and rich, eh?"). Benign, urbane, incisive, describe Socrates. The most famous of the Socrates series is *The Phaedo* (5), Plato's portrayal of what he thought may have transpired during the last few hours of Socrates' life.² (Largely, a relaxed, speculative discussion of death and the after life.)

Plato wrote much which was independent of his portrayal of Socrates' thought. Among the more influential is *The Republic* (6), in which he discusses ideas about the administration of an ideal state.³ Reading it some 2400 years after it was written, one feels one could be listening, say, to an Oxford professor in the Humanities. Of all the many new concepts which Plato suggested, greatest is the theory of ideal forms. According to this (7), the ideas and concepts of our lives are imperfect versions of that quality, which, somewhere, exists in its own pristine wholeness. If we conceive of something which we feel is beautiful, then, somehow, BEAUTY itself must exist, the same with TRUTH, GOODNESS, etc.⁴

² Socrates was condemned to death by drinking poisoned wine. His offense was perverting the young by asking too many disturbing questions.

³ Plato believed in a skewed democracy. All citizens should vote, but to each citizen attached a value to his vote depending on his profession. Thus, philosophers were allotted the greatest number, politicians a much lesser one, finally the unqualified citizen just one vote.

⁴ Mathematics illustrates Plato's concept which is alive in philosophy today. He did not think mathematicians created new mathematics, but as the subject expanded, the new forms were discovered.. But, then, where were they before they were discovered and where is, now, the mathematics still to be discovered? As an example, the mathematical equations for the expression

Born 44 years after Plato (i.e., in BC 384) Aristotle became Plato's student and then colleague in the famous Academy in Athens.⁵ Aristotle is known for contributions so broad in the many fields which he investigated and so deep in concept formation, that it is he who gave more than any other to the basis of thinking in the West (8). Plato had described the soul as having an independent existence, but Aristotle stressed the soul's inextricable connection (during life) to the body. Aristotle's views were fully teleological, i.e., he thought that what happened was always goal-directed and thereby he differed radically from a most basic idea of the Science born in the 17th century, according to which the world develops by means of chance happenings.

Although he was the obvious candidate to replace Plato as Head of the Academy in Athens, Plato had his nephew appointed to succeed him. Aristotle then left Athens and founded his own Academy. He also became the tutor of the young Alexander, later to become a military leader who ranks among the greatest of all time. Alexander's triumphs were certainly influenced by Aristotle's training, for Aristotle had seen to it that the famous military exploits of the heroes of *The Odyssey* and *The Iliad* were shown to Alexander as role models.

Aristotle contributed to metaphysics⁶ ("Are certain statements about the future intrinsically false?"). In ontology, he delved into the nature of geometric figures. Aristotle also found time to be a great zoologist, and was not above field work to observe, e.g., the mating of snakes in their native habitat. Much of what he wrote for the first time survived as the best knowledge available into the 17th century.

Aristotle's contributions not only lasted unchallenged for 2000 years, but both Bacon and Leibniz admitted their indebtedness to him. But, the most influential effect Aristotle had consists of his influence on Thomas Aquinas (1224/5-1274), the most influential theologian in Christian times. Aristotle's Greek works were brought in translation to the West via Islam in St. Thomas Aquinas' time. Aquinas used Aristotle's ideas to rationalize the church's doctrine (9). He seized upon the teleological aspects of

of fractal forms were discovered in the 20th century. Plato would have seen such a theory as having always existed; it was waiting to be discovered by a mathematician, as new land areas used to be discovered by explorers.

⁵ The building still stands on a hill high above Athens. Tragically, all the famous buildings of the ancients in Athens which, until mid 20th century withstood the ravages of 2500 years so well, are now succumbing to the attacks of acid rain and other pollutants, which spread a haze over the city seen from the Academy Buildings.

⁶ Aristotle's physics (e.g., his laws of motion) are sometimes quoted to show the great advance achieved by the mechanics in Newton, who wrote some two thousand years after Aristotle. Although Newton's *Principia* undoubtedly founded modern physics, Aristotle's laws of motion contain practical sense. Thus, an object did not move until the force applied to it exceeded a critical value. Of course, this is correct for real (friction affected) bodies. Newton's basic law that acceleration is force divided by mass (i.e., bodies accelerate for any force above zero) refers to bodies in space, uninhibited by contact with the surroundings.

Aristotle to give a basis to theology, which up to his time had depended largely on faith in the revelations which were claimed by earlier theologians to be of divine origin.⁷

1.4 PTOLEMY AND THE GEOCENTRIC WORLD VIEW

Until Copernicus (1473-1543) and Galileo (1564-1642), the daily apparent rising and setting of the Sun on opposite sides of the Earth was taken to be as it appeared, the earth was the center of the Universe, and the Sun revolved around it. This view was given substance by Ptolemy (b. 127) who had gained a strong reputation by writing an encyclopedic book comprising all the known mathematics of the time. The alternative heliocentric idea was known in that time but Ptolemy reasoned that if the Earth moved, a body thrown up vertically would come to rest at a point displaced from that at which it was thrown upwards.

Ptolemy's geocentric model involved a series of circles centered on the Earth (10). These were called deferents and were to be used as a basis to calculate astronomical events by a series of corrective smaller "epi-cycles". To obtain agreement with events observed in the sky, Ptolemy showed ingenuity by changing the deferent's center a short distance from the center of the Earth. He realized that planets were nearer to earth than the fixed stars.

Ptolemy's model had influence for some 1400 years because it worked so well. The great importance of it in this book is what it exemplifies: *that an utterly wrong theory can give excellent agreement with experiment*. Indeed Ptolemy's model was preferred by astronomers as a calculational tool even after Kepler had published his heliocentric laws of the movement of planets in elliptical orbits.

1.5 THE CULTURE OF EUROPE: 1100-1600

The preceding simplified account so far given of ideas and paradigms from early Greek sources through the Holy Roman Empire involves some distortion, which should be corrected. It has been written with knowledge available around the year 2000. It has concerned earlier civilization, but as seen through the eyes of what it is appropriate to call one-dimensional man, man restricted by the dominance of Science in forming modern beliefs. Three of these are:

- (1) All happens by the application of certain scientific laws involving *chance* events. There is no directing overall teleological influence.
- (2) To be believed, "facts" must have to do with material objects. Proposing beings of a non-corporeal nature is nonsense.
- (3) Following from (2), death ends the existence of a Being.
These views differ greatly from those which dominated Medieval times, which were:

⁷ This chapter concerns the West. But it is appropriate to notice the great advances in culture made in Islam, particularly from Mohammed's (578-632) time through 1200. In Islam was invented new mathematics and chemistry. The use of paper first occurred in Islamic countries and increased the ease of communication. Buildings, constructed under Islamic influence, were greatly in advance of those in the West. The Crusades began the West's reaction against the Muslim invaders, who eventually took all of Spain and threatened advance into France. They were defeated October 10, 732 AD in the Battle of Tours by Charles Martel (the Hammer).

(1) Man's mind is open and acceptive to an assumed reality of products of the imagination. The Medievals were aware of the possibility of illusions, but they accepted as real a vast number of possibilities (including angels and demons) which Science does not (yet) allow. They lived in a colorful (indeed an enchanted) exciting world.

(2) Immortality, followed by eternal bliss upon the sight of God, or immersion in (however, non-consuming) fire forever, were firm and universal beliefs and had necessarily a strong chastening effect upon behavior.

Attempts to suppress sexuality went to extreme lengths, because sexual acts outside marriage were thought to be extremely sinful. Accounts exist of the violent castration of monks who had had consensual sex with nuns. Women were severely put down by men who complained that they were sexually insatiable and shrewish, - a danger to, and a burden on men (11).

However, it would be wrong to conclude from the fear of the female that life was not colorful in Medieval times. One way out of serfdom was to become a priest. Thus, the clergy were usually ill-educated. In spite of the pessimism and fear associated with contact with women, they themselves married or had concubines. The male progeny of such unions inherited the living. Priests, dressed often in colored garments, sometimes had feasts, even with erotic dancing inside their churches (12).

Thus, the paradigm at 1500, say, was certainly Fear of God as prescribed by the Church; but along with it shimmered the colors of the enchanted world. One thing the Medievals had which has been lost in modern times was: a complete, holistic explanation of everything without doubt or conflict and an unchallenged, stable social order, in which everyone knew his place and was not conscious of any idea that could or should ever be changed.

1.6 THE BIRTH OF THE MODERN WORLD

The multicolored, enchanted world of Medieval times faded and this fading was based upon the realizations arising from the discoveries of a number of persons, the essence of whose contributions shall be briefly outlined.

Perhaps the most remarkable of all (because of their early time) were the contributions of **Roger Bacon** (1220-1292). A Franciscan monk, he lived long before the main onslaught of astronomical discoveries upon the enchanted, world, in fact, his suggestions can be considered as a starburst in the (rational) darkness (13). However, his contributions were little felt for they differed so much from the Medieval paradigm. Thus, Roger Bacon stressed experiments. This was a new idea altogether, one which his contemporaries would have denigrated. The view of the time was that the universe was clear and fixed, the need for investigation and innovation was negligible. Roger Bacon traveled widely.⁸ Philosophically, Bacon was an Aristotelian. In spite of his advocacy of experiment, he was more a talker than a doer and the experiments he carried out were mainly alchemical. Among the more remarkable predictions he made were that boats would travel under water and that carriages would move without horses. Finally, his

Franciscan Order had had enough of Roger Bacon and his disturbing suggestions: they had him arrested and imprisoned.

Copernicus (1473-1543). This Polish astronomer was the originator of the most important of the changes which brought the Medieval world to an end, for it was he who first proposed that the daily appearance and disappearance of the Sun was due not to the Sun's movement but to that of the Earth (a stunning anti-observational suggestion). In addition to the daily rotation, he suggested a yearly circling of the Sun by the Earth. *These very remarkable ideas are at the bottom of the concepts on which the modern world is based* (14). They may be considered among the greatest of all original suggestions, because they were so inconsistent with the daily observation of the Sun's "movement" and because they were the first and the greatest of the blows which eventually fell upon the authority of the church. For if such a great change in paradigm came not from the Pope and the prelates but from a mere astronomer, it gave much cause to wonder and stimulated some to think.

Copernicus' suggestion was made on the basis of few measurements (the telescope was not yet invented). He wisely restricted his thesis (1511) to private circulation. It was not published until 1540, and by 1543 he was safely dead.

Before Copernicus, the world was fixed, covered by a blue dome, on which sparkled at night many lights. A lantern-like Moon swung helpfully across the night sky, month in, month out, giving the needed light. The first objection to the heliocentric ideas was that no movement was felt. If the Earth turned over at night, it was asked incredulously why its inhabitants did not fall off? Further, the proposition that the Earth was round mitigated against what everyone could see: it was flat. But above all, the Sun could be seen by all to rise each morning, - and then to move across the sky.

The proposition of heliocentrism was much more difficult to believe than any of the other disturbing ideas which eventually followed it (e.g., that unseen, minute "insects" (bacteria), not demons, caused much disease; or that one is not normally aware of much of the content of one's mind).

Not only was Copernicus' suggestion massively neglectful of common sense based on daily experience, but it fell upon an ignorant people who, had they been educated, would have learned, in Latin, about the work of saints, or about kings and armies and who were all thoroughly convinced of the authority and truth bearing doctrine of the Roman Catholic Church.

Francis Bacon (1561-1626). Seen in the light of history, Francis Bacon's contributions to the new order were less original than those of Roger Bacon (whose contributions were made in deeply Medieval times). However, he wrote a work of great historical importance called *Novum Organum* and in it, a number of remarkable predictions of future technology, including flying machines, were described. Francis Bacon also laid great stress upon concepts which can now be seen to give basis to the scientific method. It should involve experiments to test ideas proposed (15). Although earlier suggested by Roger Bacon (a monk), Francis Bacon's position as Baron Verulam

⁸ Travel, in Medieval times, was difficult and slow. But it is remarkable that some whose records have come to us traveled widely (e.g., London to Rome). Sea journeys had been common in Roman times. Land journeys when undertaken, could only be on foot or on horse.

(and Chancellor of England) gave his suggestions much greater weight than those of his predecessor.⁹

Galileo (1564-1642). Galileo shares with Bacon, Kepler and Newton, the greatest fame among those who founded Science as it is understood today.¹⁰ He was a mathematician and physicist and dealt, for example, in questions such as where is the location of the center of gravity of a body. Galileo certainly introduced the telescope, and there comes down to us the story of what happened when he invited cardinals in the Church to look through his telescope at the surface of the Moon, seeing that it was indeed irregular, containing mountains, etc. The prelates refused to look because, in their Ptolemaic philosophy, the Moon was "perfect" and "the queen of heaven."

Galileo is sometimes credited with dropping weights of various magnitudes from the leaning tower of Pisa, to show they all reached the ground at the same time (16). According to Aristotelian ideas, the heaviest ones would fall the fastest. Had it really happened, this would have been a triumph of experiment over theory. However, modern historical research finds no evidence that Galileo ever performed this experiment. It would have probably failed anyway, because air resistance might well have hindered the fall of the lighter body.

Why is Galileo so famous? It is because he openly supported the Copernican theory of the Earth's rotation. Copernicus had lived in far off Poland and even after he published his work, its influence was not widely felt. Galileo lived in Italy, near to the seat of power in the West: the Church. When he supported Copernicus, it became a very serious matter. After much discussion with the Pope, who was a friend, - he was forced to remain under house arrest for the last eight years of his life, during which time he became blind (17).

Kepler (1571-1630). The German astronomer, Kepler, followed up and greatly developed the Copernican view of planets moving around the Sun. He had succeeded Tycho Brahe¹¹ and on the basis of his observations, deduced that the orbits of the planets were elliptical (18). He discovered the mathematical laws for planetary movement (later deduced theoretically by Newton). He augmented the 772 stars discovered by Brahe and catalogued 1005 heavenly bodies.

⁹ The Bacon family is an example of the strength of genes in inheritance. It contained many remarkable men, not the least of whom was a descendent of Francis Bacon, Tom Bacon, who in the 1950's, made seminal contributions to the development of fuel cells, - being the first (in 1959) to demonstrate a practical 5 kW hydrogen fueled fuel cell which could power a tractor.

¹⁰ There were Greek savants, who speculated about many of the subjects later investigated by scientists. However, Greek science was always speculative and the concept of doing experiments to test out and decide between ideas, was not yet in sight.

¹¹ Tycho Brahe was an astronomer, remarkable for his original work on the stars. He recognized 772 but worked also on the behavior of the planets. This would be remarkable enough but it was done before the availability of telescopes.

Newton (1643-1727). It is often said that Isaac Newton of Cambridge University in England was the greatest scientist of all times, including the originators of quantum and relativity theories. The reasoning for this classification is based upon the content of his major work, called *The Principia* which contained the foundation of the inverse square law for gravitational forces and its application to the motion of the planets. He found that the assumption of this law made it possible to deduce theoretically Kepler's empirical laws concerning the elliptical orbits of the planets around the Sun. The book contained three laws of motion in mechanics (Newton's Laws) which laid the foundation of classical mechanics. Newtonian mechanics lasted unchallenged for some 400 years. It is often said to have been *displaced* by Relativistic mechanics (also by Quantum Mechanics) but *in practice*, the relativistic calculations show differences from those of Newton only for bodies (if any) traveling at velocities significant in comparison to that of light.

Newton worked on other parts of natural phenomena known at the time, and in particular on the nature of light, which he saw in terms of a stream of particles, a forerunner of the later recognized photon. He invented the Calculus (a discovery shared with Leibniz) and was the first to use logarithms in calculations. Much less well known is Newton's work in alchemy (19). He was religious in orientation (as were all men of his time) and was correspondingly interested in occult phenomena. He stood in the woods, having surrounded himself with a circle, and attempted to conjure spirits and, in particular, the Devil (20). He made a commentary on the book of Daniel, a work which he prized more than his *Principia*.

Newton's contributions to science were recognized in his time and he became an almost royal figure, traveling in London in open carriages and gently waving in the fashion of royalty to the crowd assembled to witness his passage.

There is evidence of a darker side to Newton's character. His struggle with Leibniz about the origin of the Calculus was carried on in a polemical style which attempted to cast aspersions on the character of his opponent rather than stress the facts of the controversy. The laudatory documents about him, archived in the Royal Society, - were in fact written by its President, Newton! Be this as it may, there is no doubt that Newton was a very great and historically important man. His invention of the basis of theoretical physics in *The Principia* can justifiably be seen as the most influential single document in science and acted as a firm basis for its growth.

Leibniz (1646-1710). Leibniz was a German mathematician and philosopher. The calculus was independently discovered by him as well as by Newton. He sought to bring the new thoughts which were emerging in his time into an Aristotelian framework. He was eager to reduce everything to numbers and in this sense became a forerunner of digital computing. He put forward a crude, mechanical, calculating machine in 1673 and invented a number of mechanical devices.

Leibniz's name is best known, however, for his philosophical contribution of "the Monad." The Universe is composed of a hierarchy of Monads, each of which reflects the universe to a different degree, within a harmonious whole created by God (21). Could such ideas be seen vaguely as forerunners of Bohm's concepts of the function of the hologram in portraying the whole planet in tiny sections of a medium?

Leibniz was a most brilliant and outstanding man. However, the effect of his work on the subsequent paradigm has been small compared with that of Newton.

1.7 OTHER FOUNDATION STONES OF THE PRESENT PARADIGM

The present age is clearly one in which Science, and the development of engineering rationalized by it, dominates the intellectual scene. The result of this is that the life led by some one-third of the world's population is marvelous beyond the imagination of those who lived only 200 years ago. We have seen when modern science, - science, based on experiments, - was born. However, such ideas as a rotating Earth and an inverse square law of the force between the Sun and its planets remained the property of a minuscule fraction of the world's population and the change of mind (to the Present Paradigm) did not come to be among those in the cities who had some education, until the nineteenth century. By the end of that century, a number of hammer blows had descended on the enchanted world remaining over in an emasculated form from Medieval times. Who were these contributors to the Paradigm in which we now believe?

Columbus (1451-1506). Columbus (cf. The publication of Copernicus' work, 1540) was a supreme adventurer and explorer who regarded a sea passage westwards to the riches of the orient as the High Frontier of the time. He finally persuaded the King and Queen of Spain to fund his three ship expedition (22). After several weeks sailing westwards towards India, they finally made land on what we would call an island in the Caribbean but thought they had succeeded in reaching India (Hence "Red Indians" for native Americans).

Columbus returned, triumphant, bringing with him gold and the first Americans to visit Europe. His enthusiasm did not survive through three more voyages (the last one without royal support) and he had finally to admit that an error of magnitude had been made. On the other hand, the truth was far greater than the provision of an easy sea route for the spices of the Orient. The work of other explorers (in particular Magellan, whose expedition succeeded in circumnavigating the world for the first time) (23) finally established the extent of the discovery triggered by Columbus: a vast continent, unknown to the Medievals, existed westward between Europe and China!

This discovery¹² delivered a heavy blow to the Church and to its theology which had been rationalized 300 years earlier by the Aristotelian, Aquinas. The basis of the confident concepts of the Medievals was that they *knew* the truth. God and his angels had told it to the Church and it existed in the Holy Books. But this knowledge contained nothing about a huge chunk of the world, bigger than Europe itself, which had been hidden all this time from the West. Why was this not known to the Church?

¹² Although Columbus is still celebrated as "the discoverer of America," it has been securely known for more than a century that Leif Erickson and other Scandinavian explorers had reached North America (probably Nova Scotia) in the 11th century and, indeed, there are signs of a Scandinavian settlement in Minnesota. There is also some evidence that other explorers, from both East and West, landed on the American continent before Columbus. In spite of these forerunners, there is merit in Columbus' position as the (unintended) discoverer of the American Continent because it was he who brought this devastating piece of new knowledge to Europe and power. His discovery also began the great period of European exploration and conquest.

Descartes (1596-1650). This French mathematician and philosopher struggled to make a synthesis of knowledge in the troubling times when the Medieval world was beginning to doubt itself. He left his native land to work in Holland, striving to be *scientific*, to eschew BELIEF unsubstantiated by evidence, which now seemed precarious (24). He concluded that all propositions of which he was conscious were uncertain, - except the one. He was sure that he *thought*, and he became famous for this first published recognition of Consciousness. Descartes strove to give an account of a philosophy, not inconsistent with, that of Aristotle, and he suggested a most important idea, still very much with us, namely, Dualism. His theory was that the body constituted, indeed, a machine but it was inhabited by a Mind (Consciousness, Soul?) - in which lay the power of the individual, his will, his intentions, etc.

Descartes' suggestions were consistent both with those of the oncoming Science (the body as a machine) but they were also not inconsistent with the Church's teachings: for "Mind" could be changed to the immaterial "Soul", and all was well.

Faraday (1791-1867). This Englishman was a bookbinder by trade but became apprenticed to Humphrey Davy who was President of the Royal Society in London. While in this position, he taught himself Physics and Chemistry. He proved to be a supreme experimenter. Based on this prowess, he was chosen to succeed Davy. Hanging in the corridor which led to Faraday's office was a notice: "Work, Finish, Publish."

Among Faraday's many discoveries was that moving a magnet near to a wire produced an electric current therein (and vice versa), and it was this discovery which led him to make the first Electric Motor (25).

He discovered that sending an electric current between two metal plates inserted in an ionic solution led to metals dissolved in the solution being deposited on one of the plates dipping into the solution, the amount being proportional to the quantity of current passed. This discovery not only led to electroplating, but became much later a support for ideas about electricity being composed of a number of particles, - electrons. The formal discovery of the electron was made at Cambridge University by Sir J. J. Thompson in 1897.

However, Faraday's discovery of electromagnetic induction had a much greater impact in a more telling area. He was the first to recognize the something which he called a "field." It had long been known that magnetic materials attracted certain substances. Faraday focused upon the fact that something invisible must emanate from the magnet for this to be possible. This not-understood something (the constituents of "the field") he described phenomenologically in terms of "lines of force". The idea was a new one though it could be compared with that of Newton who maintained that, - somehow, - an invisible force of attraction existed between bodies. Faraday's idea of an "invisible something" coming out of magnets led to concepts in electricity and magnetism; and, - through the development of such ideas by Maxwell and Hertz, - to the present model for electromagnetic radiation, and thus to the radio and TV, all of them associated with invisible somethings which, on the other hand, could be a carrier of information.

It has been said that Newton's *The Principia* was the basis of Modern Science. Was not Faraday's experiment leading to electromagnetism the most people-significant experiment of all time?

Darwin (1809-1882). The five year voyage of *The Beagle*, the ship in which Darwin served as the naturalist, led to his observation of the different forms of animals in the various geographical areas visited by the ship. Returning to England, he developed the ideas to which these observations had led, gradually and cautiously, because he was, with great trepidation, coming to concepts which would not be well received by the still very powerful Church (26). However, he was flushed out into the open when he received a manuscript written by a younger man, - Wallace, - containing the same conclusions to which he had come. In fact, the famous phrase: "The survival of the fittest" was coined by Wallace (27) and not by Darwin. Wallace and Darwin first presented their similar ideas at the same meeting. All have heard of Darwin but few of Wallace, who can be said to have had the priority by a hair's breadth.¹³

The Wallace-Darwin concepts, - that the present set of species on the Earth have been built up to the existing forms under the hammer of environmental assaults, is very much a part of the present paradigm, but in a new form. "Neo-Darwinism," is a modern version of the original. Now, cosmic rays (or chemicals) interfere with the genes in the DNA and cause mutations. A tiny fraction of these changes lead to improved modifications and the new form survives better, - has more offspring, - and, soon, a new form (eventually new species, such as bird from a fish), - is thus developed (See Chapter 3).

The Wallace-Darwin theory of evolution had, to Darwin's dismay, a very poor reception by the Church. Man was no longer created by God but, - of all the impossible (and undignified) thoughts, - had developed as an improved form of an animal! But this was entirely contrary to a central dogma of the Church, - that man was *created* by God in His image.

The Teaching of the Church had received a mighty blow from the discovery of Copernicus (the Earth no longer the center of the Universe). But this had not had much effect upon the prevalence of Believers, because few accepted it. (It seemed ridiculous to suggest that one was tossed upside down every night). However, suggesting that human beings, with their unique and external souls, were not directly created by God was near to blasphemy. Public battles and debates roared away. Professors of Science (e.g., Huxley) v. Bishops (e.g., Wilberforce), went at it, point by point.

Darwin published *The Origin of Species* in 1859. A century later, very few educated people could be found who did not believe the basic ideas contained therein. Indeed, by the 1990's, mention of the idea that God created men and women was banned in some American schools (28).

Flaubert (1821-1880). This French novelist is quoted here less because his work contributed to the creation of the modern paradigm but more because in his most well known work, - *Madame Bovary*, - he encapsulates the Zeitgeist of the mid nineteenth century. The antiheroine Madame Bovary enters into an affair with a scientist who

¹³ However, the dominance of Darwin's name (and the eclipse of Wallace's) is justified for Wallace later withdrew his theory on the ground that while he continued to maintain that environmental conditions favored a certain form in a species more than another, he could not see that such a mechanism could lead to the creation of complex organs, e.g., eye or brain (See Chapter 3).

proved to be totally cold and scientific, without love. Love? For Madame Bovary's man, love is sex. When Madame Bovary realizes the character of her lover, she kills herself (29).

Nietzsche (1844-1900). Nietzsche was the first known example of a type of person who received a descriptive name in England in the 1950's, - the ANGRY MAN. Although German by birth, he chose to be a Swiss citizen and taught Classics in Basel. His health was poor and he retired early. All the work for which he is so well known was done after his retirement from teaching (30).

He turned out to be a furious critic of the ethics of the time - and of Christianity. He was an admirer of the great German composer Richard Wagner, whose dramatic operas idolized great and powerful men and women. Among those of his works which presents his ideas most strongly is "Beyond Good and Evil," published in 1886 (31). Here, he inveighed against the hypocrisy of Christianity and its debilitating effect it had on MAN whose natural aggressiveness was thwarted by the peace-preaching Christ. For Nietzsche, the direction of development was to reject utterly all the nonsense taught by the Christian churches which now stood, revealed as fallible by the tremendous error of geocentrism; and their inability to face the depressing truth revealed by Darwin.

Then, Nietzsche coined a phrase which one might say epitomizes all that had gone into the destruction of the enchanted life: GOD IS DEAD.¹⁴

Nietzsche was not only destructive. He concluded that man was entirely alone and must face that fact (Existentialism). Mankind would need 200 years to recover from the end of its childhood. It would have to develop supermen, - people strong enough to stand life without God and forge forward to a New Future. The Nietzschean doctrine lay at the basis of National Socialism. It can be heard in the speeches of Adolf Hitler, and read in Mein Kampf. Those who know Wagner's music and the stories of his operas will well appreciate how it matches Nietzsche's concepts, - and they are majestic. However, their implementation in Naziism led to catastrophe on a grand scale.

Freud (1856-1939). Freud began as an Austrian neurologist and worked, - successively, - with two of the most outstanding neurologists of the late 19th century. However, he sought new methods to cure patients, - in particular, "hysterics" (people who could not be classed as psychotics but who had to struggle to deal with every day reality). Freud discovered a method which led to successful cures. The patient told his or her doctor all that entered thier mind as one thought led (usually, it seemed, without sense) to another ("Free Association") (32). This led to the technique of psycho-analysis, and one of the ideas which early resulted from it was that some diseases of the adult mind originated in painful experiences in childhood, which the patient unconsciously forgets ("represses"). Recalling these experiences, connecting them *with feeling* to the parent surrogate, - the analyst, - was found to lead to a cure.

Freud's work led to a change in the treatment in the West of neurotics. For 30-40 years after WWII, the method was prominent, particularly in the US. However, the

¹⁴ One might see some significance in the fact that Nietzsche had to be led away to an asylum for a time in 1848. His writings were made after he recovered from his descent into insanity and are the logical conclusions of the 19th century view of Science.

cure took too long (4 years was usual, some analyzed remained attached to their analysts for far longer) and was therefore too expensive and time-consuming. It was succeeded by a dozen different short term psychiatric methods and in particular by psycho-active drugs (which led to the cruel release of sedated patients in mental institutions onto the streets).

Although psychoanalysis is impractical as a therapeutic method, Freud's work led to the introduction of a number of concepts, the knowledge of which has become a part of the every day currency of the West. The most important is "the Unconscious," the idea that within us, the mind is iceberg-like, the rational, conscious part floating on top of a boiling caldron of unrealized instinctual drives, most of them irrational and unacceptable to civilized communities.

Freud developed a theory which divided the "instincts" into two types. In the one (Eros) are all the life giving instincts, the sexual, the creative. In the other (Thanatos) were the death oriented instincts, - the drive to be the first, - destroy rivals, etc. These instincts led to drives ("the sex drive") which (though unconsciously) greatly influence our lives. The correct degree of suppression of these drives underlies the formation of civilizations. Too great (and unconscious) a suppression ("repression"), however, may lead to unhappiness, illness, and in extreme cases, breakdown.

Such ideas are of great importance to the present paradigm of the West. If I am driven by these unrealized drives, which must not be too much suppressed, then, maybe, slaughtering a person who stands in my way could not only be useful but indeed healthful for me. If sex drives are a legitimate part of life, perhaps one may have particularly strong ones (how does one know?). Perhaps these cannot be "discharged" fully (hence healthfully) in the family with a single person.

The acceptance of Freud's discoveries has followed Copernicus' heliocentrism and Darwin's theory of Evolution in further reducing man's self image. His wish to rise high, to climb mountains, was seen to be no more than a repressed wish of the young child for mother's breasts. The glue which held much of civilization (i.e., the family, the community) together, began to dissolve.

Thus, the realizations from psychoanalytic work added strongly to the effects of Copernicus' and Darwin. Human beings are in the grip of unconscious drives, which it is unhealthful to suppress too strongly.

But in all this there is no hint of the spiritual, of the soul, which Descartes thought could exist along with the machine-like body. The scientific view of man became more and more about his body. Silently, there crept on the West, - and particularly after the 1920's, - a recognition of what Nietzsche had said 25 years before: God is dead and Science is the new Religion of the West.

1.8 THE GROWTH AND TRIUMPHS OF TECHNOLOGY

Some peaks in the foundation and development of Science have been cited. It was firstly in England that these scientific principles led to inventions in engineering advances ("the industrial revolution"), and the change from a rural society to one concentrated in cities where the work was. It is appropriate to mention illustrative examples of the substantial changes which have brought us to where we are.

(1) The first practical, working steam engine (33) came from the need to pump water out of mines and is due to Newcomen, 1712, a time early in the period known as the Enlightenment (18th century).

(2) The stationary steam engine of Newcomen was eventually mounted on wheels and drew carriages on rails in 1804 in Wales. The effect on society of Newcomen's engine had been slight but the beginning of rail transportation had a great effect on society, for it revolutionized mobility. In 1800 people traveled by stage coach. By 1850, railways (and the mobility to which they led), were widespread in England.

(3) Telephone communication (Bell) in 1826 (34).

(4) Anesthetics: Until the introduction of general anesthesia (Morton 1859), patients on whom a surgical operation (particularly, amputations), had to be undertaken, were sedated with alcohol to reduce screaming and held down to reduce writhing. The discovery of general anesthetics revolutionized the possibilities of surgery and thus greatly extended life.

(5) Internal combustion. Some preliminary models of this, the most important of transducers in the 20th century, preceded the first satisfactory design, which was by Otto (1878). Automobiles driven by Otto engines (35) began to be mass produced by Ford (1908). Among the many consequences was the increased size of the cities, - it became possible to have substantial distances between work and home.

(6) Commercial aircraft. A substantial pause arose after the Wright Brothers' first heavier than air flights (1903-1908) (36). The Wrights' great invention was not recognized until the French saw its revolutionary implication. However, an active air war was waged in WWI (1916-1918). Commercial flights began quite slowly around 1920, but transatlantic and even transpacific services were available using "flying boats" in the 1930's. The societal consequences of the development of universal, cheap air transportation are well known. Together with telephones and TV, they led to a global economy.

(7) Commercial availability of radio. This began in the 1920's¹⁵ although Marconi's radio telegraph of 1896 is the origin (37). The availability of radio was widespread in the 1930's. "Radio-location" (later: radar) was also realized in the 1930's and the necessary towers were set up in the UK before hostilities between England and Germany began in September, 1939. The commercial uses of radar after the end of WWII led to greatly increased safety of the developing air transport.

(8) A stable TV picture was firstly demonstrated in 1926 (Baird). However, commercial TV was not widespread until after WWII.

(9) Contraception. Devices to reduce the likelihood of pregnancy have been known for at least 2000 years. They did not become freely available and effective until WWII. The availability on demand of a contraceptive pill for women occurred in the early 1970's and was revolutionary (38). It at last allowed a disconnect between sexual activity and reproduction, a fundamental change for women - women's liberation.

(10) Nuclear fission. In 1937, Hahn and Meitner (39) in Berlin were trying to make new elements of higher atomic weight than uranium. Bombarding uranium with neutrons, however, yielded an element of lower atomic weight, barium, the inert gas

¹⁵ A crude way of tracking ships "by radio" was developed by the British Admiralty in WWI (i.e., before 1918).

krypton and more neutrons than had been used to provoke the reaction. Frisch, in 1939, calculated the energy yield per gram atom as about a million times greater than that of a chemical reaction. The resulting military development is well known. The building of the first nuclear reactor with a steady evolution of heat was supervised by Fermi at the University of Chicago, in 1942.

(11) Computers. Machines to carry out calculations have been described since the 17th century (Leibniz). Extensive, secret, use of a development of these machines was used by the UK and the US to break, respectively, the German and Japanese codes (from transmissions intercepted by radio).¹⁶ The first computer ("ENIAC") showing commercial possibilities and thus the Father of all the vast development which has followed, was developed at the University of Pennsylvania in 1946, but computers were not generally available in university laboratories until the 1960's.

(12) Fuel cells. Although fuel cells were firstly invented in 1839 (Grove), they underwent many delays in development. In 1959 a 5 kW fuel cell was demonstrated by Bacon in Cambridge, UK. It ran on pure hydrogen. Fuel cells were used to provide auxiliary power on space vehicles (1958). In 1997, the Daimler Company announced a major program for mass producing fuel cell-electric motor driven cars by 2004. The hydrogen fuel was to be produced on board by the reforming of methanol to produce hydrogen. A revolution towards clean transportation (no CO₂ emission) and the first practical step towards reduction of the Greenhouse Effect has thus begun¹⁷ (41).

It would be difficult to overstate the extraordinary speed of development between 1800 and particularly after 1900. On the other hand, the corresponding transformation in living standards pertained to only about one-quarter of the world's population.

1.9 THE COMING OF FREEDOM FROM RELIGION IN UNIVERSITIES

Until the middle 19th century, the manifestation of religious belief, e.g., in attendance at religious services, was more devotedly and continuously carried out in universities than among the general public (42). Thus, in some institutions, daily attendance at chapel was expected - three times on Sundays.

The process of the Enlightenment, heliocentrism, evolution, concepts from psychoanalysis, - and above all the advent of life-transforming technologies (railways, telephones, electric lighting), began to make it easy to start disregarding religions, which had contributed nothing to the new realizations, and was uneasy with the raising of living

¹⁶ The UK development at Bletchley in WWII became eventually so efficient that Hitler's orders, sent in code by radio, could be intercepted, the code (changed daily) broken, translated into English, and made available to the British Prime Minister in c. 30 minutes. For most of WWII, unknown to the Germans, - their military plans were known to the British through Bletchley Park and appropriate dispositions made to meet each attack (40).

¹⁷ However, Thomas Bearden, a former Systems Analyst in the US Army, claims (2002) to have invented a device which enables a universally present energy (arising from the surrounding universe) to be tapped, clean and abundant energy for all for ever! His work is taken seriously and the principles regarded as correct.

standards. Thus, the basis of religious doctrines was the revelatory vision, claimed to have been experienced by the fathers of the Christian church, some two thousand years ago. But now, man had shown that he was capable of finding out things for himself. Moreover, these things had relevance to the here and now, - and it could be inferred that continuance down the scientific pathway would produce a cornucopia of life enhancing improvements, - perhaps even an extension of a healthy lifespan.

These very 19th century thoughts (wild optimum about the effects of science) continued to eat away at the strength of religious belief among university graduates. After about 1920, decline of religious practice in the universities increased (42). It began to seem shameful to admit personal belief in the unscientific theory behind religious practices. In fact, for a professor in the sciences, it became necessary to hide any residual tingling one might have of the actuality of a spiritual component to life. (If one still went to Church, one did so furtively in a remote church.) This attitude of rejection of spiritual life extends at present in universities, but occurs outside the sciences, too, e.g., to historians and even students of the Bible, some of whom try to smooth over, e.g., the miracles reported to have been performed by Jesus Christ, reducing them to stories for the pious. Because they are impossible according to the scientific theories of the time, they must be rejected as part of reality.

So, it has become that in universities in the Western world, religion and matters "of the spirit" exist only as intellectual studies within, e.g., anthropology or sociology. It is acceptable to show interest in the strange past and present beliefs of people, be they in the many gods of the Indians, or the monotheism of the Jews. One may study Hinduism, Buddhism, Christianity, Mohammedism and so on. Some degree of interpretation of the fantasies which people used to have can be given, e.g., in Freudian psychoneurotic terms. The study of Religion is the study of Illusions (43), for its basic beliefs involve immaterial entities and none are known to Science. Immortality is impossible because death destroys the brain.

All this goes on in universities today, - and the few who still feel spiritual forces, who are even subject to spiritual experience, - must keep it part of their private life.

However, outside the walls of the temples of knowledge, there is plenty of evidence for what might be called a Religious Instinct, or Drive. The best example is in Communist Russia where the people experienced 70 years of a vigorous government campaign to stamp out religion but who immediately flocked to the churches directly after the Communist Party was itself banished.¹⁸ Young people, too, in the West, show curiosity for religious systems and spiritual thoughts - although by the sophomore and senior years, in college they learn that open acceptance of revealed religion will have them branded by the fateful word "irrational".

1.10 THE SCIENTIST AS PRIEST

From the earliest recorded times, poor health was treated by "doctors" using a mixture of herbs for simple ailments and psychic means for difficult ones. Thus, shamans could drive the patient to a state of high excitement, eventually to a frenzy, and when both the Shaman and the patient were high, it was claimed that a cure could be effected.

¹⁸ The 70 year existence of this party, can be instructively compared with Stalin's famous question: "And how many divisions has the Pope?" He did not live to find out:

As to knowledge, this was earlier provided by specialists who were called by Western explorers "witch doctors", oracles,¹⁹ or seers.

After AD 300, Western civilization meant that Catholic priests became the main source of moral advice. Thus, salvation from eternal punishment in an after-life for sin became the dominant consideration. In this way, priests held the keys to paradise and the avoidance of unspeakable suffering. Some monks could read and write; knowledge, recorded in rare manuscripts, was available (before 1500) principally in monasteries.

Priests as the source of moral advice were accepted well into the 20th century. They taught the young in Sunday School and daily prayers were said in schools until 1971 when prayer in public schools was forbidden in the US (freedom to pray was reinstated in 1984).

Ideas of sin and love were powerful concepts through the 1950's. However, WWII and the atomic bomb, penicillin and antibiotics, antimalarial insecticides such as DDT, had had a powerful effect in enhancing public esteem for scientists; basic spiritual concepts began to fade in importance in the views of young people. Sin became antisocial behavior, due to disorders of the brain, and could be treated by psychiatrists and neuroscientists. Love, the subject earlier of countless songs, plays, novels, and films faded. It had been analyzed by Freud as the result of unconscious childhood attachments, particularly to the parent of the opposite sex (44). The loosening of sexual controls, which occurred particularly after the mid-sixties (along with the introduction of the contraceptive pill), reduced the strength of the states of loving, and hence the importance associated with the concept.

As to morality, it still exists. In so far as sexual urges cause abuse, civil action can be taken against the perpetrator. However, the trend is now less to punish the miscreant for his deviant behavior, but rather to help him fit in with the values of his community, less by incarceration, but via psychiatry, - and help.

Indeed, in the last years of the 20th century, behavior (e.g., manic-depressive psychosis) was being ascribed to gene-related biochemistry (45), and therefore often manageable by the administration of newly synthesized medicines. Humans are biological machines - and can be modified to perform better. The scientist has taken over from the Priest.

1.11 SAINT EINSTEIN

There is no doubt that the public image of the learned scientist is based upon some photographs taken of Albert Einstein in his sixties. In so far as intellectual members of the public can say anything about why it is that Einstein's name is so much better known than that of his peers, the answer is that "he proved all the others wrong," or "that he changed the world."

As to scientists and physicists above all, a majority agree they do not understand Relativity though most wrongly think Einstein was the first to derive a relation of mass

¹⁹ Oracles in Greece were the main source of knowledge. The Oracle at Delphi was famous for its accuracy. In a test set up by King Croesus, around 500 BC, he undertook an unlikely act (boiling a stew of turtles and steak in a cauldron at a specific time) and sent out ten messengers, each one to a famous oracle in various countries (their task to ask what the king was doing at this set time). The Oracle at Delphi immediately described the unlikely activity.

to energy.²⁰ Another erroneous concept widely accepted is that the (fission) atomic bomb was created on the basis of this equation. Some scientists are embarrassed by not being able to say, explicitly, what Einstein was the first to establish.

Criticisms of Einstein's work on Relativity have been made in depth by some (46) (Chapter 3). However, at present, papers which throw doubt upon the relativistic mechanics which is associated with Einstein or which attacks what is called his theory of gravity, (General Relativity), are by and large rejected by mainstream physics journals. Thus, Einstein's contributions form a strong and protected base to the present paradigm.

Relativistic mechanics was developed by Poincaré before Einstein, the concept of the change of length with speed was suggested by the Irish mathematician Fitzgerald, and put into a mathematical formula by Lorenz. Einstein's proof of $E = mc^2$ was defective, as shown by Planck (47).

There is no doubt that Einstein was a brilliant physicist, who made lasting contributions to the theory of Brownian motion, to the diffusion of ions in solution and to the interpretation of the photoelectric effect for which he received a Nobel Prize. Photographs of the leading physicists of the time of his major activities (the first and second decades of the century) show him sitting in the front row. He had intensive and lively correspondence with many scientists, in particular Bohr, during the evolution of the Quantum Theory (the interpretation of which he never accepted). He wrote a paper with Podolski and Rosen, the examination and development of which has led to one of the more exciting concepts in science at 2000 (though it led away from Einstein's ideas) (48). He introduced an assumption which changed the relativistic mechanics which existed before his contributions and this led to new developments in mechanics (now seen as doubtful, by some) which apply to galaxies in deep space or to super accelerated particles. What is called his theory of gravity is at present widely accepted. Moreover, Einstein was a practical and realistic man who applied for patents, e.g., in refrigeration technology (49).

However, - and that is the point of this section-his contributions did not have the paradigm altering, culture -changing, long-range effects brought about by, e.g., Newton, Darwin, Maxwell, or Freud. He should be compared with Poincaré, Bohr, Born or Heisenberg, great scientists of whom the public has never heard. The status of this single scientist alone as the most outstanding of the century, is a lesson in how public reputations are based less on a rational estimate of the societal value of contributions, but,

²⁰ J. J. Thompson was the first to conclude that there was a relation between mass and energy involving c^2 . Fritz Hasenöhrl published (*Annalen der Physik*, Series 4, 10, 559) a paper a few months before the $E = mc^2$ paper of Einstein which showed that spherical conductor behaves, in the presence of radiant energy, as though it suffered an increase in mass equal to $4/3$ the energy of the electromagnetic field divided by c^2 .

at least in this case, (because while so few comprehend what he did)²¹ because they are sure it must have been wonderful.²²

There is no doubt that the image he created (and the incorrect attribution to him of the invention of nuclear energy) has contributed substantially to the impression within the culture that scientists are the origin of a cornucopia of inventions.

1.12 COMPUTERS AND THE WORLD-WIDE WEB

Leibniz invented a calculating machine in the 17th century. Babbage demonstrated a digital automatic calculating engine in the 18th century. The understanding by the use of computer of the German Enigma machine in WWII and the ability to break the coded message to which it gave rise, had a major influence on the Allies' ability to defeat Nazi Germany, and the power of computers was thus dramatically established. Essential contributions to the development of the computer (50), with extensions towards artificial intelligence, - are due to Turing (1936).²³

Modern computers are based on the digital system. Everything given to a computer is in terms of 0 and 1. The advantage of such a system over analog systems arises by the greater clarity of message transmission. Decision as to whether a signal is 0 or 1 is easier to make than of variations in a wave motion.

A series of digital signals which comes to a central processing unit which passes on the series to the so-called "hard drive", a piece of hardware about half the size of a phonograph record. An arm projects over the rotating disc which contains the information. The arm is able to read 0 and 1 and a circuit consisting of a number of transistors then translates the digital signal back to words which may appear on a screen. Hard drives can store very large amounts of information, e.g., a document of 10,000 pages can easily be stored on a common hard drive.

The use of a computer's hard drive to record information represents a minor use of the computer. But it becomes a revolutionary machine when it is coupled with the world-wide web. It has been possible to cable "telegrams" to most parts of the world for

²¹ The present status of Relativity is discussed in Chapter 3. However, it should be noted here and now that it in no way displaces Newtonian mechanics in every practical case, for its predictions differ from those of Newton only when bodies have been accelerated to velocities comparable with that of light!

²² It is not only the great over-estimation of the effect of Einstein's work on Science which should be moderated. There are some, e.g., C. J. Bjerknes, who have identified a plagiarism in Einstein's work. There is evidence that his most important work ("Special Relativity") was largely his wife's work (Albert Einstein, XTX Inc., Downers Grove, Illinois, 2002). Poincaré wrote most of the mathematics of Special Relativity before Einstein. The transformational mathematics was first written by Voigt. The hypothesis of (apparent?) change of length with speed came first from Lorentz.

²³ Turing was gay. He associated with young men and was not embarrassed to admit his orientation. However, before 1955, homosexuality between males was a crime in England. In the view of the British authorities, Turing might leak state secrets to his companions, at least one of whom was a foreigner. He was arrested and charged. While awaiting trial, he doused an apple in potassium cyanide solution and ate it. His mother continued to insist that he died accidentally.

all of the 20th century (the first transatlantic cable was laid in 1858). However, the computer deals in digitized information exchange. Upon being given a certain formula, e.g., bockris@tca.net, a distant computer can access the computer, the sign of which is the one quoted, and transfer to it an E-mail message. By using corresponding encrypted addresses (uniform report locator or home page address), computers can activate, i.e., gain access to information stored in the Internet service providers which corresponds to the home page desired.

Thus, one may use a personal computer to find a telephone number but at the other end of the scale, one can sit in Texas and read the front page of today's newspaper in Warsaw, Poland; or, gain access to a program which will plot for you the course of the shares of a chosen company; or ask one computer to find the best route for a journey.

However, the Web has far greater resources than those so far mentioned. Its operator can call on Search Engines and these will find information on a stunningly wide breadth of subjects (example: "Forbidding school prayers" in the United States has 2390 entries). The world-wide web is a resource of immense significance. A "world brain" becomes available to any person who can learn the fairly simple rules of computer operation (51).

The desk-top computer is a triumph of electronic engineering. Historically, they came then a century after Hertz's realization of Maxwell's electromagnetic radiation. They lead towards the world envisaged by Bill Gates and others who have commercialized machines originally conceived and devised by Turing and others in England in the 1940's.

At present, most information of interest to scientists is available in books and papers but the library of books will be gradually replaced in the present century by information stored in web sites held at the servers.

It is frequently asked whether computers can (or will be able to) think (Artificial Intelligence). At present action by computers follow instructions written by humans, particularly instructions as how to do calculations, following a certain algorithm (i.e., a set of instructions, - a program).

Computers have a fundamental limitation which bars them from an awareness similar to that of a human being (52). They deal only in information which can be digitized. If one asked a well programmed computer about the history of the United States, it could tell you that the first President was George Washington. One could ask in what city he lived during his presidency and get the right answer. But, then, if one pointed out to the computer that the President must have slept most nights in Washington, - assent, - and put it to the computer that you know his bed was placed against the wall so that, when he lay down, he would firstly lay his left leg in the bed, - yes, - and then ask the computer, finally, where did he put his right leg?, - one would get no answer. The computer would be searching its memory for information it did not have. It would be unable to make the connection which would take place, without effort in every human brain.

1.13 ROBOTS

A brief presentation on computers leads to a few words on robots. Science fiction is credited with being 30-40 years ahead of practically achieved Reality and many descriptions have been given of, e.g., robot servants outfitted to look like butlers, -

dutifully serving the wine at dinner. There seems no doubt that such fantasies may be realizable in the present century, - their acceptability will be economically determined. At 2000, however, there is a way to go before robots, - even on wheels, - can guide themselves round corners, avoid obstacles, etc.

Some writers have suggested that future land battles will be between robotized tanks, - no crew, - on each side. At 2004, achievement of the goal of a well behaving robot tank, able to distinguish an enemy tank, e.g., from a Red Cross ambulance, and shoot accurately at the former is decades distant (though a goal of military research).

In any case, the nature of warfare appears to be undergoing a revolutionary change in which battles on land, sea or air will be something of the past. Spreading harmful disease among crops, exploding suitcase sized bombs in cities, broadcast of radiation of a certain frequency may reduce intelligence among an enemy. These will be more the types of warfare of the near future.

A large part of our society can be transformed, - indeed taken over, - by computer directed machines, programmed by humans.

Teaching at present hardly differs in method from that used in Medieval times. Students have for decades had the possibility of teaching themselves with computers; schools and universities in the present sense of teaching institutions seem unlikely to last through 2050. Purchasing of goods - shopping - can already be done using computers (in France, every household is provided by the government with a computer, programmed for such domestic purposes). One can see that activities now seeming to need human judgment, may be better, - more objectively, - carried out by computers. Thus, one could see a time where a computer system judges the relative merits of prosecution and defense, each presented by a computer (programmed, of course, by human lawyers of each side).

Before these advances become realized, computers must be made much more user-friendly - as easy to operate as a TV set, - say, - and an important part of this is that they must respond to the human voice. These²⁴ seem reasonable goals for the near future.

1.14 THE FUTURE OF WORK

Looking down the 21st century, it is clear that computers and robots will increasingly diminish the need for employment (53). Thus, factory work is almost gone in the USA, the job of the office secretary is being taken over; trains are largely controlled by distant computers; ships navigate themselves by means of satellite-positioning radar; mining is still carried out by men - because it is cheaper than the amortization costs of machines which could take the miner's place. Medical organizations and the criminal justice system are at present fully staffed with humans - but one wonders how long before the need for having people in them will be greatly reduced.

Scientific research might be thought to be an area needing human brains. On the other hand, bench type experiments can, to a great degree, be replaced by computations with a 90% reduction in needed man-power and cost.

²⁴ At 2003 AD one can purchase software which enables one to dictate letters concerning normal subjects to computers which then produce a typed letter. However, technical material is not yet well transcribed.

Discussion of the "end of work" usually concludes that there will still be jobs, at least through the 21st century. This seems true at the very bottom and at the very top. Thus, a cheerful ice cream serving person may for long be an improvement on a serve-yourself ice cream machine, - the question is, will it be cheaper for the selling organization? There is likely to be a human US President and CEO's of companies for the foreseeable future. However, the general picture is clear enough. The economic system will have to be changed and the idea of a right to an income, - at a reasonable level for all citizens, disconnected from the services they perform, - implemented.

The practicality of this depends on the supply of energy, for machines can do the work of production, agriculture, food production, but they all need energy. Future energy is bound to be nuclear in origin, - use of the fossil fuels must be curtailed as soon as is politically and economically possible because of Greenhouse warming and air pollution. What kind of nuclear process, solar, hot fusion, or "cold fusion" will be involved is as yet undecided, largely due to a vast preponderance of funding for hot fusion, control of which to deliver energy for machines has not been achieved after 50 years of research.

Incoming solar or nuclear energy can be converted to electricity or stored in hydrogen and distributed to centers where it fuels fuel cells to produce electricity to operate machines which make food from resources on or over the Earth (CO₂, N₂, H₂O, etc.). They also will have to recycle materials, i.e., collect CO₂ back from the atmosphere and with nitrogen, water and enzymes, recreate food. Any material used up in manufacturing will have to be recovered and recycled. Given sufficient energy and automated (i.e., computer controlled) machines, a human population can operate with more than 90% of the population not having to work. It may be possible to extract energy from the vacuum - a concept still at the theory level but touted by respected scientists (Puthoff, Bearden, 54).

A point for discussion in Chapter 2 is the maximum world population which can be thus supported for the foreseeable future. Calculations show that if renewable resources are to give the energy needed to operate the machines on the planet, the sustainable population may have to be reduced.

1.15 SCIENCE IS THE RELIGION OF THE WEST

Religion involves the Belief in an invisible Super-Power. There is no doubt from what has been reviewed in this chapter - chasing the paradigms over the last 3000 years, - that SCIENCE is looked to, now, - and increasingly for all the past century, - as the invisible entity which people in the technologically advanced West look to as the most likely way to solve problems. After WWII, it has become the ULTIMATE AUTHORITY to which one may appeal.

The reasons for the evocation of this paradigm have been described. Look around! Antibiotics exist to cure most ills; jet aircraft can reach any spot on Earth in less than a day; computers and the world wide web bring information from anywhere in the world on nearly any subject onto your screen.

If any citizen should doubt the supremacy of the scientific way to Knowledge and Realization, she should look to the universities, - the hubs of the intellectual life of every country. There, professors of the humanities pride themselves on their increasingly

scientific approach. Schools of Divinity are changing color - keeping quiet on the subject of legends concerning actions which scientists say are impossible.

The Power of Science is seen far and wide. Two or three more generations and it is reasonable to predict that people will be born and die more than 100 years later, having never had to work. Adam and Eve were cast out of the Paradise of No Work and Plenty, because they disobeyed God. Science is headed towards putting their descendants back there again.

SCIENCE IS THE RELIGION OF THE WEST. It is the invisible entity we really believe in. It will not turn out to be angry or jealous and push us into the fire.

One should believe in the entity which proves itself day by day. Isn't the scientist the only priest one needs?

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CHAPTER 2

THE FUTURE OF THE WEST

2.1 INTRODUCTION

It has been seen in Chapter 1 that SCIENCE, in the modern sense, began quite suddenly in the 17th Century. The time in which homosapiens is thought to have lived is between 0.1 and 1 million years, but very recent publications (outside mainstream studies) suggest a much extended tenure, to 5 (and even 50) million years. If we take 1 M years, and put the total time of existence of the planet (4.5 B years) on a 24 hour clock, homosapiens have been with us for about ½ minutes and Modern Science for around 1/100 of a second!

The beginning of the *technological* changes which have transformed the lives of around one third of the Earth's population were substantially delayed after the discovery of the scientific method in the 17th century. During the first half of the 19th Century, life for most people was still rural and the big changes began in the UK with the spread of railways, between c. 1825 and 1850.

Our present situation, in the early years of the third millennium, is impressive indeed, so long as one restricts consideration to those who live in technologically developed countries. In fact, the previous chapter perhaps underplays the oncoming influence of Science and Technology, for it has said too little of the frightening changes which seem to stand no more than 1-2 generations distant (e.g., the uncertain consequences of genetic engineering).

Thus, our present position has come upon us with astonishing speed. It should not surprise us, then, that, along with it (though given less attention than the good news) are a number of accompanying trends which are less than good. Some of them, too, result from our acceptance of Science as the supreme source of new ideas of "progress". In this chapter, the purpose is to take a sober look at the down side of the Science-based life which is coming upon the Western peoples. The question is: Can our present expectations, - that "Progress" and Science are linked, - be sustained? What are the *costs* of this kind of progress?

2.2 HOW MUCH DO PEOPLE KNOW ABOUT SCIENCE?

Some acquaintance with the curriculum of high school education, at least in the US, would lead us to expect little in the way of knowledge of science among modern Western citizens, albeit "Science is the religion of the West." A recent survey (1) provides results which are sobering. On the good side, 75% of the 2006 persons asked pertinent questions by a National Science Foundation survey of 1996 showed that they knew that the interior of the Earth is hot; and that light travels faster than sound.

However, when it came to the planet, it turned out that less than 50% (one has not been told how many less) realize that the Earth goes round the sun once per year. Correspondingly, only 44% knew that an electron is smaller than an atom.

People do not claim much knowledge of Science either: only 10% felt well informed about it and much less than that had some grasp of leading scientific ideas, such as the laws of thermodynamics; or what the Quantum Theory is about.

Thus, people are caught up in Science, admire it, trust it, and live in the hope that it will yield them yet more material comforts. But few know much about it. Indeed, it has

become for most a religion, - something in which there is much faith and little knowledge. Perhaps, therefore, the paradigm that was cited in Chapter I as that of the West in 2000, should be expressed more accurately. "Science is the Religion of the West" is true in a general sort of way. But religions ask for Faith in their claims so it is *Faith* in Science which is the main philosophical basis of the Western citizen's world view at this time.

2.3 INSUFFICIENT FOOD (2)

The greatest concern in respect to the provision of sufficient food for the future rests upon the needs of Asia and above all on those in China where a startling growth in consumption of food is taking place among those who have used Western technology to form businesses and produce profit. Thus, most Chinese have lived on a cereal diet, but incomes have increased, the number of people demanding meat and dairy products has grown rapidly.

To satisfy these demands, there have to be more cattle, - but more cattle need space and exude more methane, a greenhouse gas. The space they need is not only for the beasts themselves but also for the land needed for the growth of materials with which to feed them.

The increase in food consumption in China between 1991 and 1995 was about 50% so that it seems likely that in the present decade (2000-2010) we are going to see at least a doubling of food demanded from China alone, neglecting the rest of Asia.

At present, there is no technology known whereby we could double food production in ten years for this region.¹

Thus, present trends indicate that in the next 30 years, - it seems inevitable that some of the Southeast Asian population will starve to death, with resource wars developing along the way.

So, the question is, - could there be invented new technology, available and in practice within 10 years, which could lead to a doubling of the productive possibilities of the present area of the planet given over to food growing?

According to R. B. Shapiro (2), the CEO of Monsanto, such a possibility is being researched with positive results. The solution may be found in new Biotechnology using knowledge gained from the DNA analysis of the plants concerned. For example, it is known how to encode a plant so that it will repel harmful insects. Were such a process to be put into practice on a large scale, it would not be necessary anymore to use insecticides, and this would have a large positive effect because, at present, about 90% of the insecticides used are absorbed by the Earth and some carry a toxic character which kills off many organisms necessary to the health of the soil.

2.4 THE DECLINE IN THE AVAILABILITY OF WORK (3)

The decline of the availability of jobs for those in the ghetto has increased so that joblessness among inner city blacks has reached numbers earlier seen only during the Great Depression. The "end of welfare" was supposed to push those on welfare out to get jobs, but where were the jobs for those (most of the recipients of welfare) who had no skills?

¹ It is not only the absence of space for growing more but that of the absence of sufficient transport to bring food from countries where an increase of food production could be made, e.g., in the United States.

An example is the neighborhood of Washington Park near Chicago (3). In the 50's, most adults here held jobs but by 2000, only 1 in 3 worked regularly each week. The result is crime and family dissolution. In 1953, neighborhoods such as that mentioned above had homes, some of them large and prosperous, stores, laundromats, drugstores, hotels, and doctors offices.

In Woodlawn, in the south side of Chicago, there were more than 800 businesses in 1950. Now, there are about 100 (3). The area, once busy with crowded streets now resembles a war zone, with charred stores, vacant lots, broken glass and garbage. What remains are liquor stores and cash checking agencies.

The schools still remaining in such neighborhoods are overcrowded and have poor standards of academic achievement, - and thus diminished ability to train for employment involving technology. Students often conclude that violent crime is the only activity which may give them some money to spend.

The general attitude of those who work to those who do not work is that the latter are lazy and feckless. For the most part, this is an unfair criticism. For what is a single mother to do about a job when she has two children under six years of age? Who will look after them when they are ill? Low paying jobs do not provide health care benefits. If the mother takes a job she must pay for child care, medicines, and the expenses of travel to and from work. It makes more economic sense to stay on welfare as long as she can.

The disappearance of work has had a negative effect upon the stability of families. In areas occupied by African Americans, only about 1/4 of the families have resident husbands. There is little incentive for an African American male to get married and take on the responsibilities of a family of dependents. It is difficult enough for him to find support for himself.

Difficulties arising from the scarcity of good jobs increased during the period of downsizing which seized the country from 1992. Around five millions of men and women who had had well paid jobs and were proud to do them, - were forced out and had to take jobs as waitresses or janitors, - the only ones available. To get better jobs one has to have a specific skill to sell, - and of course, - be computer literate, a skill which had to be learned (where - and for how much?) for most over 40 years of age. The availability of jobs has continued to decrease as the Recession, which commenced in 2001, took hold.

It is reasonable, in this context, to look down the road at a one generation or 30-40 year future. The truth is that there will be a virtual disappearance of jobs which can be done more cheaply by people than by robots. How many secretaries will be needed when a person can turn to his computer and dictate a letter, which the computer will type and send by e-mail (5)? What about the number of medical professionals needed when it is possible for a patient to communicate with a computer, which will ask a graded series of questions and reduce areas of difficulty, thus completing the preliminary work of an examination which will no longer need doctors or nurses. What of the future of laboratory research when so much can be done, e.g., in the design of drugs, by computational procedures needing a small fraction of the number of scientists previously needed for the same job carried out by comparing the efficacy of various alternative drugs in the lab?

It is true that, for the foreseeable future, the software which is needed to be given to the computers, will be written by humans, - and this needs high skill. The picture does not extrapolate to "no jobs," but it does extrapolate to a world in which humans will only be offered jobs which they can do more cheaply than robots. There will be jobs in which the

computer is an unacceptable device for cultural reasons. Who would want to dine in a restaurant in which the choice of wine is made by punching a number on a menu computer attached to their chair?

The present situation in the United States is hierarchical enough in respect to the distribution of financial power, with 38% (4) of the wealth in the hands of 1% of the population, but the present trend suggests (during 2000-2050 at least), that the most populated profession will be that of the scientists, engineers and technicians involved in work to compensate a decline in the environment by building a "green energy" supply which avoids global warming. The need here is urgent because the maximum in the oil energy supply rate is estimated to occur around 2012 (6).

As to the armed forces, they have been organized for a repeat of WWII still using explosives. A radical reorganization is needed, primarily focused on a defense against biowarfare, cyber-warfare, "psi"-warfare and nuclear terrorism, but also organized in small groups for response, which can become effective in any area of the world in twenty-four hours. Much downsizing can also occur, giving rise to the saving of billions in the c. \$40B US military budget which will indeed be needed for the construction of a nonpolluting energy system. Naval forces will be radically reduced in size and consist mainly of large submarines, suitably equipped with electronic means for projected psychological disarray of an enemy.²

It is clear that somewhere along the way towards greatly diminished employment opportunities there will have to be a fundamental re-evaluation in the relation of income to employment. Citizen's Pay, a revolutionary development of social security benefits would be the basis of income for the majority of the population. Those whose work is still needed would then become relatively highly paid. Of course, the practice of executives in companies awarding themselves total annual compensation of more than \$10M must be abolished. What do CEO's do apart from carrying out "deals". Surely, their pay should be limited to ten times the average pay of the company's employees.

Such changes will have radical consequences. The object of university education will become largely cultural, because the majority of people will not be competing for jobs.

Thus, the decline in the availability of jobs is an unavoidable result of the Computer Revolution. However, at 2003, there was little discussion and preparation for the type of society which seems inevitable from present trends.

2.5 THE DECLINE IN PAY IN THE UNITED STATES FROM 1972

Is there a parallelism between economic growth and advances in the basic sciences? The general assumption is that this is so. The US has the greatest investment in basic science and the perceived economic vibrancy of the country is thought to be a result of that investment, - doesn't everything come from new discoveries in science?

This is not the case according to the socially active materials scientist, Rustum Roy, of Penn State University (7). His view is that the support of the *basic sciences* is

overdone in the United States and indeed the practical sciences, for example, environmental engineering, - are more worthy of much greater support.

Roy gives two pieces of evidence to support this case. First of all, he considers the average weekly income in the United States corrected for inflation and goes back to 1967 and up to 1990. The graph is shown in Fig. 2.1.

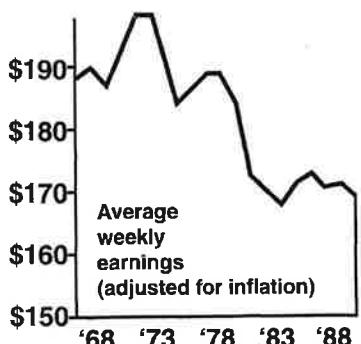


Fig. 2.1. Average weekly wage in the USA as a function of time. Reprinted with permission from *Ceramic Engineering and Science Proceedings*, 12 (1991) 2275-2311.

Thus, the maximum year, in terms of weekly wages, after adjustment for inflation, occurred in 1972, and although there have been ups and downs since then, the tendency has been down (and parallels the increasing participation of women in the work force).

The second piece of evidence which Roy gives is an unexpected one. He takes the rate of growth of economies of the principal countries and plots them against the number of Nobel Prizes a country has won per head of its population. The resulting relation is in Fig. 2.2

Average Annual Real Rate of Growth in GNP (1974-1983)(%)

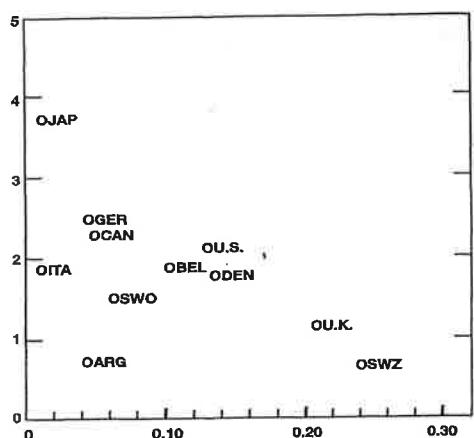


Fig. 2.2. Gross National product per head declining with number of Nobel Prize winners per head. Reprinted with permission from *Ceramic Engineering and Science Proceedings*, 12 (1991) 2275-2311.

Nobel Prize Units in Physics and Chemistry per 1,000,000 Population (1945-1984)

² The use of Extra Low Frequency Transmission tuned to certain critical frequencies to sweep an enemy population with enervating effect on brain structure, and the research and development of methods of subliminal persuasion, will offer jobs to suitably qualified persons.

Thus, there is less support than is usually assumed for the idea that recognized activity in the fundamental sciences causes rapid economic growth.

2.6 CLOSING OF THE STUDENT MIND AS A RESULT OF THE STRESS ON SCIENCE AND ENGINEERING (8)

2.6.1 Students and Culture

In considering the development of students at Western universities during the last 50 years it is necessary to start with a definition of Culture. This concept refers to the beliefs, customs, arts, and institutions of a nation. In the United States, students who enter the university tend to have only weak cultural ties. However, a culture is vital, because without it, there is nothing to defend, and there follows a tendency for minds to be preoccupied with only lower motives.

2.6.2 Music

Music is an important part of culture. If one knows the type of music that a person likes, it is possible to tell much about him or her.

Thus, the uncultured man dances to the sound of crude and wild music. Civilization tames the passions. However, from the early 60's in the West, rock music has been the main musical meal for young people.

Who are the heroes of such music? They have household names. Do such people make good role models for young people? Yet, they are made multi-millionaires by the young people who pay to hear them, thus contributing to the disorientation of the culture of the Society which bore them.

2.6.3 Relationships

The principal relationship which has developed as a result of the scientific culture in the universities after WWII, is each person with the individual herself. "Get in touch with your feelings" is typical advice in this period, particularly after c. 1965. As a result, there is little *national* spirit or feeling. When one asked an individual in the later 60's what they held important, one heard a hesitant answer, - something in monetary terms.³ Most had an aim of retiring early. None with whom I have discussed personal aims (mainly seniors in the university) have mentioned an aim which was above personal self-interest.

Are such ideals an expected accompaniment of democracy? Plato thought that democracy was "mob rule". He thought that it would make life free and sweet, but also disordered and aimless" (8).

The sexual liberation of the sixties changed students. As I was able to witness, from WWII to the mid-60's, students were more intellectually curious, wanted to know and learn. From some time in the later 60's, they began to resemble much more people "after the party". They appeared less interested, less alive, asked less questions, and clearly saw no Enchanted World of sparkling new things, to attract them onwards in their careers. In fact, they were more likely to see a metallic gray world into which they unenthusiastically

³ It may be difficult to believe in the presentw Millennium, but until WWII, the consideration of the income to be obtained in a given profession was not the primary factor in choice. A chief consideration used to be whether one liked the proposed activity and could do well at it.

stumbled. The Business Schools and Engineering courses gave them a career which promised a better car, a larger house, vacations abroad, and?

2.6.4 The Universities

Science has put man up as the triumphant master of Nature. A further change in culture came in the 60's and the effect of what happened in the Humanity Department of US universities was called by Allan Bloom, Professor of Philosophy at the University of Chicago, "like the sacking of Rome by the Barbarians" (8).

Thus, in most universities in the late 60's, there were student revolutions against the status quo. African Americans were featured as victims of the existing system. Thus, at the University of Pennsylvania, an elite Ivy League school, in which from 1953-1972, I was a Professor, white revolutionaries demanded extraordinary measures should be taken to reverse the lot of black people. They should be let into the universities without passing a qualifying entrance examination and given a chance to become as educated as the whites. At Pennsylvania, the Provost gathered the entire Faculty to hear these claims and hinted that it might be necessary for the university to tax professor's salaries to fulfill the revolutionaries "non-negotiable" demands.

However much there might have been a touch of idealism in these demands, mixed with the hostility and feeling of disappointment among the white students for what they saw in the future, the effect on the university by partially complying with the revolutionaries' demands was disastrous. The African Americans let in to the universities were less educated than those students who had reached them from high school by climbing over various academic barriers and there was no question of their being able to take part in science courses. They were therefore led into the humanities and the departments of philosophy because at any rate *some kind* of communication with them could perhaps occur.

The result was that such departments were effectively gutted and two very undesirable results remain over (8).⁴

The first is grade inflation. There had to be something done to keep the new entrants in the universities. If grades had been given according to the standards prevailing before the Student Revolution, the new entrants would have mostly failed and therefore, in order to keep some of them, the grade of F was changed to a just acceptable C, etc.

The second was cultural relativism. This was a movement started in the 60's and which resulted in greatly weakening the "wasp" culture which had led America until WWII. According to Cultural Relativism, there is no particular virtue in any one culture. A preference between African, European, or Hispanic cultures was value-dependent and unjustified, for ideas behind values have no content supported by scientific principles. Correspondingly, there should be no virtue in anybody's "pretending" that he has superior qualities to contribute. (For there is no way to distinguish the value of, e.g., a student of law from one of, say, statistics.)

⁴ The student revolution was terminated with finality when an army group announced through its address system that a field near Kent State University should be cleared of students. After 3 warnings failed to clear the field, the soldiers opened fire upon the students, killing some in a kind of American Tiananmen Square. In a parallel event in San Francisco, a park was cleared of revolutionaries by an Army helicopter which sprayed the occupants with noxious gas. These examples of the Limits of Free Expression in the US are seldom mentioned in discussion of, e.g., Chinese "Suppression of radicals."

Correspondingly, the concept of right and wrong, and particularly that of "sin" dissolved (8). Everything is all right (if legal). It is all a matter of lifestyle, what one likes to do. If one believed that it is undesirable to dress poorly, and one wants money, then one is morally justified in helping the rich share their wealth, even if it is against their will. This may be your lifestyle, this is what you want to do and should therefore do, being careful to escape the clutches of the antiquated and immoral justice system. Or, perhaps you have realized that contracts and agreements are merely legal instruments to keep you down and prevent you from enjoying the fruits of the Society, then it would be acceptable to use violence to break the shackles with which the Establishment had tried to tie you.

These trends, treated as merely "interesting" by social scientists, are culture destroying. So the countries of the Western world face the future in a weakened state because of the wounds made on the university body in the 1960's.⁵

2.6.5 The Way Back from the Enlightenment

Nietzsche (9) and Heidegger (10) both thought that New Knowledge came from Inspiration and Revelation and not from rational thought. John Gray (11) thinks of the revolution in Western thinking based upon rationalism and science as having led to Cultural Disaster. In Gray's view, it has given rise to the modern world, a civilization without values, on its way to self destruction caused directly by resource exhaustion (but indirectly because the Western public sees nothing against hedonism and that involves using up all the resources for one's own pleasure now). The question is whether anything can be done about it, now that the negative consequences have been realized?

The positive vista which Gray sees, is in the East, in Japan, Malaysia, and perhaps in China. There, the pre-Enlightenment concepts exist, they were never extinguished. No country is more modern than Japan, but most Japanese are basically Buddhists and share clear values. Japan is by no means only a materialistic society.

The Enlightenment interrupted the earlier relationship of people with the Earth. Bacon introduced a cult of *measurement*. It destroyed traditions which had been in existence for millennia. It reduced spiritual consciousness for the majority of the people in the West (11). It diluted and pushed out the Greek philosophy which had come down to us through Islam and Aquinas (12).

The quintessence of the Enlightenment in Gray's view is the attempt to give a rational justification for morality, but this simply pits one presupposition against another.

What could be done to attempt to recover from the Enlightenment after several hundred years of going in the wrong direction? The first thing is that the concept that science is the supreme form of knowledge must be replaced by broader concepts which allow weight being given to extra-scientific concepts. Nietzsche said that science would destroy morals, and this seems to have been what has tended to happen as the educational system has become largely science based. The nihilism in values arising from science, according to Nietzsche, to Allan Bloom and to Gray, has been the origin of Catastrophe in the West. It has meant that the Enlightenment led to an exploitation of the Earth for which

the end is now in sight. Spengler's prescient concepts of 1918 (12), - that Rationalism led to the Death of the Culture, - seem to be largely fulfilled.

Will it be possible to make a change in paradigm while the influential West and its materialism is the chief determiner of what is thought? Will it be possible to give up the will to power, the challenge to God in the attempt to master the Earth, and make a start on an attempt to share the Earth with the different cultures which live upon it? However, such aims are opposed by the global market economy which has spread throughout the world and it may well be that we have to face the end of our Civilization in resource wars which are likely to result from the mounting population and its fight for the fading resources.

2.7 HUMAN DOMINATION OF THE EARTH'S ECOSYSTEM

2.7.1 The Ecosystem

As the human population has grown, and the power of technology has expanded, the scope and nature of the resulting effects on the Earth have increased (13). Earlier, the term human dominated ecosystem applied to occasional patches of the Earth, but it now applies to the majority of the Earth's surface.

Figure 2.3 delineates the methods by which the human activity interacts with the Earth and causes changes in it, many of which are substantial. Every ecosystem is affected by the increased atmospheric content of CO₂. Estimates of the fraction of land degraded by human activity fall between 39 and 50 percent (See Fig. 2.4).

Overall, land transformation represents the primary driving force which is causing a loss of the biological diversity. Land transformation causes some 20% of the increase in anthropogenic CO₂ emissions (13).

The oceans are being affected by human activity because most of this is concentrated near the coast (60% within 100 km). Oceans provide only about 8% of what humans need (14); but in some areas, e.g., in the temperate regions of the continental shelf systems, it rises to 35% (15). Some fishing has had to be closed down because of exhaustion of supply. According to Vitousek et al. (13), about 22% of recognized marine fishes have actually already been depleted and 44% were near depletion by 1997.

Algal blossoms in coastal areas suggest that human activity has affected the base of the marine food chain. Such blossoms cause extensive fish death due to the toxins which they produce.

⁵ My daughter teaches 9 year olds in San Francisco. She tells me that teaching them "right and wrong" is not advisable. For who are you to judge?

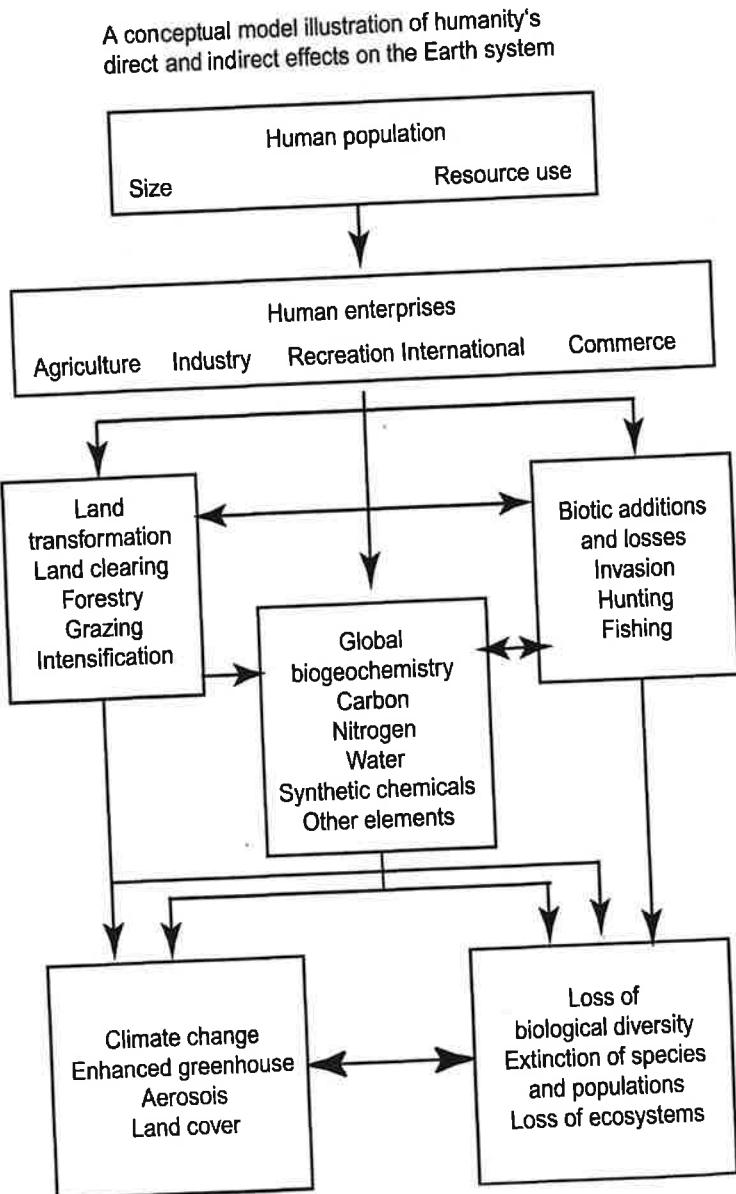


Fig. 2.3. Methods by Which Human Activity Interacts with the Earth. Reprinted with permission from a *Science* (print version) article by T. M. Vitousek, H. A. Mooney, J. Lubchenco and J. M. Melillo, *Science*, 277 (1997) 494. Copyright 1997.

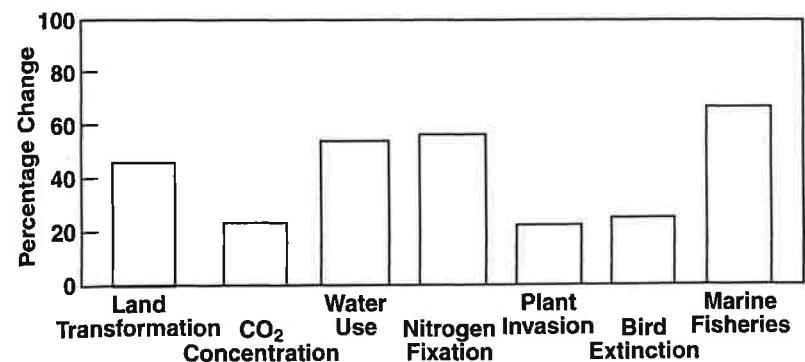


Fig. 2.4. Change in Various Land Degrading Activities between 1900 and 1992. Reprinted with permission from a *Science* (print version) article by T. M. Vitousek, H. A. Mooney, J. Lubchenco and J. M. Melillo, *Science*, 277 (1997) 494. Copyright 1997.

The increase in this century of atmospheric CO₂ represents the best authenticated indication of the alteration of the eco system. Thus, between 1957 and 2000, the increase of CO₂ has been from 315 to 372 ppm. It is possible to estimate the concentration of CO₂ in the atmosphere at much earlier times by analyzing the CO₂ concentration in air bubbles in ice found at various depths in Antarctica and Greenland. Such examinations show that the atmospheric concentration of CO₂ was stable at 280 ppm. The beginning of the increase was visible before 1900, it is exponential now (16, 17) (Fig. 2.5).

It is possible to distinguish the CO₂ increase which has been due to the activity of the inhabitants of the Earth by comparing ¹⁴C and ¹³C analyses. Thus, atmospheric CO₂ with its affects on world temperatures will continue to rise exponentially until the power source in transportation is changed so that it no longer adds CO₂ to the atmosphere. Other sources of CO₂ - much manufacturing, and production of electricity by burning fossil fuels - will have to be replaced by sources (nuclear, solar) which do not involve by-product CO₂ production. The widespread introduction of fuel cells, which at last seems to be happening (2006), will reduce CO₂ emissions because of the greater efficiency in energy conversion compared with those of heat engines. However, the undesirable injection of CO₂ into the atmosphere will cease only when the hydrogen needed for fuel cells no longer comes from sources which contain carbon (i.e., hydrogen from water).

As far as fresh water is concerned, humans use more than half of the run off and about 70% of this goes to agriculture (13). Large rivers such as the Colorado, the Nile and the Ganges, are now used largely for irrigation so that less than half of their river water reaches the sea.

The Carbon Dioxide Spike

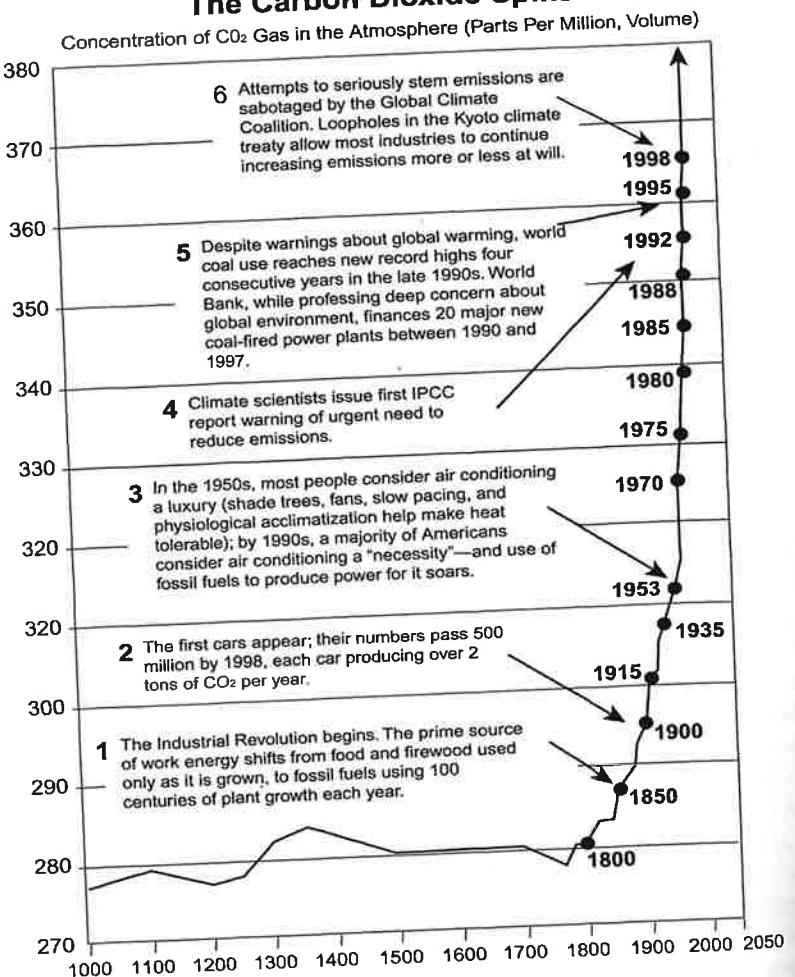


Fig. 2.5. The CO₂ Spike. Reprinted with permission from *God's Last Offer*, by Ed Ayres, published in 1999. April 1, 1999 by Four Walls Eight Windows.

The biotic inhabitants of the ecosystem have been affected by dams which have been increasingly built because they apparently produce clean energy.⁶

Aquifer water is rapidly being used up. As an example, Saudi Arabia obtains about 75% of its water from these sources (18). Nearer to home, the Ogallala aquifer which

⁶ The "apparently" arises from an accounting of the environmental effects of the dam building, and the later effects on the fish which previously used the rivers concerned. Thus, the damming of the Danube River has altered the silica chemistry of the Black Sea (18).

underlies several US states, is being used up at a rate which alarms farmers who depend upon it.

As far as the global cycle of nitrogen is concerned, human activity using fertilizers and fossil fuel production (NO) has interfered with the cycle. Thus, the oxides of nitrogen are powerful greenhouse gases.

Synthetic organic compounds are being produced at the rate of around 1000 new compounds per year and many of these are toxic even in concentrations of 1 part per billion. Polychlorinated biphenyls (earlier used as plasticisers and in paints) have been banned in North America since 1976 (19). They are still detectable in many organisms and will circulate for many decades to come. We do not yet know what the effect of such substances (there are many) upon our health, particularly our mental health, is. However, it is known that a linear decline in the sperm count of males (a halving between 1920 and 2000) is occurring (20). Correspondingly, the DDT molecule is now present in the brains of most mammals.

A typical example of the dilemma met at the interface of what is absolutely necessary versus what is impossible is met in the case of the stability of the oil platforms in the North Sea. There, the economics were calculated on the basis that their lifetime would be - 25 years. However, sea water corrodes the stanchions on which the platforms rest and the interior of the pipes which bring oil from under the sea bed to the surface, - for this oil is mixed with sea water. The 25 year lifetime (hence eventually the cost of producing oil from under the North Sea and Gulf of Mexico) depends upon the use of organic corrosion inhibitors injected into the upcoming oil-sea mix low down in the system. When the mixture reaches the platforms, the sea water (containing much of the corrosion inhibitor) is then cast back into the sea.

The corrosion inhibitors which are successfully used to control corrosion and allow the 25 year life are complex organic compounds, typically imidazalene, a 5 membered heterocycle. Such compounds (most of the known inhibitors) are toxic to the inhabitants of the sea. Although quickly diluted, they build up in the bodies of fish and cause extensive damage to marine life. Such damage has been found unacceptable by the governments of countries bordering the North Sea. If no substitute inhibitors, - non-toxic, - can be synthesized, the banning of the use of the present inhibitors would radically reduce the life of the platforms with consequences for the cost of the oil extracted.⁷

As to what can be done in all these changes, - if they are not halted, they will eventually make man's presence on the Earth difficult to maintain. It is easy to propose programs but whether they can be put into practice depends upon politics and economics.⁸

⁷ Bhardwaj and Lin (21) in work for a consortium of oil companies at Texas A&M University in 1995-1997, used computational means to derive some organic structures which are inhibiting but non-toxic. Their use by the Inhibitor manufacturers depends on the pressure exerted by European governments versus the enhanced cost of their production compared with that of the toxic inhibitors.

⁸ In a collision such as that pictured above for corrosion inhibitors, the usual course of events is that government bans helping the environment are threatened, then, protestations are made politically concerning the effect of the changes upon economics and the negative public reactions, threatening loss of jobs. In some cases, the proposed government ban is then raised.

The first and the most important aim would be to reverse the direction of growth of the still growing human population (5.9B at 2000), for its size is the basic origin of the stresses now being hurled against the planet's surface. The next point is dealing with the CO₂ evolution caused by producing energy from fossil fuels. The third would be to increase the productivity of the farmed land to increase food production. It is, of course, important to maintain the species (about one quarter of all bird species have already been destroyed by human activity) (22). Thus, we have to protect wild species which are being grossly affected by our own domination of the Earth (G. C. Daily, Ed. Nature's Services Island Washington, DC, 1997), for in some cases (e.g., the bees) our food chain depends upon their continued activity.

2.8 PRESSURES UPON TECHNOLOGICAL CIVILIZATIONS DURING THE THIRD MILLENNIUM (23)

Since the Enlightenment among intellectuals in the 18th century, and for the public after the introduction of industry in England in the 19th century, there has been a growing confidence in Reason and Science. It is fair to say that a plot of the Confidence in the Present Paradigm against time would be ever rising for the last 150 years. This is particularly true within the well protected Castles of Science, particularly in North America. confidence in the present paradigm remains strong today.⁹

The two most important publications which represent the core of opinion among the scientific Establishment¹⁰ are the British publication *Nature* and the American publication *Science*. It is, therefore, of significance (23), that on May 8, 1998, *Science* published a paper by James Lovelock (24), a British scientist, associated particularly with the heretical hypothesis that life on Earth (biota in general), have an influence on the constitution of the atmosphere of the planet, on what grows on the land, and the characteristics of the surface water. The actions of the biota are seen as being coordinated in such a sense that they oppose stresses made upon the Earth's environment and thus stabilize it.¹¹

⁹ I held a professorship in the University of Pennsylvania from 1953 to 1972 and in that year moved to an Australian university, on account of the deteriorating position caused by the "student revolution" in American universities. In the first weeks at the new institution, I overhead a student saying what appeared to me to be a shocking and unexpected thing. What she said was: "If Science is any good" Nothing in the previous 20 years of an intense research life in the United States had prepared me for such a statement. By 2000, it would have caused no surprise, except within the university science departments themselves.

¹⁰ They represent the scientific academies of the leading countries, together with professors in senior universities and research institutes. Such persons often refer to "good science" by which they mean the body of scientific opinion among members of the Establishment at the time which is naively assumed to be the final "truth."

¹¹ This is the hypothesis called Gaia, the latter being the goddess of the Earth (24). Thus, during the last 10,000 years, the Earth's temperature has remained essentially constant while the solar intensity has changed by about 10%.

The essence of Lovelock's article is the proposition that there should be an effort toward encapsulating in simple terms the scientific knowledge possessed at this time; and preserving it "on durable paper with long lasting ink." The records would be preserved in places and under protection which will be likely to withstand whatever assaults a forthcoming period of upheaval and chaos would be likely to bring.

Until, say the late 1970's, such a suggestion would have been labeled as preposterous by any scientific publication and unthinkable in authors of the establishment's journals. In 1998, the editors of *Science* thought it worth airing.

The more common view at the Millennium was that the trends of the recent past (development of a global economy, increased environmental management, computerization and robotization) will continue.¹² However, this was not the opinion of Otto Spengler (12), who already in WWI wrote a remarkable book entitled "The Decline of the West". According to Spengler, civilizations have a life time of a few thousand years, and this life goes through clearly defined stages. At first, there is a great religious leader who founds the civilization and introduces a period of intense religious fervor. The civilization grows and spreads with increases of knowledge until it comes to the stage of great cities whereafter in a time of a few hundred years, - collapse occurs.

Toynbee, the eminent British historian, has developed and expanded Spengler's thesis (25). He has applied the hypothesis to seven civilizations of the past. Our own civilization and our paradigm that science is our exclusive source of knowledge, has made us the most powerful civilization in history, but it appears to be an unlikely proposition that we shall avoid the fate which has come to all the other civilizations. Thus, according to Toynbee, all earlier civilizations failed when their growth exceeded the resources available to them.

Thus, the present way of thinking in the West is to see a poor future for the peoples of two thirds of the world who live outside the high technology areas of the West. The people of the developed world, however, are thought to be able to survive, - that is, the system will not fail.

A modern representative of the Spengler and Toynbee concepts is due to Joseph Tainter (26). He notes that our international banking system shores up speculators even if they gobble up billions of dollars of public money (26). Is the NAFTA agreement a positive contribution to the welfare of the world? It has destroyed tens of thousands of jobs in the United States and thrown Mexico into social and economic chaos. Is it reasonable to spend 70% of the vast government research budget on weapon research, when there is no enemy comparable with that offered by Environmental Decay?

The world is finite in area and economic resources. There is little room on Earth in which to continue expansion. Mars is the only conceivable place which we could colonize on a large scale. A manned landing there is still in the further future, and even when we attain a Martian base, it would still take at least a century to provide this planet with an atmosphere. Thus, among pressures which assault the Earth at this time, are the following.

¹² The attack made by shadowy forces in the Middle East upon the USA on September 11, 2001, may jerk this view out of its groove. Because the Muslim populations in the Middle East are poor, it is possible to see the attack as the opening salvo of the first resource wars.

1. The growth of the population, already exceeding the capacity to provide needed food in Africa, with poor prospects of being able to provide the Southeast Asian population with food surfacing during the next 50 years.
2. The salinization of fresh water sources due to their repeated use in irrigation.
3. Acid rain and its effect upon the stability of buildings.
4. The decline in the ozone layer, and the consequent threat of the exposure of increasing fractions of the population to uv radiation with resultant skin cancer.
5. The greenhouse effect and rising world temperatures.
6. The increasing resistance of bacteria and insects to antibiotics and insecticides, respectively.
7. Deforestation, - increasing the greenhouse effect.
8. Soil erosion, and a decrease in the fertility of land.
9. The decline of the fisheries and hence of a major food source.
10. Extinction of many species needed for the fertilization and thus the propagation of crops.¹³ (Fig. 2.6)

All of these assaults upon the Earth arise from man's attempt to use science to master the planet (23).

It might well be possible to master one of these difficulties or two or three. However, the assault of all these together makes a prospect more daunting than any threat from unconventional military forces (27).

2.9 DEVASTATION IS WORLD-WIDE

Mark Hertsgaard has made a remarkable report in his book *Odyssey* which is an unvarnished literal description of how the world is outside the prosperous West (28). He describes the Dinka tribe in Africa and the standard in which they live; a hundred days ahead is all they can think of and their main concern is whether they can get enough food to keep them alive (29). They travel by foot. Water comes from stagnant pools. A stench pervades much of the territory and comes from holes made in the ground which they use as latrines.

Hertsgaard has recently visited Bangkok, Thailand, which he describes as a "largely shanty town, - similar in nature to Nairobi, in Africa." There is viscous gunk everywhere and foul chemical odors catch in one's throat and give a headache within a few minutes.

¹³ We do not yet understand what causes the disappearance of certain species, thus we have in the last decade seen the demise of frogs. Bees pollinate about 80% of our floral growth and should bees disappear, then we will lose a resource which has provided this service for billions of years. Because of the decay of so many species at this time, the disappearance of bees should be listed among possible world-terminating disasters.

The Extinction Spike

Number of Species Eliminated, Worldwide, Per Year

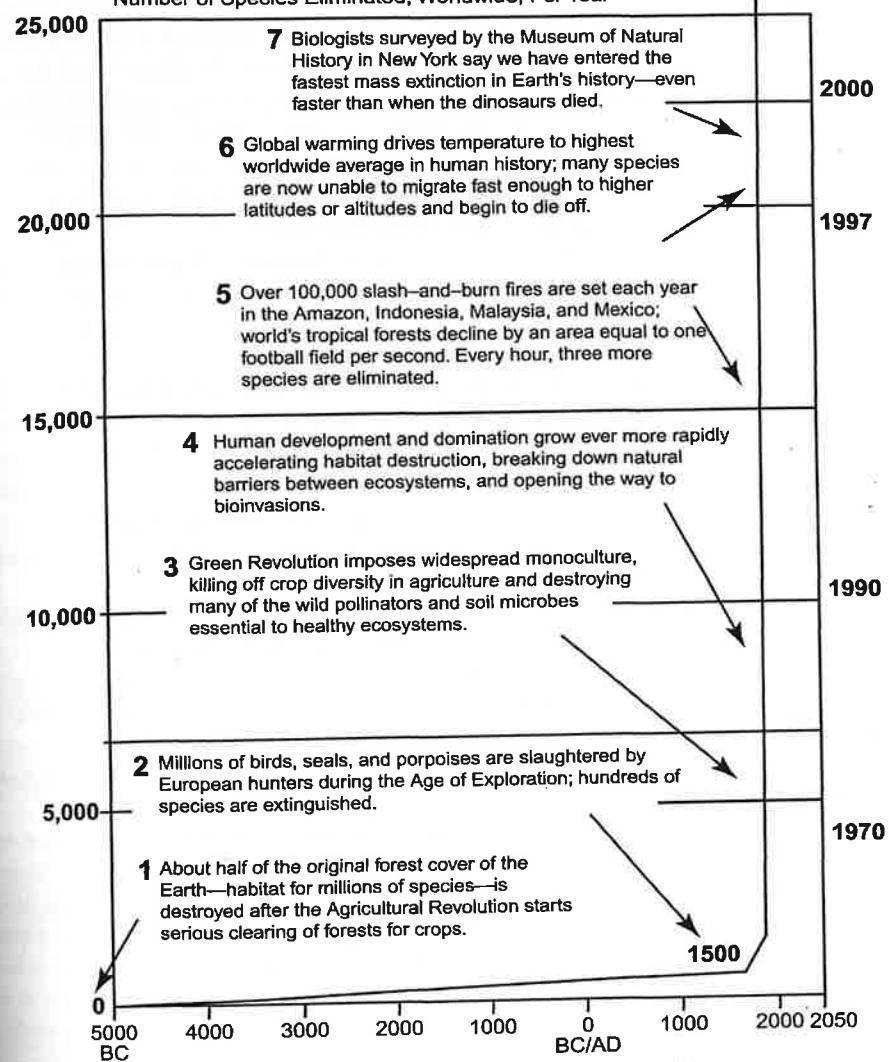


Fig. 2.6. The Extinction of Species. Reprinted with permission from *God's Last Offer*, by Ed Ayers, published April 1, 1999 by Four Walls Eight Windows.

People in Bangkok are devoted to the search for riches, but with it comes the pollution which causes the odors and gives the headache. In parts of Russia it is rather different: the pollution has less to do with chemically caused gunk from production and more to do with lethal pollution from nuclear wastes, and nuclear plant malfunction.

It is in China that one finds the worst situation (30). Nine out of ten of the most polluted towns in the world are in China. This is because the only energy source which the Chinese use is coal. In winter the alternatives are to keep the body warm and suffer the threat of cancer from inhaling the fumes of coal briquettes, or to freeze. Coal has indeed brought China into the industrial era, but it has made Beijing and Shenyang two of the most polluted cities on Earth (28). Correspondingly, China is the greatest producer of the fluorhydrocarbons which destroy the ozone layer (30). This country brings together the largest concentration of population and the greatest degree of poverty, while at the same time, it tries to emulate capitalistic growth by burning coal.

In China there are few stop signs for traffic, few traffic lights, and no concept of the right of way. The town Guang Zhou is thick with litter, plastic bags, cartons, discarded strips of synthetic fiber. The average living space is 7.9 sq meters per person, the most compressed in the world (28).

There is a truly extraordinary difference between the various peoples of the Earth. In an industrially developed country the average resident consumes three times as much fresh water, 10 times as much energy, and 90 times as much aluminum as someone in a developing country. The United States alone contains 5% of the world's population and accounts for 22% of fossil fuel consumption, 24% of carbon dioxide emissions, and 33% of paper and plastic use. A baby born in the US creates 13 times as much pollution as a baby born in Brazil (28).

What is the possibility of sustainable development? It is certainly not by having great world meetings as the Earth Summit Meeting in Brazil in 1992, for virtually nothing has been done to implement the resolutions made there. Indeed, it is clear that it will be difficult to make environmental progress while the ruling economic aim is growth, which goes a decrease in environmental quality, an extreme case of which is that described in China. The environmental situation, on the other hand, implies the need for an immediate limit to growth.

There are at present no laws which are specifically aimed at the growth of environmental quality (31). The US government does not put its subsidies in the direction for environmental protection. For example, an environmental tax upon the use of CO₂ producing carbon to make energy would be a win win situation because the environment would begin to be protected from the greenhouse effect and there would be a considerable increase in job possibilities and industrial development arising from the needs of new technology. Germany has begun this direction making each factory legally responsible for disposal of its wastes.¹⁴

¹⁴ Thus, Hertsgaard describes his experiences in Chong Qing (28). "After walking another 50 yards we encountered a second stream of (pollutant), this one a mere foot wide, but clothed with brassiere clusters, of dried, orange foam the size of pineapples. Up ahead was a third small creek. Its stench identified it as household sewage (workers on China state owned factories generally live on site or nearby), but its most extraordinary feature was its color, - as black as used motor oil. Not ten yards from the creek, a grizzled peasant in a dark blue mao jacket and trousers (an outfit still worn in China by the poor) was bending over tiny vegetable plants to pick some greens for his mid-day meal.

Yet all of this was dwarfed by what lay ahead. It was the vapor we saw first, - a wispy white, it hung low in the air, like tear gas. Stepping closer, we heard the sound of rushing water. Not until

Finally, it appears we must rely on miracles if we are to sustain ourselves. However, it is not entirely hopeless for miracles do happen. Who would, for example, have assumed in the 1980's that Russian Communism was about to be overthrown? That the Apartheid government in South Africa would be replaced peacefully and that the long-term troubles in Northern Ireland would be largely resolved by 2001? These sudden unexpected reversal of trends could, just possibly, change the growing environmental damage which we are so tragically doing to the Earth upon which we depend (29, 32).

2.10 IS A DEGREE OF SOCIAL COLLAPSE OCCURRING?

There is no doubt that the scientific culture which now dominates much of the world is correlated with a large number of social ills. Some of these are shown in the following figures from the work of Fukuyama and concern increase in crime, divorce and teen age pregnancy (33).

The opinion among sociologists is that family values and family structure determine social outcomes. Societal rejection, which had earlier been a consequence of sexual license, has become reduced or is entirely in abeyance. Thus, the popular "Murphy Brown" figure in a television series of 1998 was portrayed approvingly showing herself pregnant, from some partner in whose face she says she had no interest. (Figure 7)

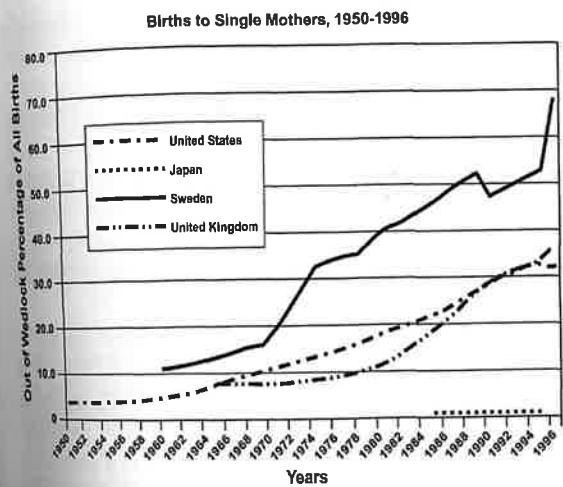


Fig. 2.7. Reprinted with permission from *God's Last Offer*, by Ed Ayers, published April 1, 1999 by Four Walls Eight Windows.

Declines in social quality can be regarded as arising from a decrease in "social capital", i.e., of people in the community who uphold social standards which lead to a smoothly working,

We were mere footsteps away, however, could we see the source of the commotion. A vast, roaring torrent of white, easily 30 yards wide, splashing down the hillside from the rear of the factory, like a waterfall of boiling milk. Again, the scent of chlorine was unmistakable, but this waterfall was much whiter than the first. Decades of unhindered discharge had left the rocks coated with a creamy white residue creating a perversely beautiful white on white effect. Above us, the water fall had bent the trees sideways; below, it split into five channels before pouring into the unfortunate Jialing (river). All this, - and the factory was operating at only 25% capacity."

effective, community. Fukuyama thinks that the decrease of social capital which has been occurring in the United States since the beginning of the 60's, may only change direction if a revival in religious practice occurs (33). (Figure 2.8.)

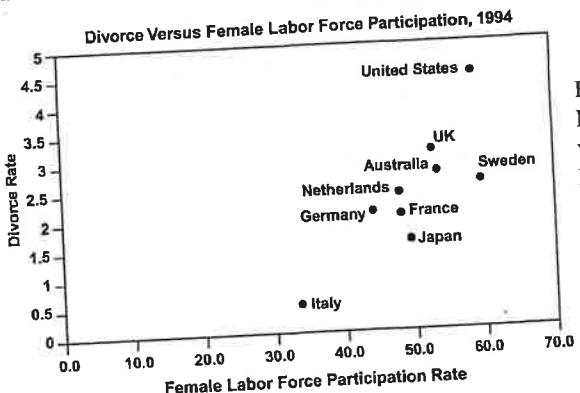


Fig.2.8. Divorce versus Female Labor Force Participation, 1994(33). Reprinted with permission of The Free Press, a Division of Simon & Schuster Adult Publishing Group, from *The Great Disruption: Human Nature and the Reconstitution of Social Order* by Francis Fukuyama,

Thus, in contradiction to the practices of an earlier age, tolerance has become a cardinal virtue. This is a characteristic of the type of society entitled "liberal democracy". Such a type of society, in which people follow their own interests, independently of the constraints of a cultural network, may be successful in the United States, but it is less so e.g., in South America, where the countries in this subcontinent have experienced much political instability. The United States was settled primarily from British culture, which at the time of the early settlers and indeed until the end of the 19th Century, was strongly Protestant (34). Latin America, however, was settled largely from Spain and Portugal, where the culture was largely influenced by the less strict and censorious Roman Catholicism tradition.

A good illustration of the importance of social capital, and the resulting social quality, can be given by citing the difference between northern and southern Italy. It is largely a matter of trust. Thus, in northern Italy, trust extends beyond the family and truth telling, the meeting of obligations, and reciprocity, makes the community function. However, in the extreme South, and above all, in the Mafia society, there is a very strict bond to silence among family members, the breaking of which may result in death to the miscreant. The radius of trust in such societies does not extend "outside the family" and thus, it is difficult to make the community function.

One quantitative measurement of social capital which can be made, are the number of groups which are formed. Thus, as pointed out by Fukuyama (33), sports clubs, choral societies, political groups, etc., are all illustrative of a trend towards social intercourse which extends outside the family.. An important origin of this trust in North America was that from the Puritans who stressed honesty among all members of the community, not only within their own religious group, but among all human beings.

Decline of trust in the United States can be measured by the numbers in parent teacher associations which has declined from 12 million in 1962 to 5 million in 1982 (33).

Correspondingly, since the revelation that the Vietnam conflict was commenced purposely by the US, the trust in public institutions in the United States has declined to an extent such that many Americans regard members of congress as being in office with self interest exceeding the interests of the electors who put them there.

The decrease of social quality which is being seen may be augmented by the dense population of the cities. Thus, it is known in sociological studies (35) that within a community of rats, a peaceful existence occurs among the members until the space available to each animal is reduced to a critical minimum whereupon violence breaks out.

Another force towards a decline in social quality from the 60's may be connected with the fact that the two job family has become the norm whereas before the mid-60's, it was the exception. Clearly, this has a great effect upon the young children because they then fail to obtain the values from mother at an age where Mother's designation of right and wrong, is unquestioningly accepted.

These individual elements of the causes of social disruption may be part of the story, but on the other hand, there have been, from the earliest times in the Enlightenment, critics of its consequences. One of the greatest of these was the Irish philosopher, Edmund Burke, who foretold that an increasing degree of anarchy would be a consequence of the replacement of traditional values which had held before the Enlightenment, with the rational ones which were its consequence.

Correspondingly, it has been pointed out (11) that capitalism, which has dominated most of Western countries since the collapse of Communism, places self interest ahead of obligations to the community and destroys bonds built up among communities leaving nothing but self interest. Social capital is thereby spent, but is not replenished. Thus, if the majority of people wish or feel excited by the portrayal of sex and violence on the national TV, its portrayal will increase the audience and consequently be increasingly funded by the advertisers. However, the children see that heroes are those who make money by whatever means and win by use of a gun.

On the other hand, if one looks back in history, of only a few hundred years, one sees a cycling of this quality. According to Gurr (36), homicide rates in London were three times higher in the 13th century than the 17th and three times higher in the 17th century than the 19th. Again, the homicide rates in the 19th century are twice as high as those in the 1970's. Correspondingly, according to Hofstader (37), in the late 1700's only 10% of Americans went to Church and if one were over the age of 15 one's consumption of alcohol was twice that of the average person in the 20th century. In the early part of the 19th century, it was normal for workers to go to a tavern on the way home from work and stay there until they were drunk and went home. Correspondingly, in terms of pregnancies, among unmarried females, there also have been some degree of cycling for in the 1700's 10% were premarital, but by 1790, it was 30%. The introduction of the factory system had an important impact on this but factory employment did not become widespread until the 19th century.¹⁵

¹⁵ According to the description given by Fukuyama, as recently as 150 years ago in American cities, few people slept in beds alone. They lived surrounded by manure. Broken windows, sagging doors, rotting clapboards were a norm of their existence and infrequently repaired. Men, and some women, chewed tobacco and the resulting spit was everywhere. However, these habits changed in the Victorian era largely because of an increase of the quality of social values. For the Victorians kept a

2.11 SOCIOLOGICAL ATTITUDES TO THREATS OF DECLINE IN THE WEST

The first of such attitudes is a denial of the fact that anything is wrong. This arises because the truth is threatening and unpleasant, so that it becomes more comfortable not to believe it. An example is the aborigines who first saw Captain Cook's ships in a voyage in which he discovered the Australian continent. They were unable to believe that such large ships existed, - for the only vessels they knew were small canoes in which they ventured onto rivers and the sea near shore. Only when they went out in their canoes and actually touched Captain Cook's ships, could they believe that the ships were real.

Take for example, an obvious sign of danger, the CO₂ spike (38, 39, 40) (Fig. 5).

In spite of the compelling nature of the relationship, the media presents the situation that the economy must be first, it cannot be disturbed, for this would cause a decline in profit and then in jobs.¹⁶. Such an attitude is analogous to that of the man who says that he has to drive to his appointment in a distant town so quickly that he cannot stop to fill his car with the necessary gasoline (42).

Some of the attitudes arising from commercial groups are short sighted. One may look at the example of McDonald's, a world-wide organization, which insists upon one type of potato (38). Because of the size of McDonald's demand, the other species are allowed to decay. On the other hand, it is well known that pests can settle upon a given species and destroy it: then, from where else would potatoes be obtained? (43)

Correspondingly, consider the growth in consumption that has expanded with time. Such an extraordinary increase in consumption, is likely to impose an unacceptable burden upon planetary resources. These things are well known to environmentalists but remain untaught at high school or university and are eschewed by the news media.

A corresponding example of short term thinking is the purchase of 15,000 acres of prime farm land in Seoul, Korea, by the Ford Motor Company (45). It is clear that the foreign companies' intentions here are not that of producing food. Correspondingly, the consumption of the Amazon and Russian forests is being carried out entirely for the purposes of profit by commercial organizations whose view ahead is 2-4 years and who feel no responsibility for the damage, - irreversible, - that they are carrying out on the oxygen supply of the peoples of the Earth.

Another daunting aspect of the sociological side concerns the difficulty of obtaining reliable information. The attitude of the press has generally been one of optimism. Even in the *Wall Street Journal*, one can read that global warming is a myth (44)! It is the immediate which is headlined. Long range trends are seldom featured. There is little concern with sustainability, but only with the prospect of the immediate future (45).

The propaganda minister for the Nazi government in Germany in WWII, Joseph Goebels, was probably the first practitioner of the propaganda technique of the Big Lie. Thus, Goebels promoted with great positivity extremely unlikely propositions favourable to his country. This is similar to what was already predicted by Orwell in his novel, 1984.

strong control on young people who were forbidden to indulge in extramarital sex and discouraged from drinking alcohol.

¹⁶ In addition, the general attitude, e.g., in the *Wall Street Journal*, is that the Economy will grow again - with neglect of the threat of Arab attack (41).

called double speak. For example, the Weyerhouse Corporation, is largely concerned with cutting down and pulping our forests, but a slogan it put out is "where the future is growing." Another technique which is used to confuse is calling a subject controversial when it is in reality perfectly clear (38). For example, 2,500 scientists have signed a document which indicates that the economy would boom if it put itself on the track of recovering the environment (46). However, if emissions were reduced, this would be a blow to the present interest of a number of corporations, which may well have influence on the government. So lobbyists are employed to negate legislation which would help to save the environment.

2.12 WAS MALTHUS RIGHT?

Malthus (47) made a fundamental argument concerning the food supply and its exhaustion. He pointed out that the production of food was proportional to the number of people who worked to produce it, a number roughly proportional to the population. However, each man and woman together created, on average, more than two new people and hence the number of mouths would always grow to exceed the number of food producing individuals.

The desolate end result of Malthus' prediction has not yet been reached (48). On the one hand, the population has been often reduced by plagues and now by AIDS, the final result of which is not yet known. But the main change since Malthus' day has been that food production is no longer proportional simply to the number of people who work to plant, sow and reap, but is greatly aided by the activity of machines on the farm.

However, the Malthus prediction in a new form can now be seen (49). This refers to the exhaustion of space which may be used for the growth of food. It might be formulated so: the number of plots on Earth where one can produce food is limited, and each person needs a certain area on the Earth in which his food is being produced. The maximum number of people on the Earth is thus limited by the area for food production (49).

What is this maximum population number? This has been a subject of much discussion in the past, and the range of predictions is 6-8 billion people (50). If one neglects that there has to be space on which to grow food, the number of persons who could occupy the Earth can be predicted to be greater but the numbers then predicted are unrealistic.¹⁷ (Figure 2.9)

The most sophisticated contribution to a quantitative estimate of the time until which the technological civilization of the West can grow was made by Meadows, et al. in 1972 in a famous book (51). Meadows and his colleagues broke new ground in their analysis. There have been works in which the possible growth of one factor with time (e.g., the production of food) had been estimated, but what Meadows and his team did (following work by Forester at MIT (52)), and utilizing the superior computer power which had come in the early 70's, was to calculate the feedback of each factor upon the other (53). Thus, it is obvious if one is going to increase the population, then there is less space for the growth of food (54). Of course, as with all computer calculations, the results depend upon what is fed into the computer, and here again Meadows et al., necessarily made some assumptions

¹⁷ The possibilities of marine culture have not yet been figured into the numbers discussed. It might be possible to grow certain materials *on* the sea.

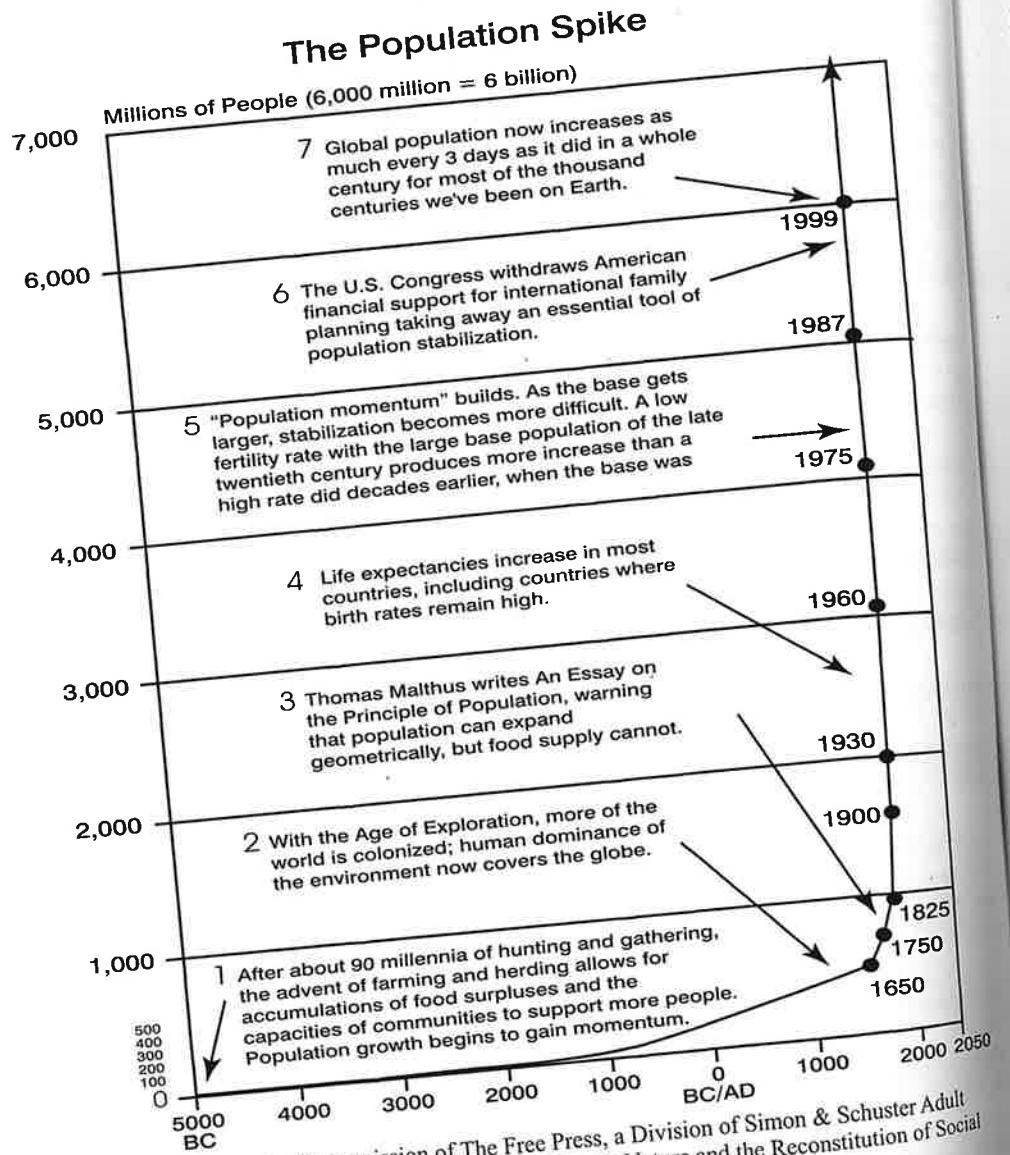


Fig. 2.9 Reprinted with permission of The Free Press, a Division of Simon & Schuster Adult Publishing Group, from *The Great Disruption: Human Nature and the Reconstitution of Social Order* by Francis Fukuyama.

to begin with. One was that the world population would grow no faster than 2% per year (the increase in the 1990's has been 1.6%) and another was that the total amount of a resource present on the Earth was not more than 10 times that which was known to be available in 1972.

The Meadows work was regarded as revolutionary when it was first published in 1972 and it drew a great deal of criticism, particularly, of course, from the corporate world which depends for its being upon the idea that growth can continue indefinitely. Therefore,

many arrows were flung at the Meadows work and there were also more specific criticisms, e.g., that the actual computer programs had not been published (they were indeed published later and some minor revisions in the predictions resulted).

There is no doubt that what becomes clear from the Meadows work is that growth of the GNP in the USA will maximize in the present century. The date, of course, depending upon the assumptions made and several detailed variations of the calculations, have been published (55). However, it is difficult to make reasonable assumptions and still obtain a date past 2075. Of course, all such calculations assume the continuation of *present* trends and if, finally, the democratic system allows remedial action to be taken, the date would be extended. (Figures 2.10 & 2.11)

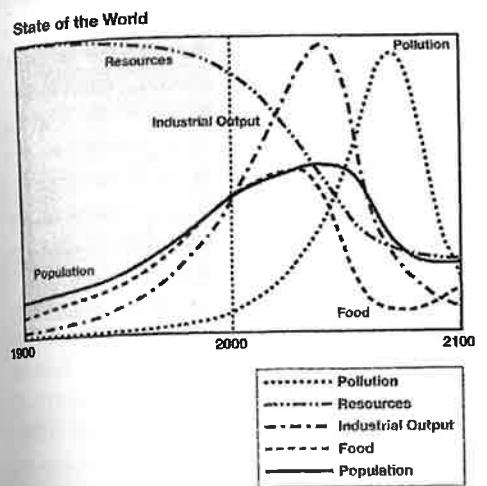


Fig. 2.10. Reprinted with permission from *Beyond the Limits*, Dennis L. Meadows, and Jorgen Randers. Copyright 1992 by Donella H. Meadows, Dennis L. Meadows & Jorgen Randers. Used by permission of Chelsea Green Publishing, Post Mill, Vermont, 1992, p195

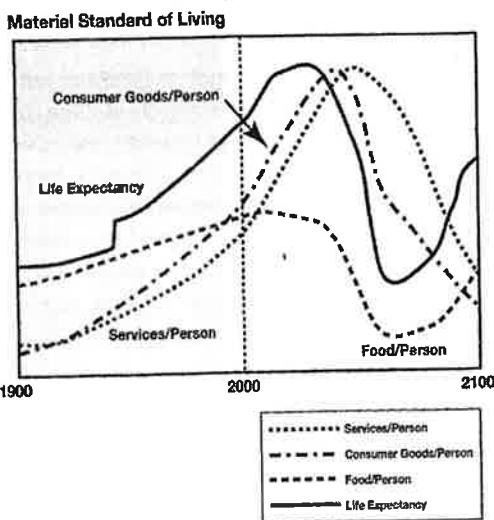


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Because of the criticism and negative reaction which this computer oriented prediction produced, another work was published and this was by Masarovac and Pistel (56). The first impression on reading this second book was that the situation was a bit better, because it did not show the maximum in growth and the following downward trend. However, this seems in retrospect to have been something of a deception for the reason that the advocates was that they did not publish results for the latter part of the century. Thus, Masarovac and Pistel did not shake the basic conclusion from Meadows, but simply tended to decrease anxiety and criticism which publication of the original book had caused.

However, a truly different model was published by economists from Argentina and Brazil (the Bariloche model) (57). Thus, Meadows had shown that growth could not continue beyond the second half of the present century because of the exhaustion of resources, the growth of pollution (associated with the growth of population), and the rise in temperature caused by the use of oil to power machines. The Bariloche model was no longer concentrated on growth but on the support and health of the population, the distribution of income and resources, etc. It gave rise to a better, - i.e., less revolutionary, prediction, but did not have much effect upon views in the Western world because of the intense preoccupation there with the continuation of growth, which will lead, - as Meadows et al., showed, - to an end forced upon it essentially by exhaustion.

It is important to stress that the conclusion to the calculations on growth is qualitatively quite definite. It is that, if present trends continue, a maximum in GNP in the Western world will occur in this third millennium and thereafter descend. The time is arguable, but the freedom to change the result by altering assumptions, - e.g., the growth of the world population will slow down, etc., - is limited in effect, - 2075 may become 2088, etc. In some ways, the Meadows calculations were not needed: there is a limited area in which to grow food; and limited resources. It is obvious that at some population value, and at the corresponding time, further growth will become unsustainable (and certainly undesirable).

Is there the possibility of changing direction in time? For example, in China a serious attempt is being made to limit the birth of children to one child per woman. If a couple produces more than one child, then this child has reduced rights, i.e., she has no right to education, medical benefits, etc. Such draconian population control in China works in the cities where the inspector's control is effective, but it is difficult to apply in rural areas, and that is where most Chinese still live. Thus, a new child produced by a woman can sometimes be switched to a childless person. Further, it is only the Chinese who have applied these controls checked by government agents. India, with its huge population of 800

million people, and Pakistan,¹⁸ Malaysia and Thailand, are all countries in Southeast Asia which do not have population control and where the population is growing rapidly.

Of all the factors with which we are concerned, the most important is the growth of the world population (58). At present, if one assumes that 8 billion is the maximum carrying capacity of the Earth, then this population will be at a 2% growth rate, by ~ 2015 and it is difficult to see that for Southeast Asia anything but grave difficulties in the food supply. The situation will become similar to that in Africa now, where in the central African states, millions of people are already living near a starvation level.

2.13 IS THE GREAT DISRUPTION REVERSIBLE?

2.13.1 Actions Which Could Be Taken

It is interesting to scan the content of the present chapter and bring out a few examples of the actions which would have to be taken to attain a sustainable world (59).

1. Schemes would have to be instituted in law which would ensure that all high school students are taught at least four years of physics, chemistry and biology, respectively, so that the fraction of the population which has some ability to comprehend the environmental situation increases to a politically significant fraction. Correspondingly, courses in environmental science would be required in high school and in universities, not as an elective but as part of the core curriculum for all students, including those in the Humanities.
2. Laws would have to be made to halt the further depletion of nonrenewable resource (55) on the Earth, - or at least to make resource use very tightly controlled and minimized until substitute methods using renewable energies could be instituted. There can be no longer any buying up of precious raw materials to be sold to the highest bidder. In a moral sense such resources belong to everyone on Earth.
3. Measures would have to be taken by means of remedial education and eventually police action to remove from society those whose actions are destroying it. This has begun in California with the permanent incarceration of all those who commit more than two crimes. Such measures are needed to build social capital. Correspondingly, sale of music containing songs which decrease the viability of young people to be healthy citizens within the society, would be declared illegal.

¹⁸ As late as 1986, the present author led an NSF mission to Pakistan, with the aim of producing a report on the advised future Energy Policy of that country. By the second day of the visits to a number of scientific centers, it became clear to the six man US team that, if the growth rate of the population continued, the values it had attained since the creation of the new state in 1947, there was nothing which could be suggested which would be able to supply the country with energy even for the needs it had in 1986, as a developing country. Directly the question of population control was broached, the Pakistani scientists who were our discussion partners informed us that this was off limits as far as discussion was concerned: "Questions of that kind are private matters between a man and his wife" we were told, reverently.

4. Effective measures would be taken to reduce the world population, above all in underdeveloped countries in which the population cannot support itself. The difficulty is the increase in population world wide (60).
5. We should address publicly the now coming era of diminishing employment opportunities and not try to meet it by keeping the unemployment figures down by counting part time jobs of great simplicity as if they counted as equal to the jobs from which so many have been removed. Correspondingly, social security benefits would be increased to provide a living standard corresponding to, say, 75% of the job displaced (up to a maximum of \$100 K/yr)..
6. It should be made unlawful to have tattered and unrepairs buildings. If the owners neglect their buildings past a certain point, they would be required by law to bulldoze them and sell the land for the construction of clean, cheap housing.
7. Courses in philosophy and religion should be part of a core curriculum in the university studies. Students should be encouraged to practice a religion of their choice. According to Fukuyama (33), the revival of religious practice is the most effective method to restore social capital. Students should be exposed to modern scientific evidence which suggests the possibility of the survival of death (Ch. 8).

It may be that some of the measures to be taken will not be possible within the present political system. Few citizens realize our environmental situation. Some of the necessary measures would be vetoed by members of Congress. Let us look at the various needed measures, some of which could be taken within the present system.

There would be few potential difficulties in achieving the first. Number two could not be achieved under the present conditions of democracy because it would give rise to rising prices and shortages, perhaps even to rationing. Number three would probably pass under democratic conditions. Number four would be the most difficult measure to institute, and could not be done under democracy. Number five would be welcomed by many people. Of course, it would have to include government support for medical benefits for all citizens.

As to core courses which students would be required to take, the history of US education is against core courses, but the resulting poor degree of knowledge of Science is part of our problem (61)

There is a visibly increasing gap between the philosophy of the US public and that of the US military. This was brought out particularly when a woman pilot who had been trained to fly B-52 bombers on nuclear missions was discharged from the Air Force on the basis that she had committed adultery and lied about it (62).

APPENDIX

The amount of available crude oil, worldwide, has been subjected to estimates by many experts since the 1930's. Outstanding is the work of Hubbert (1970) who worked on the Geological Survey in the U.S. Department of the Interior. The maximum of the rate of supply (billion barrels per year) is often referred to as Hubbert's peak.

The critical quantity is the year at which this peak occurs. The following graphs (Department of Energy, 2001) come from various authors and show estimates which vary according to assumptions of the rate of increase of demand per year. The critical peak value varies from 2004 to 2037.

These estimates which generally come from geologists discount new discoveries but geologists consider that, apart from the unlikely possibility of recovery of oil from the Antarctic continent, the world has been thoroughly researched for oil. No major discovery has been made since 1970.

Apart from this, there are likely to be considerable increases in demand from the industrial development of China and India. This has not been taken into account in the accompanying estimates, which are hence likely to be conservative.

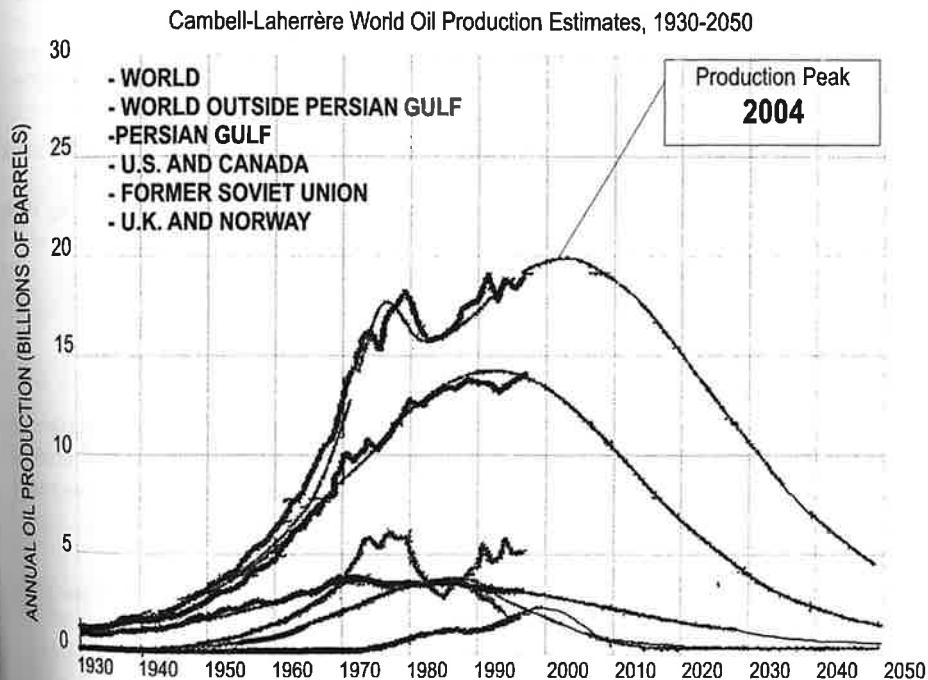


Fig. 2.A1. Reprinted with permission from correspondence with Bill Hovath, a Correspondence Specialist of the U. S. Department of Energy on March 29, 2001. It is authored by the Energy Information Administration and entitled "Long Term World Oil Supply."

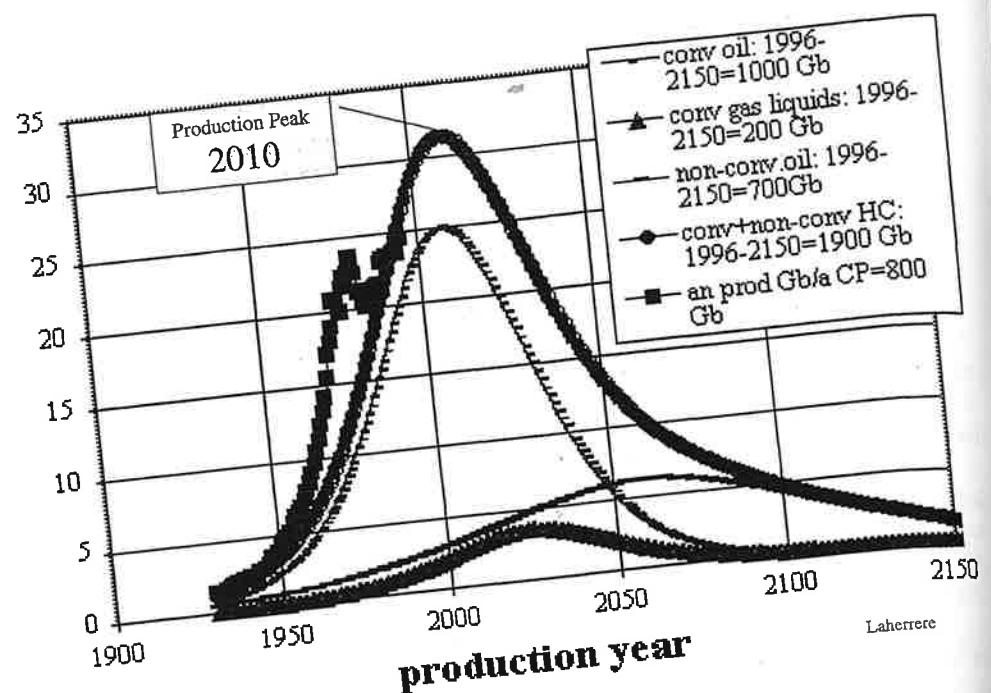


Fig. 2.A2. Laherrére's Oil Production Forecast, 1930-2150. Reprinted with permission from correspondence with Bill Hovath, a Correspondence Specialist of the U. S. Department of Energy on March 29, 2001. It is authored by the Energy Information Administration and entitled "Long Term World Oil Supply."

The time necessary to build an alternative energy supply depending on nuclear or solar (including, e.g., wind, etc.), can be estimated. Whatever assumptions are made, it would be several decades. This statement can be contrasted with the time available according to the U.S. Department of Energy.

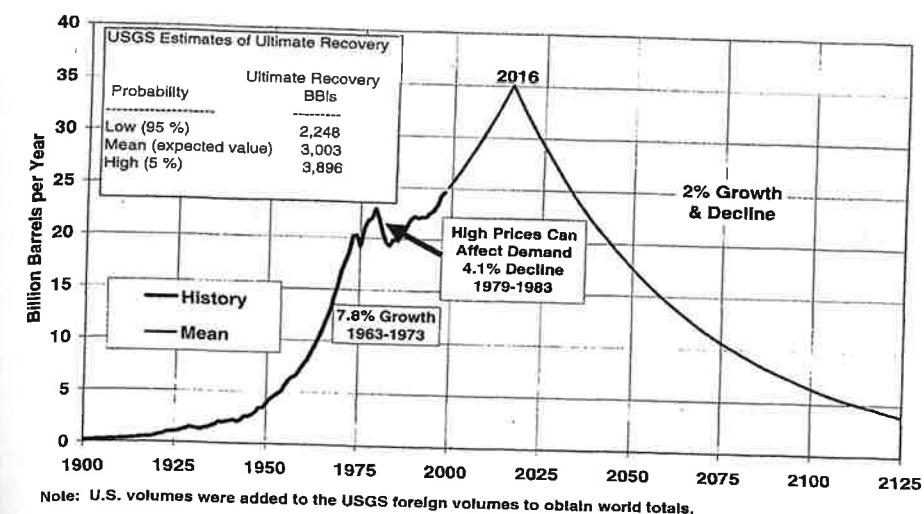


Fig. 2.A3. Annual Production with 2 Percent Annual Growth and Decline. Reprinted with permission from correspondence with Bill Hovath, a Correspondence Specialist of the U. S. Department of Energy on March 29, 2001. It is authored by the Energy Information Administration and entitled "Long Term World Oil Supply."

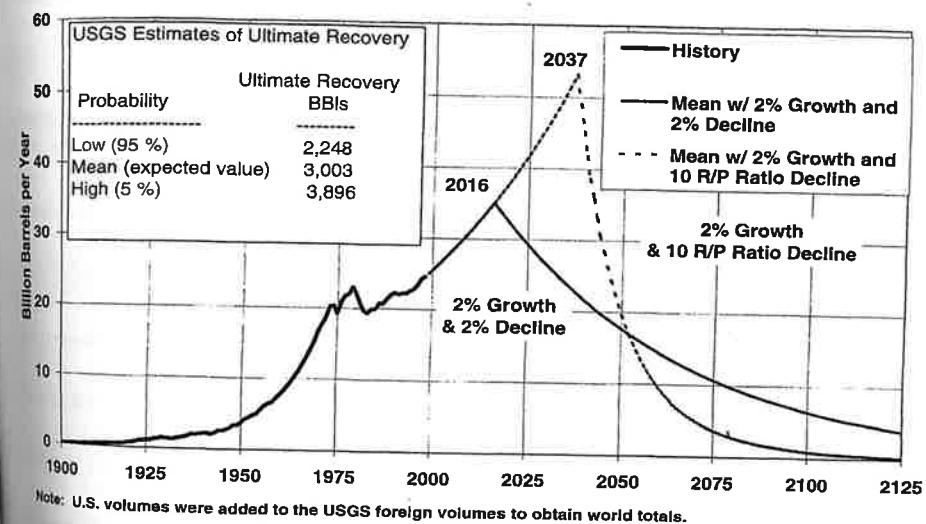


Fig. 2.A4. Annual Production Scenarios with 2 Percent Growth Rates and Different Decline Methods. Reprinted with permission from correspondence with Bill Hovath, a Correspondence Specialist of the U. S. Department of Energy on March 29, 2001. It is authored by the Energy Information Administration and entitled "Long Term World Oil Supply."

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CHAPTER 3

SHAKING PILLARS OF THE PARADIGM

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3.1 PARADIGMS AGAIN

A paradigm is a pattern or model and in the present context what is meant is "the way we think of the world." The Germans use the word "Weltanschaung", a world overview. There is no doubt about what is the world view at 2000. It is Science, and our confidence in Science is based on the enormous success it has had in originating and stimulating technological advances.

In this chapter we discuss six central topics in present Science, one in Mathematics, two in Biology, two in basic Physics and one in Cosmology.

3.2 PILLARS SHAKING?

In Chapter 1 a brief overview was given of the origin of our scientific culture. The origin of a few of the resulting technologies were also described together with their application, - which has brought one-third of the world's population up to the highest (material) living standard yet known.

In Chapter 2 some of the downside of these applications¹, - were discussed. It was made clear that *IF THE TRENDS VISIBLE AT 2000 CONTINUE*- there will be a breakdown of the high civilization, existing in the developed countries before the end of the present century. This breakdown would be due, in the first instance, to the effects of overpopulation, with accompanying resource exhaustion, unacceptable pollution, and global warming, with catastrophic climate change.

In this chapter, the status of several pillars on which fundamental Science rests will be looked at, for we base our lives upon them. It will be asked how secure these pillars are, how firm is the paradigm which shapes our actions? There is no doubt that the Enlightenment (18th and 19th centuries) has brought man power enough to affect the Earth. This triumph has brought awesome repercussions. The question is - have the material advantages which have followed brought with them changes on the planet which threaten to make it impractical, eventually, impossible, to live on.

Scientists are materialists and reject, because it is not within the present paradigm of Science, concepts such as the soul, - a common part of all religions.² It is logical, if one

¹ From when? Rachel Carson in her book, *Silent Spring*, (September, 1962) described how the use of DDT insecticide against malaria had unforeseen concomitant effects upon birds (for they ate the dead insects), - and indirectly to the food chain and to us ourselves. This book may be regarded as the beginning of the expression of environmental concern. Automotive companies became attentive to the effect of the pollution of their product before the end of the 60's and began to research it. It was 1969 when the subject began to be featured in the news media and from that time onwards there has been growing anxiety about the pollution of the environment. The greenhouse effect followed only slowly in the consciousness of people but by 2000 it was fairly well established that we face increasing world temperatures due largely to the use of gasoline in transportation. The problem of the rapid world population growth, - the greatest threat of all, - has not yet entered the consciousness of the western world because the over-population problems has not yet been felt there.

² Some scientists, do practice a religion (though it is better to keep it a private matter in respect to their careers), but they have a battle within themselves for much of the basis of what goes on in the churches

follows the standard model that one should throw out basic concepts of Judeo-Christianity and indeed those of Islam, too. Of what substance would souls be made? Life after death is a contradiction. It follows that ideas such as Judgment in the After Life and its effect on the quality of the alleged After Life are regarded by scientists as preposterous and based on superstitions which have no scientific justification.

A civilization in which the leading savants, particularly the scientists, lack a spiritual component in their belief systems has never been tried out before. Such a civilization has been developing in the West for about 150 years, so it seems salutary, to ask questions as to the validity of some of its basic theories.

Are pillars of our present paradigm weak? These are the pillars of the world view on which we base our lives. So, in our questing, we shall look clearly at the firmness on which the present understanding of our existence is based.

Before discussing specific parts of Science, it may be valuable to look at a few preliminary questions.

3.3 HAVE PRESENTATIONS IN BASIC SCIENCE PUBLICATIONS BECOME GLIB?

One has to be inside the process of research (particularly that in universities) to appreciate some aspects of its post 1960 development, parts of which detract from the integrity with which scientific investigations are regarded by the public.

1. No Longer Being So Careful with "the Truth"

Until around 1960, scientists were, by and large, careful to acknowledge in their publications what they had learned from previous work in their field and to distinguish what had been established beyond reasonable doubt and what was speculation. There is now much less stress on these requirements. The careful accounting for the roots of one's concepts has decayed. But more regrettable is that the vogue at 2000 is boldly to state speculative conclusions as though they were established truths. No longer does one read: "... it seems possible (probable) that" Now one reads: "... it is ..."

2. Consequences of the Competition for Research Funds

Within the basic sciences, a professor's career depends on his or her research publications. But nothing can be done in the experimental sciences without government or private grant money. This gives rise to two trends which diminish integrity in scientific reporting.

(i) Grant getting depends on how one's proposals are evaluated by one's colleagues to whom the proposals are sent. There are many more proposals than money to fund them (in some agencies, only one out of twenty of the proposals can be funded). Hence, "dressing up" to make a proposal look its best, rather than presenting it objectively without bias, become part of a professor's life.

(ii) Cronyism: After, say, a decade of one's career in the university, one develops personal likes and dislikes of one's colleagues and they of you. One has to be careful to be in the right camp, - the one the Program Officer in Washington likes, - if one is to be funded. For that Officer decides on the referees of the Proposals and knows who hates whom and who likes whom.

is absurd when regarded in terms of the standard model of present physics.

3. Castles in the Air.

In some areas of science (e.g., in cosmology), there are many amazing concepts. Publishing semipopular books about, e.g., "The first three minutes in the life of the universe" may make the author famous or wealthy. But it may not enrich Science, for the topics presented may involve speculations which are impossible to falsify and which may be gone in a few decades. But becoming wealthy by presenting to the public extravagant speculations as though they were true, is less than helpful for Science as a vehicle to Truth.

4. Effects of the Computer.

Since the 60's, modern computers have transformed the ability to make complex calculations in practical times. Government sponsors and industrial fund givers delight in seeing the results of computer simulations, often done with programs, the contents of which are not known to the user. Some such programs are even given high-sounding Greek or Latin names.

Associated with the advantages which the ready availability of electronic computers have wrought, however, one has to ask about the degree of integrity in theoretical calculations which now always agree exactly with experiment (for the computer makes it easy to adjust parameters until that is so).

The task of the referee of a theoretical paper is made impractically difficult for he or she cannot check a calculation made with a program to which he or she has no access especially the detailed calculation sequence within it. Further, the scientist may have to use a program that is commercially available-the nearest one to what one wants. To have one's own program written for one's own original theory, may be prohibitively expensive. Thus, a scientist who has ideas for which no program has been written finds himself boxed in. To get a publication accepted, he may have to use an older theory, for which a program exists, which he can afford to buy.

5. New Ideas?

The dependence of progress in a professor's research on decisions made by program officers in fund-giving agencies has made the acceptance for funding of ideas outside the paradigm virtually impossible. Refereeing of proposals is arduous work, even if the proposed research is a straight line extension of the prevailing knowledge. An honest objective referee is going to find it impractical to subject proposals that are out of the paradigm to the investigation, discussion, and thinking they require. Nobody wants to find out he has been on the wrong track anyway. The way out is to choose words in his report ("utter rubbish", etc.), which will make it easy for the Agency Program Manager's decision.

3.4 WHICH PILLARS?

It is easy to choose the pillars which form the present paradigm.

The first is **mathematics** and this is so obviously basic to everything that is done in science that it is hardly credible that it be anything but utterly reliable.

The second pillar is **relativity theory**. This basic aspect of Physics originated in the 17th Century and was much developed before the contributions of Einstein, which are so often quoted. It has become sanctified as the most holy pillar of all, so that papers which question it are simply rejected by the editors of senior journals without explanation. Herbert Dingle, who was for long a professor of physics at the Imperial College of Science and Technology, London University, tried to argue down the Einsteinian proposition of the

"Twin Paradox", in which people who went for journeys in space vehicles, accelerating to high speeds and then returning, did not age as much as those who remained on Earth. He asked why the occupants of the space vehicle should be taken as moving? Surely, in Relativity it would be as logical to consider the Earth moving with respect to the space vehicle. Dingle, whose reputation was that of solid contributor to basic physics, carried on his quest for an answer to this question through the editors of Nature and eventually the President of the Royal Society, etc., but his request for publication of his reasoning was always rejected, - though with no explanation.

The hallowed nature of scientists' attitude toward Einsteinian Relativity has a curious basis. For nearly all scientists, when asked, e.g., what the theory means, will disarmingly say they don't fully understand it (though they say this with an attitude of awe).

The quantum theory will be discussed in the context that physics students in universities will say they understand it after having studied one of the many tomes explaining it that are available (1). However, physicists deeply engaged in quantum theory research will admit that, at a deeper level, they are not clear what the theory means. On the other hand, the quantum theory is usually presented as one of the central theories of all physics (and, eventually, of theoretical chemistry, too).

In cosmology one is dealing with the Big Bang. It was welcomed by many, not only those in physics, because it gives some rationale to the creation story in Genesis in which God created the universe "out of nothing." The Big Bang still had about 100 prominent scientists working on it in the United States at the end of the millennium and is believed in by virtually all scientists, although one supposes few have the fortitude to think about a universe which was at the beginning less than one present-day atom in dimension (2).

Chemistry. This subject extends in so many directions that it is difficult to say it itself shakes. However, since 1989, the nuclear part of it has been shaken by the discovery that nuclear reactions can be made to occur in the cold,³ and the study we shall make here of the treatment of new thought in this field provides a good example of suppression of new scientific data.

Biology. Here, of course, one focuses on the theory of evolution. It seems reasonable to say that this is the thickest pillar of all in the paradigm and one of the most important in the history of science, partly because it was the most God killing. Until Darwin, scientists were mostly religious folk (indeed Darwin himself was religious⁴), but once the idea got hold of people that man was not unique, - perhaps indeed not made by God, - but evolved out of a predecessor animal species by accidental changes in the material of inheritance, the credibility of the Judeo-Christian story began to unravel - and Science gradually replaced Religion in the West.

³ This is the controversial subject of Cold Fusion (3). It is poorly named because it has turned out that many of the reactions involved (all in solids) are fission reactions. Chemically assisted nuclear reactions is a better name.

⁴ Newton was also a religious man (5). But his originality and curiosity brought him to attempts to conjure up the Devil as well.

Virtually all scientists are convinced of the theory associated with Darwinian Evolution and many become angry if it is disputed to any significant degree. Publication of evidence critical of it in journals may be difficult.

3.5 GENERAL QUESTIONS ABOUT BELIEF IN PRESENT SCIENCE

There is no doubt that the picture of the subatomic world which physics has presented to us since 1926 is difficult to understand, because it is different from the reality with which we perceive through our senses.

University professors continue to present these "difficult to accept conclusions" and take the attitude that those who do not understand, lack the wherewithal to do so (4).

However, a number of scientists, particularly small groups of physicists, have taken a strong attitude towards what some have called "the bunk in physics today." About 150 of them in the USA have formed a society called The Natural Philosophy Alliance, which concentrates upon the dilemmas and difficulties of present physics (6).

The following is a quote from a paper by David Bergman (7).

"Orthodox physics is in a deplorable state, not unlike the situation before the advent of Kepler's laws when the orbits of celestial bodies had to be explained by increasingly more complicated assumptions.... All of us feel uneasy at the sight of tremendous masses of nonsense publications which fill book shelves in libraries and seem to address only the scientists who claim to be able to follow the weird ideas presented... The quantity of nonsense publications has reached a critical limit that threatens to drown physics in an ocean of worthless paper."

Consider the following basic questions, all of which are in the realm of physics, but physics is basic to the rest of science and so it is reasonable to regard these questions as affecting the basis of our understanding of scientific concepts at this time.

1. What is a wave function?
2. The Schrödinger equation is in terms of waves, but what are the waves "of" and what are they waves "in"?
3. What is an electron?

There is no generally accepted answer to any of these three basic questions in modern physics today. In the quantum theory, electrons are "point charges." Of course, science deals all the time with wave functions, Schrödinger's equation, and electrons, but when one gets down to it, the question which has to be asked is, do we know what we are doing?

Bergman expresses himself like this (7). "We believe that modern science is a structure built on a foundation of sand and the entire structure seems about to topple."

Before embarking on a discussion of six fundamental areas of science, it is reasonable to ask whether they are intellectually secure. It is reasonable to put forward a general question, perhaps the same as the questions asked above, but in a lower key.

Thus, there is no doubt that Gödel (8) in a general way, and Turing (9) with respect to computers, showed that there are certain questions which will never be possible for formal logic to answer. Gregory Chaitin (10) puts the matter differently. He asks whether the real world is too complex for us to comprehend. There may be questions in the area of physics, but also in biology and economics, which are beyond our power ever to answer.

Let us see.

3.6 MATHEMATICS

3.6.1 Introduction

Physics is the emperor of the sciences, but in modern times, physicists have found that their discoveries cannot be expressed in words, explained in terms of concepts of the macro world, - and therefore they have resorted to mathematical expressions. It might well be said that the emperor walks on shoes made of mathematics.

Consequently, much of physics depends on mathematics for its validity. It has often been pointed out that it is remarkable that many of the properties of materials in the world can be represented in mathematical terms. Because of this close association between mathematics and physics, it is necessary to find out if the foundation is bedrock or, - at least occasionally, - on unsafe sand. Many will be surprised that potholes in the mathematical highway do exist.

3.6.2 The Nature of Mathematics

Of course, mathematics began with counting, but even there, - as Barrow (11) points out, - one has to make a reality check.

Mathematics was developed early. The ancient Greeks are famous for their contributions (e.g., Pythagoras theorem) but they had limitations in matters which seemed to lack realism. For example, they were conscious of a three dimensional world and for this reason thought that the first three powers of x were rational but x^4 was a mystery, - because what geometric aspect of reality would it represent?

Among the greatest names in the development of mathematics in the West are those of Newton (1642-1727) and Leibnitz (1646-1716), each of whom, independently, originated the calculus. Gauss, who lived much later (1777-1855), contributed to the theory of numbers, and originated the Gaussian distribution law, the law which defines the distribution of a function when the errors in its measurement occur by chance.

It is instructive to compare the position of a freshman graduate student in a university mathematics seminar, and, say, one in a corresponding chemistry seminar. In the latter subject, a graduate student can take part in any seminar and get something from it. However, a graduate student in mathematics who attended a seminar in one of the frontier topics would be entirely left behind. Thus, the cutting edge of mathematics is very far ahead of the mathematics one learns, say, for a first degree in mathematics.

3.6.3 New Ideas in Mathematics, - from Where Do They Come?

This is a subject which has received much discussion. There are two approaches to it. In the views of some, new mathematics is invented by the people who first present it (11).

In the views of others, new mathematics is *discovered*, not invented. A good example here is the theory of fractals. Fractals, for example in the form of snow flakes, and many other forms of nature, appear at first to be irregular, but have certain spiky shapes, some consisting of dendritic forms. No mathematical theory of fractal shapes was available until 1919. But fractal forms have existed for billions of years. Where was the mathematics hiding? Thus, Popper and Eccles, - in their book, *The Self and Its Brain*, - put forward mathematical ideas as part of their "World III" (12). This world consists of cultural ideas of music, science, beauty. It is "out there." Within philosophy, the origin of such an

approach is in Plato's idea that real things are from an ideal form, perfect in all respects, from which we experience an imperfect rendition.

Thus, it seems that mathematical ideas are firstly intuited by people and then, later, are proven and publicized.⁵

3.6.4 Break Down: Examples

Over the years, starting around the 17th century, it has gradually transpired that there are curious exceptions to the solidity and rationality of mathematics, so that, when you use it, - and rely on the fact that it is helping you, - you may suddenly find that it has played you short.

(i) The order in multiplication.

It was the Irish mathematician Hamilton (1805-1865) who discovered that the order in which one multiplies expressions is sometimes important. He was dealing with a type of mathematical expression called quaternions, i.e., expressions of the type

Where:

$$Q = a + bi + cj + dk$$
$$i^2 = j^2 = k^2 = -1$$

What Hamilton found was that, if the product is to be a quaternion, then $jk = i$ but $kj = -i$, i.e., the order of the multiplication changes the result.

This was a shock to the mathematical world because the discovery seemed irrational.

(ii) Matrices.

A similar shock was experienced in the multiplication of matrices. It was found that the product is sometimes zero although the value of each matrix is finite. This example raised a doubt about the certainty of mathematical reasoning.

(iii) Square Roots.

Some numbers, such as 4, 9, 16, 25, 36,, have rational square roots but the square roots of others, for example, $\sqrt{2}$, have no exact value. If one tries to find $\sqrt{2}$ on a hand calculator, one obtains 1.414213562...with no repeating sequence of decimal digits. The lack of satisfaction which this result gave is that it does not answer the question what is the square root of 2, for it is somewhat different than the approximation stated above. In the theoretical - even philosophical - sense, this was regarded, although not having any practical significance, - as profoundly unsatisfactory.

(iv) Calculus

When one is first taught calculus, the account given involves the "theory of limits". The differences between quantities are made smaller and smaller and one is led to think that, finally, the quantities concerned extrapolate to zero and the differential consists of zero divided by zero.

Thus, within the differential calculus one has that, if $y = ax^n$ then,

⁵A good example of this is in the life of the Indian mathematician, Ramanujen (13). He possessed only a high school education in mathematics. He was able to write down large numbers of new and original theorems, some of which he could prove but some of which he simply stated as true, but which were later proved by other mathematicians at the University of Cambridge, in England, to which he was brought in his early twenties.

$$\frac{dy}{dx} = ax^{n-1}$$

For example, if n is 3, then the answer one gets is that $\frac{dy}{dx} = 3ax^2$ and gives a simple numerical answer, e.g., 24 if $a = 2$, and $x = 2$.

All this works well. However, an equally valid piece of reasoning would be to say the answer is the limit zero, divided by the limit zero, i.e., 0/0, and this is not anx^{n-1} .

(v) Series (14)

Certain series are deceptive, i.e., give irrational results.

For example, if one takes $\frac{1}{1+x} = 1 - x + x^2 - x^3 + x^4 \dots$ and take $x = 1$, one finds that the series adds up to zero whereas the expression is obviously $\frac{1}{2}$. But why is that?

Correspondingly, if one takes $\frac{1}{1-x}$, this is $1 + x + x^2 + x^3 + \dots$, and with $x = 2$, the answer is obviously -1, whereas the sum gives infinity.

(vi) The Effect of Gödel's Theorem

Up to the time of Gödel (1906-1978), it was thought that mathematical (or formal logic) would allow one to reach a conclusion with certainty. Thus, in the attempt to derive statements which cannot be doubted, mathematical logic was the primary vehicle.

However, in 1931 this German mathematician, Gödel, published his Incompleteness Theorem, the effects of which are still working their way through the sciences. What Gödel proved was that the truth or falsity of some mathematical propositions cannot be known by logical inference.

This was a blow of magnitude, for it destroyed the confidence which had been placed in logic, - depending as it does on a mathematical type of reasoning.

It is interesting, - to some extent amusing, - to give an example of Gödel's theorem, applied to practical life rather than to mathematics. A "real life" example would be:

"The Barber of Seville will shave any man who cannot shave himself. Does the barber shave?"

Thus, seemingly innocuous questions may turn out to be undecidable. The conclusion is that we cannot always rely upon logical argument to bring us safely to truth.

Correspondingly, Turing (1912-1954), who made some of the most fundamental contributions to the development of computers, deduced that there were some propositions which could not be computed and this is a major argument against the development of "artificial intelligence" (for much of Reality is not digitizable).

3.6.5 The Bottom Line on Mathematics

Mathematics is an indispensable tool in science, above all in physics, but it is clear that there are parts of our experience which cannot be dealt with or described in mathematical terms. A mathematician is rather like a person who has 100 coins and all of them are solid gold except for one which is made of brass. He uses these coins as all gold every day, - but he never knows when the brass one is going to turn up (14).

It seems reasonable to let a very experienced person have the last word here and one of the many quotes of Albert Einstein is the following: "Insofar as the propositions of mathematics give an account of reality, they are not certain; and insofar as they are certain, they do not describe reality" (15).

3.7 THE MECHANISM BY WHICH NEW SPECIES ARE FORMED

3.7.1 General Introduction

Until the second half of the 19th century, the public philosophy in the West had strong threads back to concepts universal the world over and originating, - for the West, - with the Greek philosophers. The essential point in the Paradigm was the existence of Design.

Modern Science began, - as has been described in Chapter 1, - with Copernicus, Kepler, Galileo and Newton. These men were all deeply religious. It would have been inconceivable to them that their work would lead to the change of the paradigm in the West, which it indeed did.

Although the revolution against the teachings of the Christian (mostly Catholic) church began with Luther (1483-1546), the greatest blow against the dualism of a body and an inhabiting spirit was undoubtedly that struck by Charles Darwin (as with the other pioneers, a religious man), who published his very influential book,⁶ "The Origin of Species" in 1859 (cf The Descent of Man, 1871).

As Darwin's ideas spread, - it was increasingly realized that he was proposing rationally and with evidence, - that there was no need for a Designer. As a result, the central pillar of the long-standing paradigm buckled and broke. The existence of Divine Purpose was relegated to a belief among the faithful.

Darwin's theory of the Evolution of Species by means of "natural Selection" had a greater effect in forming the paradigm of the 20th century (Chapter 1) than the Quantum Theory or Relativity. Copernicus and Newton had explained the cosmos and now Darwin had proved that man was no more than a Superior Monkey. Compared with this, the effect upon the paradigm of the mystical seeming Quantum Theory and the theory of what happened to objects moving near to the speed of light seems mere detail.

In the following pages, it will be asked whether the evolution of new species by means of random changes in the DNA due to outside influences is still tenable in the third millennium.

Over these vital concerns, there hovers the ghost of the Greek philosopher, Aristotle. For his paradigm, - involved the assumption of teleology, the idea that all is influenced from on top. Darwin's work was a confrontation to this and was at the roots of the widespread existence of Atheism among scientists and intellectuals.

Charles Darwin was a thoughtful man whose father, Erasmus Darwin, had been an eminent naturalist. What he observed on his five year voyage, - and he had time to think about this as the Beagle went slowly on her way, - was that what species of animals were to be found seemed to depend upon the nature of their surroundings. He was impressed by the fauna which he found on the Galapagos Islands, isolated atolls far from land. Here, he

⁶It usually goes unmentioned that Wallace sent a manuscript of his book to Darwin before the latter had published. Wallace had written much the same thing as Darwin and had, by a whisker, the priority. Wallace is forgotten and Darwin was the Einstein of the 19th century. Whose work gets to be celebrated in the development of culture depends on many factors - particularly on the self-promoting personality of the one remembered, - but in this case there is some justification for elevating Darwin and suppressing Wallace. The reason is that, - later, - Wallace reneged on his conclusions. (The world was too complex, too well fitted together, etc. There must have been Design.)

found fully developed creatures, - but quite different creatures from what existed in Chile, - the nearest land.

On this and similar observations, Darwin developed his theory. A given species had to compete with other species and with the surrounding pressures of the environment. In so far as the species was born with characteristics which gave it a competitive advantage against its rivals, it would have more offspring than they and these offspring would populate a greater fraction of the species, - eventually producing an improved new species.

In *The Descent of Man* (1871), Darwin went further. There was a hierarchy of creatures from the unicellular ones which existed upon the Earth four billion years ago, to man who developed by the mechanism of evolution of creatures with new and stronger characteristics from the higher hominids, during the last 100,000 years.

This seemed a reasonable proposition to many who read the book. Pictures of the larger hominid looked somewhat like wild primitive men or women and this made it easier to accept Darwin's hypothesis.

Of course, this was against the religious culture of the time according to which man had been a special creation by God, and fierce verbal fights broke out between the representatives of the religions (Bishop W. Wilberforce is mentioned) and the Darwinians, represented cleverly by T. E. Huxley. The essence of the religious argument was no more than "it is irreverent to say this, - man can't be descended from monkeys!" Such a statement, - appealing to belief in the literal meanings of the Bible, - sounded unconvincing when confronted by Darwin's arguments based on rational argument.

But, if man was "descended from monkeys," then what had a Great Designer to do with it? Was there, then, any Great Designer?

Thus, the solid basis to, orthodox religion (special creation) was removed and there was a consequent fall in religious belief among the educated which took place in the latter part of the 19th century in the West.

At 2000, Darwinian evolution (i.e., chance changes in genes leading to advantage, in its new version based upon molecular biology), - is still accepted by most main stream biologists. In fact, even the Pope (16) made a statement in 1981, embracing evolution into the Catholic religion. But of course, it is evolution of the body which he yielded to Darwin, but God is still supposed to have put in the Spirit, Soul, or Consciousness.

3.7.2 Neo-Darwinism

From the 1960's onwards, the electron microscope and other tools made it possible for biologists to look in some detail at the machinery of life. A detailed knowledge of some biochemical mechanisms was obtained. The discovery of the structure of DNA by Watson and Crick in 1953 was the determining event of the century in biology, and at first seemed to give rejuvenation to Darwin's Theory.

Thus, Darwin had assumed that there was some mechanism, - undisclosed, - which, by chance, changed something in the inheritance mechanism of species and such changes led, - occasionally, - to an improvement in the fitness of a creature, compared with the others of his species.

What molecular biology added to this was to provide a reasonable mechanism for understanding how the chance variations could occur. Thus, once it was realized that inherited characteristics depended upon the detailed structure in the DNA in the arrangement

of the molecular groups, it was easy to see that, if by some action, part of the DNA molecule was changed, then, - although most changes would give rise to a damaging development, some might give rise to superior structures and in this way, new species (e.g., bird from fish) could eventually, maybe, develop.

By what mechanisms could the DNA be changed? This might be a rather complex matter (17), but there are passing through us at all times cosmic radiations, and changes caused by the interaction of cosmic ray photons and other elementary particles with DNA may be one mechanism. Alternatively, specific chemicals invading the body might affect the structure of the DNA, resulting usually in cancers and perhaps very occasionally in a rearrangement which would give advantage.

Thus, with the advent of molecular biochemistry and the increase in the knowledge of genetic mechanisms obtained in the last 40 years, Darwinism has been rationalized and is very widely accepted, particularly in the Anglo-American group of countries (18).

There have been sociological correlates of this movement. It fits the idea of struggle and the competitive society, of corporation versus corporation and nation versus nations at 2000.

So successful does the theory of neo-Darwinism appear to be that it is difficult to find scientific papers critical of it in the senior journals of biology (cf. a similar attitude towards Einstein's relativity). If a paper is submitted which denies the neo-Darwinian model, it is rejected as "not scientific" although what is meant is that it does not fit the ruling of the present paradigm in Biology, i.e., the views of those members of the Academy of Science who are biologists.

In spite of the apparent attraction of Darwinism, and the difficulty in finding acceptance of papers inimical to it, the post 1990 period has given rise to a number of erudite books (Behe (19), Denton (20), Milton (21)) by molecular biologists which present arguments which seem to make unlikely the Darwinian model. It has been called (20) "a theory in Crisis."

3.7.3 Modern Supporters of Neo-Darwinism

It has been stressed that most biologists support neo-Darwinism and if we mention two workers here, it is not because their views differ from those of other modern biologists, but because of the stridency and continuity of their advocacy of the theory.

The first is the biologist, Richard Dawkin (18), of the University of Oxford, and the second is the philosopher, Daniel Dennett (22) of Tufts University, Medford, MA. Each has written a book. In Dawkin's case it is called *The Blind Watchmaker*, and in Daniel Dennett's case, it is *Darwin's Dangerous Idea*.

As an example of Dawkin is his description of the evolution of the eye, which is similar to that given by Charles Darwin, 150 years earlier.

Some single-celled animals have a light-sensitive spot with a little pigment behind it. The screen shields it from light coming from one

Although the difficulty faced by those few biologists who criticize neo-Darwinism is to find a credible alternative. If "Intelligent Design" is mentioned, then there is a huge uproar because scientists use this as bringing God back.

direction, which gives it some "idea" of where the light is coming from. Among many-celled animals ... the pigment-backed light-sensitive cells are set in a little cup. This gives slightly better direction-finding capability Now, if you make a cup very deep and turn the sides over, you eventually make a lensless pinhole camera When you have a cup for an eye, almost any vaguely convex, vaguely transparent or even translucent material over its opening will constitute an improvement, because of its slight lens-like properties. Once such a crude proto-lens is there, there is a continuously graded series of improvements, thickening it and making it more transparent and less distorting, the trend culminating in what we would all recognize as a true lens.

However, if one looks closely at this explanation, one sees that it assumes macro step by macro step, simplistic explanations which overlook many factors. What of the formation of the first light sensitive spot? Such a formation would need (23), 11-cis-retinal and rhodopsin, both of which, - it seems to be assumed, - have gotten synthesized there just at the right position for biomolecular structures constituting the spot to occur. From where do these complex molecules come? What about the little cup? It would have to consist of a whole bunch of cells and why do they form themselves so conveniently into a cup? Dozens of appropriate proteins would be needed for the structure of the cup and dozens more to keep it in check. Did all these complex compounds happen to be present by chance just at the right moment and place to form the cup?

Daniel Dennett is more strident than Dawkin in his support of Neo-Darwinism and he makes an attack on people who have religious affiliations (more than 75% of Americans). He states in his book that such people are like wild animals who should be caged (sic). Parents should be prevented from misinforming their children about the facts of evolution. Richard Dawkin also makes statements (24) which ridicule religious believers. For example, he says that if a statue of the Virgin Mary waved to him, he would not conclude that he had witnessed a miracle. He would rather think that "all the atoms of the statue's arm just happened to move in the same direction at once."

Thus, the mechanisms described by neo-Darwinists lack an accounting of the detailed nature of the necessary coordination of biochemical syntheses and cellular happenings needed in an evolutionary change. Behe gives a good example with the mousetrap (25), a relatively simple mechanism (Fig. 3.1). However, as the parts of it are brought together, there is no hint of the use they might be put (no advantage, therefore, to their possessor) until the end when one finally sees a clever arrangement with a purpose. But, on the way, the build up to the final trap, there is no advantage to be had from the specific steps of assembly. Why, then, do the species which give no advantage prosper compared with species which do not have them? A series of zeros is still zero.

There are many mechanisms much more complicated than a mousetrap in biology. One realizes that, - unless one foresees its purpose, - there would be no advantage in the availability of any of its new parts, except the last one. What use would the holding bar be, unless it was to keep that the hammer in place and what would be the point of that unless it was to provide release and descent of the bar on the animal when it ate the cheese and disturbed the catch.

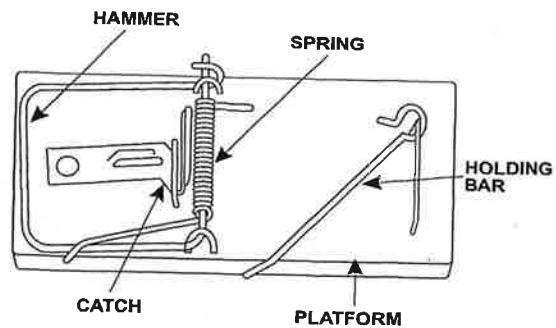


Figure 3.1 Reprinted with permission of The Free Press a division of Simon & Schuster Adult Publishing Group, from *Darwin's Black Box: the Biochemical Challenge to Evolution* by Michael J. Behe. Copyright© 1996 by Michael J. Behe. All rights reserved.

The concept of evolution by changes in an organism because it gives an advantage to that organism, fails because of the very large numbers of coordinated biochemical changes needed. Each of the "on the way" changes has no selective advantage until finally the objective of the changes is reached. Evolutionary changes give the organism some selective advantage, but none of the many micro-changes (biochemical and cellular), which have to occur on the way to the improved organizations, confer an advantage. It remains unexplained as to why so many of them occur in such concordance.

3.7.4 Irreducible Complexity

Molecular-level considerations of the mechanics of the development of a biological advantage for a creature cannot be understood if the processes are random. Thus, molecular biology reveals that changes, - formation of new structures, - in living beings are made up of many complex maneuvers and constructions involving hundreds of different coordinating proteins and many different reactions, all of which together lead to the building up of the particular new characteristic. But none of these changes by itself confers any competitive advantage on the offspring until the whole maneuver is complete (26). So, why do all the thousands of complex changes occur in such a coordinated way?

This point becomes more pressing in so far as the organism shows complex features. Until the middle of the 20th century, biology consisted much more of the macro examinations of fauna rather than that of the biochemical mechanisms. This was particularly so in the case of complex structures found inside insects, which remained unrealized until it became possible to use electron microscopy to examine how these creatures operate. It was thought that (because of the primitive nature of such creatures) the interior must be simple. It is now possible to point to numerous extraordinarily complex and purposeful machineries within insects, the chance evolution of which appears to be impossible.

Four examples will be given here of this irreducible complexity.

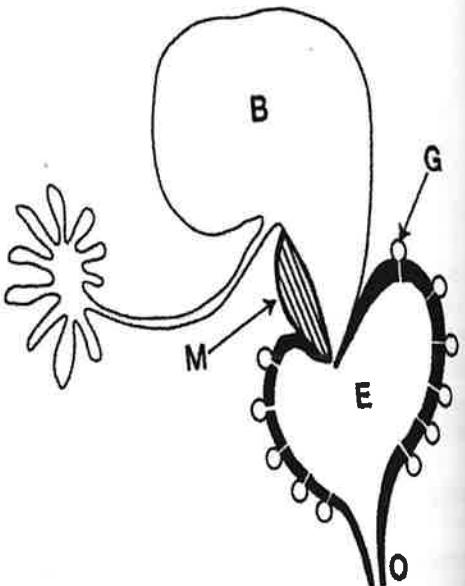
The first arises from the work of E. G. Robb and J. L. Barron on the attack mechanism on the host of the parasitic fungus *Haptoglossa mirabilis* (27).

This parasite infects its rotifa host by means of a gun-shaped attack cell. The interior end of the cell is elongated to form a barrel. The wall of the mouth is invaginated deep into the cell to form a bore. A walled chamber at the base of the bore houses a complex missile-like apparatus. The projectile is fired from the gun at high speed to accomplish initial penetration of a host.

The second example is the backfire beetle, an insect which is able to project a stream of scalding liquid at an enemy from an apparatus in its back (Fig. 3.2).

Defensive apparatus of bombardier beetle;
B) Collecting vesicle; E) Explosion chamber;
G) Ectodermal glands secreting catalase;
L) Secretory lobes; M) Sphincter muscle;
O) Outlet peroxide, exploded by catalase when it passes into E.

Fig. 3.2. Reprinted with permission of The Free Press a division of Simon & Schuster Adult Publishing Group, from *Darwin's Black Box: the Biochemical Challenge to Evolution* by Michael J. Behe.



The mechanism of this defensive action, involves a complex and purposeful apparatus. It contains two sacs, one of which contains H_2O_2 , and the other, anthroquinone. When the insect senses danger, these two sacs open and the liquid in each, inoffensive by itself, mixes and the system undergoes a rapid elevation in temperature due to the heat of the reaction, so that the liquid finally expelled is scalding to the object it strikes, apart from the chemical action of the highly oxidative chemical nature of the mixture.

A third example concerns the mechanism by which some bacteria are able to swim purposefully in water. A number of them use a mechanism called a "flagellum" which has a structure rather like a propeller.

The flagellum has hair-like filaments within the cell membrane (29). At the end of the flagellum, near the surface of the cell, this filament connects to a rotor (Fig. 3.3).

Experiments have shown that the motor which rotates the propeller is at the bottom of the flagellum where there are several ring structures (see Fig. 3.4). The energy source is not (as with the muscles of most fauna) derived from ATP, but appears to arise from the flow of acid through the membrane.

Drawing of a bacterial flagellum showing the filament, hook, and the motor imbedded in the inner and outer membranes and the cell wall.

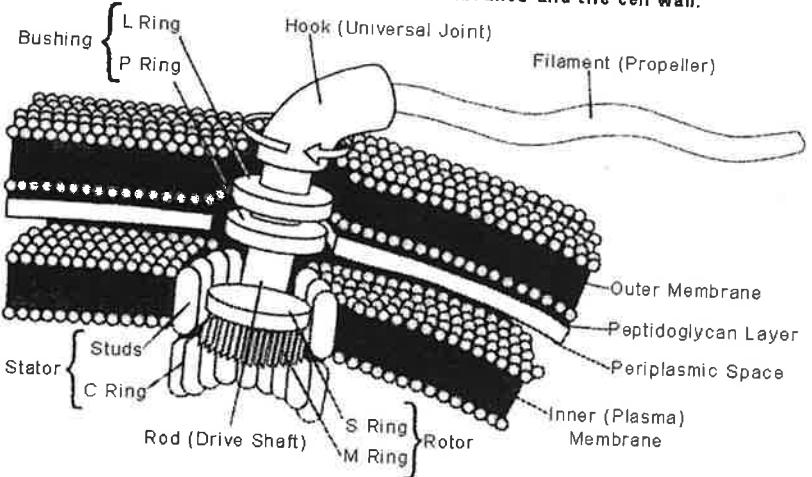


Figure 3.3 Reprinted with permission of The Free Press a division of Simon & Schuster Adult Publishing Group, from *Darwin's Black Box: the Biochemical Challenge to Evolution* by Michael J. Behe.

Explanations of such a complex and purposeful mechanism by means of a series of chance changes faces mammoth hurdles. As in the case of Behe's mousetrap, the numerous parts only have a point in the final result, which is not known until all is assembled together.

According to Behe (29), the structure of the flagellum and the mechanism of motion of bacteria are well known within biology, but are ignored in the evolutionary literature.

A fourth example is the eye. Darwin himself admitted to being "staggered" by the complexity of the eye and how it could have developed by means of chance mutations. In order to understand this, it seems advantageous to allow Behe to state the situation (29). "When light first strikes the retina, a photon interacts with a molecule called 11-cis-retinal, which rearranges within picoseconds to transretinal. (A picosecond is about the time it takes light to travel the breadth of a single human hair.) The change in the shape of the retinal molecule forces a change in the shape of the protein, rhodopsin, to which the retinal is tightly bound. The protein's metamorphosis alters its behavior. Now called metarhodopsin II, the protein sticks to another protein, called transducin. Before bumping into metarhodopsin II, transducin had tightly bound a small molecular called GDP. But when transducin interacts with metarhodopsin II, the GDP falls off, and a molecule called GTP binds to transducin (GTP is closely related to, but critically different from, GDP)."

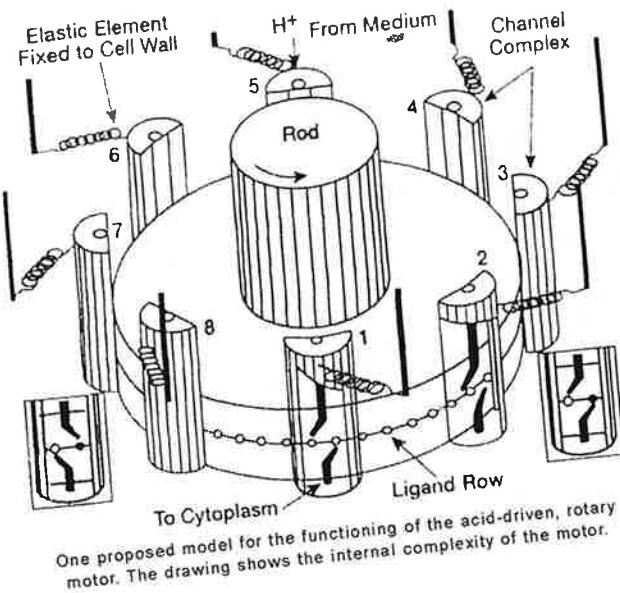


Figure 3.4 Reprinted with permission of The Free Press a division of Simon & Schuster Adult Publishing Group, from *Darwin's Black Box: the Biochemical Challenge to Evolution* by Michael J. Behe.

"GTP-transducin-metarhodopsin II now binds to a protein called phosphodiesterase, located in the inner membrane of the cell. When attached to metarhodopsin II and its entourage, the phosphodiesterase acquires the chemical ability to cut a molecule called cGMP (a chemical relative of both GDP and GTP). Initially, there are a lot of cGMP molecules in the cell, but the phosphodiesterase lowers their concentration, just as a pulled plug lowers the water level in a bathtub."

"Another membrane protein that binds cGMP is called an ion channel. It acts as a gateway that regulates the number of sodium ions in the cell. Normally the ion channel allows sodium ions to flow into the cell, while a separate protein actively pumps them out again. The dual action of the ion channel and pump keeps the level of sodium ions in the cell within a narrow range. When the amount of cGMP is reduced because of cleavage by the phosphodiesterase, the ion channel closes, causing the cellular concentration of positively charged sodium ions to be reduced. This causes an imbalance of charge across the cell membrane that causes a current to be transmitted down the optic nerve to the brain. The result, when interpreted by the brain, is vision" (29).

The eye functions as a whole or not at all. So how did it come to evolve by slow, steady, infinitesimally small Darwinian improvements? Is it plausible that thousands of lucky chance mutations happened coincidentally so that the lens and the retina, which cannot work without each other, evolved in synchrony to provide sight and finally advantage? For what survival value can there be in forming an eye that does not yet see?

Thus, Dawkin thinks Darwinianly that infinitesimal increments step by step, can occur and if an organism is favored by them, then it will eventually dominate and form a new species of animal.

However, this is a macro point of view. It does not account for the complex and cooperative nature of the necessary occurrences within the biochemistry. Thus, one may consider (30) the light sensitive spot which Darwin with Dawkin assume as a starting point. Such a formation requires a cascade of factors, including the synthesis at the right place and time of 11-cis-retinal and rhodopsin. What about the "little cup" of Dawkin? Where did that come from? To form a cup, dozens of steps are needed, all involving complex molecules doing purposeful things. It is not a matter of a number of chance mutations none of which would confer advantage. How many cooperative molecules and steps are necessary to bring about the change which may give advantage to the creature?

These considerations of micro level molecular biology tend to make Darwin's position of chance changes preposterous. It might have been acceptable in Darwin's day but modern knowledge of the molecular mechanisms make chance-derived changes an utterly unacceptable explanation.⁸

3.7.5 Fossil Record

Intermediate forms between the species were predicted by Darwin, - but have not been found in the succeeding 150 years. Towards the end of the 19th century it was expected that the "missing links" would be found in unexplored regions of the world. When H. M. S. Challenger was sent in 1872 to carry out an examination of the deep sea, it failed to dredge up any examples of necessary missing links.

Many strange new species were, however, found on the ocean floor. One of them, known as *hallucigena*, propels itself by means of 7 pairs of sharply pointed stilt-like legs (31). Along its back is a row of 7 tentacles, each of which ends in pincers. But all these new phyla do not represent the intermediate forms between species expected by Darwin. Today, the fossil record is about as discontinuous as it was when Darwin wrote *The Origin of Species* in 1859. The current situation is summed up by Robert Barnes (32). "The fossil record tells us almost nothing about an evolutionary origin of phyla and classes. Intermediate forms are nonexistent, undiscovered, or not recognized" (32).

Correspondingly, new organisms appear abruptly and no groups can be construed as being the ancestor of another group. Thus, a publication from the British Museum of recent times ends with the following statement. "We conclude that none of the fossil species we are considering is the ancestor of the other" (33). Correspondingly, gaps between the large aquatic vertebrate groups such as ichthyosaurs, plesiosaurs, whales, seals, sea cows, etc., are also quite clear. (Fig. 3.5).

Biologists who believe in Darwinian evolution have a problem in explaining these gaps in the fossil records.

⁸Thus, if the chance of the presence together in one place of the many complex, specialized molecules is 10^{-m} and the number of steps, n, the probability of chance occurrences cooperating to give a final result having biological advantage is $(10^{-m})^n$. Is $n > 1000$? Is $m > 100$? There are no reasonable numbers which make the macro change probable.

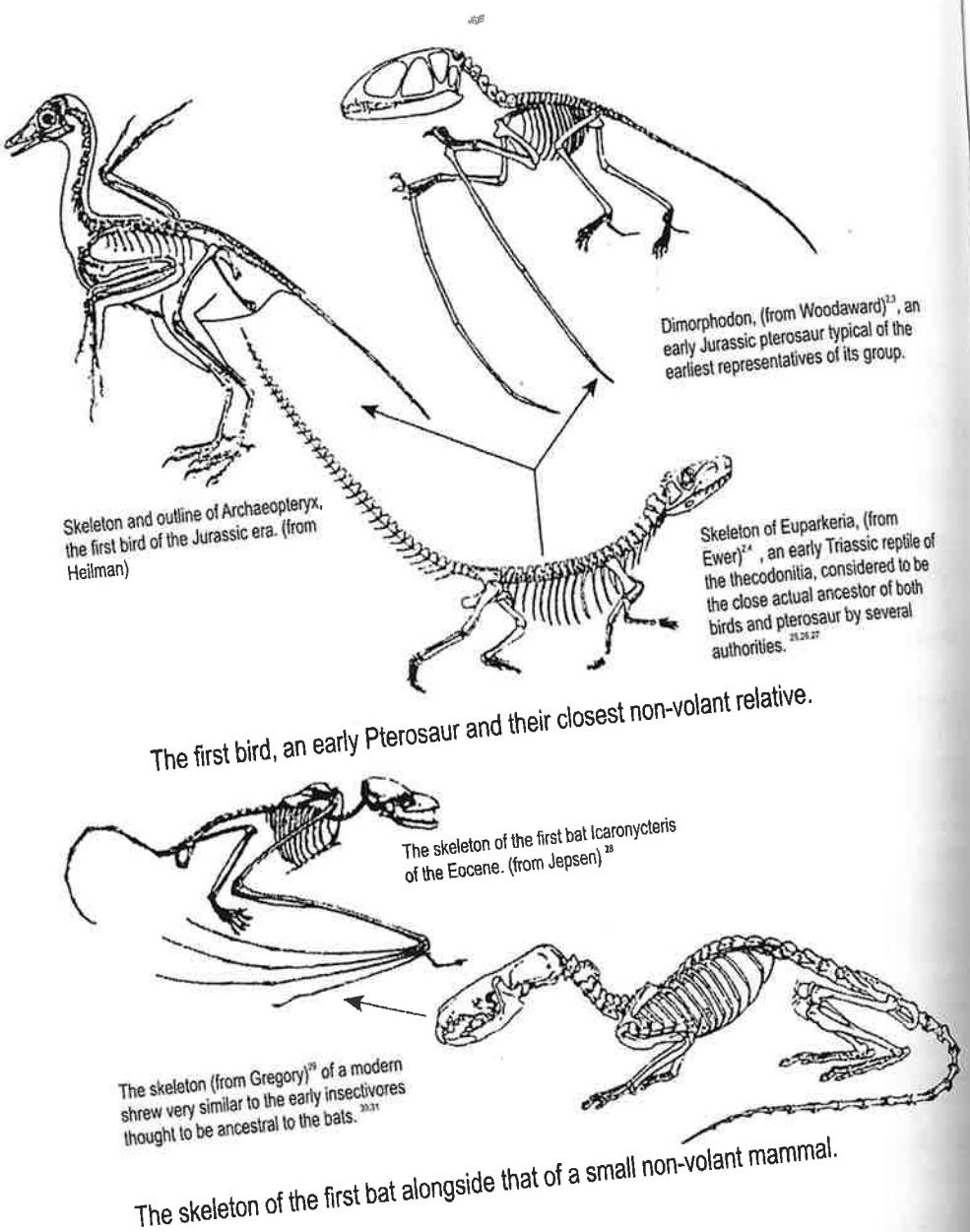


Figure 3.5. Reprinted from Michael Denton, *Evolution*, Adler and Adler, Bethesda, 1986. Publisher extinct.

The truth is that when a new species turns up, it occurs suddenly with no evidence of preliminary forms on the way to it.⁹

3.7.6 Human Mitochondria, Epron

The work of I. C. Epron, S. Anderson, and D. P. Nierlich (35) is helpful in addressing the question of the evolution of man. It gives rise to a nucleo-type sequence spanning the ribosomal genes of human mitochondrial DNA and reveals a complex genome organization wherein the putative tRNA genes are joined around the two tRNA genes. The sequence of the tRNA genes is significantly homologous in some regions to eukaryotic and prokaryotic sequences, but distinctive tRNA genes also have abnormal nucleotide sequences. The authors conclude that *human mitochondria did not originate from recognizable relatives of present day organisms*.

In 19th century terms this is equivalent to the conclusion, "Man did not originate from monkeys."

3.7.7 Can Helpful Mutations Arise from Damaging DNA?

The general idea in neo-Darwinism is that "outside influences can come and affect DNA in cells. It is admitted that nearly all cases of such damage will be unhelpful, e.g., may lead to disease, but occasionally there could be a change which will be helpful to the organism and these are the origins of the evolutionary changes."

This is a hopeful proposition based upon very little. In terms of a macroanalogy, it is like saying that if one shoots shells at a car, the result will be mostly a damaged vehicle, but occasionally the change will improve the car so much that with other helpful changes, it will sprout wings and become an airplane.

3.7.8 "Forbidden Archeology"

It is worth pausing here to ask how far back there is evidence for the existence for *Homo Erectus*. Relevant to this is a remarkable book published by M. A. Cremo and R. Thompson (36). The authors give evidence which suggests the existence of beings equivalent to modern humans many millions of years ago.

Thus, the academic view at 2000 is that men and women in the way we understand them now have existed for only c. 100,000 years. This has been the thought for the last 150 years since Darwin, but the evidence brought forward by Cremo and Thompson is inconsistent with this view. In their book, they publish the opinions of 36 anthropologists who have given their names to praise the revisionary view.¹⁰ These findings of Cremo and

⁹ In a now well known concept, Gould and Eldredge (34) have coined the phrase "punctuated equilibria" in which it is agreed that for long periods of time species undergo little change, and that, when it occurs, it is rapid and concentrated. These eminent authors have given up the mechanism of continually occurring natural selection (2001).

¹⁰ It is salutary here to refer to the work of H. Blavatsky (37). This remarkable woman spent many years in Tibet and then founded the Theosophical Society in London. However, she is best remembered for four very substantial books dealing with cosmology and evolution.

The writing in these books is dense and sophisticated. They contain a vast array of knowledge which Blavatsky claimed that she received from "masters" who are said to have

Thompson are consistent also with other reports on the existence of electrical batteries and electroplating from more than 2000 years ago (38); glass lenses in coal, and complex mechanisms found in wrecks more than 2000 years old (39), the origin of which is inconsistent with the current view of the history of technology.

An unsavory situation reporting censorship and suppression of archeological data by the editors of journals, is presented by Cremo and Thompson. Thus, reports which correspond to a time scale consistent with the Darwinian model are accepted for publication, but when evidence is reported for a much older time of man on Earth, the authors are told that their views are not scientific i.e., do not fit the academic views of the time.

An example of the suppression of data in earlier times relates to a review authored by J. D. Whitney. The paper reports the finding in a California gold mine under many layers of rubble, tools of a relatively sophisticated character, inconsistent with the standard of tool making expected from the academic picture for the time corresponding to the depth of the layer in which they were found. The estimate which J. D. Whitney (40) made was that the tools were about nine million years old, but his paper was rejected because (as the rejecting report said) it did not agree with knowledge about the age of man and Whitney should have known better.

Correspondingly, in the 1950's, Thomas Lee (41), of the National Museum of Canada, found advanced tools in glacier deposits on Manitulin Island in Northern Lake Huron. The tools were argued by geologist John Stanford of Wayne State University to be at least 65,000 years old and possibly 125,000 years old (42). According to the current academic view, human beings were supposed to enter North America from Siberia only 12,000 years ago.

As a result of what he had found, Thomas Lee was hounded from his civil service position into unemployment. His publication outlets were cut off and his evidence misrepresented by prominent authors. Thus, it would have been embarrassing to admit the evidence which was radically inconsistent with the academic view.

Cremo and Thompson (36) show evidence that human beings existed for millions of years in parallel to the apes. There are, they point out, thousands of reports of "wild men" in most parts of the world. In North America these are called the Sasquatch and have different names in various parts of the world. They are surely the remaining Neanderthals, an earlier type of being, who evidently still exists in parallel to the present modern type who have brought civilization to the world, forcing the earlier race to be thrust into the wilderness.

Thus, in considering the question of the development of modern man, we may have to take into account a longer time than is currently considered.

One of the more common errors made in discussion of the theory of evolution is to assume that the time available for the development of the species now on Earth is the age

communicated with her in London, in the last part of the 19th century. The anthropological picture which arose from her writings is more consistent with the evidence given by Cremo and Thompson than is the present academic view. Briefly Blavatsky stated that human beings have existed for millions of years on Earth and that present humans are the fourth of five races to inhabit this planet.

of the planet. This is generally taken as 4.6 B years. There are two arguments against this figure as relevant to chance based (i.e., Darwinian) evolution.

(1) The figure of 4.6 B years is reached by a complex development of a number of radioactive dating arguments. These are made doubtful by Milton (42) in many ways. As an example, one of the dating methods is to use the nuclear process potassium to argon. The decay constant for the reaction is known and if, in a confined space, the air contains more argon than does natural air, it is assumed that it came from the decay of the potassium present. Measurement of this abnormal argon could be used to give the time which the argon has had to form and contribute to an analysis of the age of the object. However, Milton points out with examples that argon leaks into such structures from the surrounding air, hence giving rise to a result higher than that which would have been otherwise obtained.

Milton analyses all the radioactive methods and finds probable errors in them, concluding that the age of the Earth may be much less than 4.6 B years.

(2) A strong argument is given by the evidence that nearly all the species now present on the Earth originated after the Cambrian, i.e., in the last 590 M years. Thus, with intervals of some hundreds of millions of years, the planet is struck by asteroids of size (e.g., 10 km in diameter) such that resulting catastrophic conditions, including intense fires destroy most all of the animals on the surface of the Earth at that time. Development of new species has to occur anew after each of these destructions on the surface of the Earth.

3.7.9 Lamarckism?

The idea of Lamarck (42a) was that evolution could occur through the inheritance of acquired characteristics. Thus, if an organism underwent certain experiences during its lifetime, the effect of these experiences could be inherited by its offspring.

This idea has long been suppressed. In fact the acceptance of Lamarckism would earlier have brought an author's career to its end. However, Lamarckian evolution is now accepted in some animals. Thus, rats developed diabetes after insulin producing cells of the pancreas were damaged by means of a drug. Diabetes then arose in many offspring (34).

3.7.10 Darwinian Evolution at 2000

One must repeat the definition of Darwinism at this point. It is the idea that the various species of living creation (bacteria, fish, birds, man) occurred by means of changes in the mechanism of inheritance caused by chance-based external factors upon which "natural selection" is applied. There would be intermediates as (due to a succession of changes) one species gradually developed into another.

This view runs up against evidence stated in some detail above.

1. Nearly all species now present were *created suddenly* (without forbears) about 0.59 B years ago.
2. Nearly all the mutations supposed by biologists would be harmful. It is not only that one needs one favorable mutation, but many hundreds to bring about a change. But only the final mutations confer a selective advantage upon the species. The many molecular changes on the way to a change in characteristic give no advantage. Why would creatures having them be favored?

3. The fossil record does not show the intermediates expected if one species developed from another.
4. Calculations based on normal scientific assumptions of chance happenings show that a change of species developing in this way is not negligible, but, in effect, zero.
5. Mechanisms found inside numerous creatures (e.g., the back-fire beetle) are so specifically oriented to a purpose that their origin by chance changes becomes a preposterous proposition.
6. Some modern workers (e.g., Eldridge and Gould, 34) have admitted that, for many hundreds of millions of years, no evolution occurs. When a new species arises, it occurs suddenly.

3.7.11 A New Paradigm?

Based upon the present paradigm in Science, - no teleology, - it is not possible to explain wherefrom came the various species existing now. As with the origin of Life, we do not know how such species (with their great complexity at the molecular level) came to be.¹¹

Thus, the presence of so many different forms of life on this planet cannot be explained on the present chance oriented theories of biological change.

3.8 RELATIVITY

3.8.1 Introduction

Relativity is the name of that part of Physics which is most recognized by the public. Correspondingly, Einstein's name has become the only name remembered among the several eminent scientists who founded the subject. Because of a number of counter-intuitive conclusions to which the Relativity Theory leads, Einstein's name arouses much public wonder.

However, in spite of the widespread acquaintance with the word, and the statement sometimes made that the Relativity Theory has "revolutionized physics," the fraction of scientists who can tell one the essentials of what it states is tiny. This is the more remarkable in that, - once one fundamental new assumption has been understood, - the bare bones of the subject are easy to understand. Indeed, most of the assertions, which are seen as originating with Einstein, had been suggested - and published - earlier.

Here, we shall deduce a few essential equations basic to the theory and then ask if there is any modern work which puts the theory into doubt.

Two initial clarifying points must be made.

(1) Phrases often used to describe the two parts of the theory: "The Special Theory" and "General Theory" of Relativity do not describe results to which the theories lead.. The Special Theory concerns the relative motion of bodies as understood in high

¹¹ However, micro evolution, - evolution *within a species* (e.g., the numerous kinds of dogs) certainly occurs and the question is how, for it, too, would require a large number of coordinated molecular changes, the probability each of which except the final one, is not seen to give advantage. Breeding of particular new sub-species, - e.g., the Doberman-pincher dog was evolved under forced conditions of artificial selection.

school physics (problems concerning the velocity of one train with respect to another), but now taking into account the fact that information about events is carried by light, which takes a finite time to come from the focused object to the observer. A more accurate name would be: "Observations of a stationary observer about an object moving near to the speed of light."

The General Theory extends the considerations to take into account acceleration and also deals with the consequences of the fact that massive bodies (e.g., stars) attract light so that its path is distorted near such bodies.

(2) It is generally agreed that Modern Physics rests on two pillars, Relativity and the Quantum Theory. However, whereas the practical realization of ideas based on quantum concepts lives in solid state devices, e.g., the transistor, and other practical developments, such as photovoltaics. Einstein's work is not relevant to the daily lives of people. The so-called Special Theory has most important application only to objects (e.g., those created in particle accelerators), traveling at speeds near to that of light. (But $E = mc^2$ is relevant to such practical matters as nuclear power - i.e., fission.) It also depends for its validity on the null result presented in textbooks concerning the Michelson-Morley experiment.

3.8.2 A Critical Experiment: Michelson and Morley

This famous experiment was carried out at the Case-Western Reserve University and published in 1887 (43). The experiment was devised by Michelson, who was assisted by Morley in doing the experiment. At the time it was universally assumed by physicists that events took place in a medium called "the ether," which extended throughout all space. Thus, one of the most successful theories of physics is Maxwell's theory (1864) of (the basis of the later developed radio and television) and this theory is based upon the idea that, when light travels, it does so by acting upon a medium, - the ether.

Michelson set out to scrutinize this idea and his thinking seems to have begun with the analogy of a boat traveling in a tidal river: (a) with the flow of the river, and (b) against the flow of the river. Obviously, in the boat's case, it would travel faster relative to a stationary object when going with the flow of the river than against it. The question was, would light do the same, - going faster (with respect to a stationary observer) when it ran with the rotation of the planet and slower when traveling against it.

Knowing the speed of rotation of the Earth at the place of the experiment, Michelson calculated the expected difference of the two velocities, $c + v$ and $c - v$, where c is the velocity of light and v the surface speed of the Earth at the place where the experiment was done. The velocity of light was known fairly accurately at this time to be 2.99×10^8 meters per second. Compared with this, the velocity of rotation of the Earth (around 4×10^3 meters s^{-1} at the equator) was tiny, so that great accuracy was needed in the measurement of the velocity of light in the two opposite directions. It exceeds our scope to describe the instrumentation used (though see a special edition of *Twenty First Century Science and Technology*, Spring, 1998): suffice to say that it involved observing and comparing interference fringes of two beams of light, differing only in their direction.

The result of the Michelson-Morley experiment was a surprise to physicists of the time. Thus, Michelson and Morley could not find any change in the velocity of light as measured at various angles to that of the movement of the Earth.

There are several interpretations of this fundamental result. For example, the hypothetical ether could be taken as moving, at least near the surface of the Earth, with the latter's velocity. However, the dominating interpretation which has been made of the observation is that there is no stationary ether through which the light moves.¹² (This conclusion, provides a problem for Maxwell's theory of light, because here the oscillations of the electric and magnetic vectors are modelled as occurring in the ether.)

The Michelson-Morley result may have formed the experimental foundation of Einstein's development of the Relativity Theory. Einstein sometimes admitted knowing of the experiment and sometimes said that he had not heard of it (44). Whatever the correctness of the Michelson and Morley result, it has remained an unshakeable basis of Relativity Physics, impervious to the publication of modern repetitions of the experiment, in which, in fact, differences in the velocity of light as a function of its direction with respect to that of the rotation of the Earth have been found (45), and those, of course, may be interpreted to bring back an ether.

3.8.3 The Basic Assumption

The impression is often given that the achievements in Modern Relativity Physics were entirely due to Einstein. This is far from the truth. Two great scientists who developed the relativity theory, later contributed to by Einstein, were the German physicist Lorenz (47) (Theory of the variation of length with speed, an idea first suggested by the Irish physicist, Fitzgerald (48)) and the French mathematical physicist, Poincaré. In fact, Poincaré had developed and published much of the structure of relativity, his work being based on that of Lorenz, by 1904 (Einstein's first paper on Relativity was published in 1905). Poincaré even wrote in his 1904 paper (44), "Perhaps it is necessary for us to regard the velocity of light as a fundamental limiting velocity," one of the main ideas attributed to Einstein.

Thus, if one considers the velocity of light in a beam issuing from a stationary source, numerical value of the velocity is quoted above ($2.99 \cdot 10^8$ m. sec⁻¹), and well known by 1905. Now, if one considers the velocity of light (as observed by a stationary observer), as issuing from a moving source (of velocity v), one might expect the observer would see the light traveling at $c + v$.

Einstein's suggestion was counter to this thought. According to him, the velocity of light (seen by a stationary observer) was a constant, *independent of the velocity of its source*. No justification was given for this assumption, the difficulty of the understanding of which is best appreciated if one thinks of light as a stream of photons.

This assumption gives rise to puzzlement to those who first hear of it. To make clear what Einstein meant, one can consider three thought experiments. In the first, the velocity of light (represented by c) is measured when the light is traveling between two stationary observers. In the second, the observers are approaching each other. Although the intuitive thought is that the velocity of light, as observed by a stationary observer, would appear to be increased, it is taken still to be c . The third thought experiment concerns the two observers retreating away from each other. In this case, one expects a stationary

¹² Therefore, no "river" to affect the velocity of the light.

observer, measuring this light, to find the velocity apparently decreased compared with that measured between stationary observers. In fact, it is again assumed by Einstein to be c .

How is it possible for so counter-intuitive an assumption to be correct? The answer is not an easy one. Attempts can be made to devise experiments to test it. However, the trouble with decisive results for experiments in relativity is that the velocity of light is *so* big and the movement of anything controllable on Earth (outside a particle accelerator) is *so* small compared with it, that devising experiments with sufficient sensitivity is difficult. The success or failure of the counter intuitive assumption depends upon the consistence of the equations worked out on the basis of this assumption. We shall return to this later.

3.8.4 Simultaneity

The counter intuitive assumption that the velocity of light is independent of the motion of its source is followed by results of certain thought experiments which are correspondingly different from what one might expect. Most of the thought experiments involve science-fictional objects (cf. the star ship Enterprise) imagined to be traveling at velocities comparable with that of light. A well known counter intuitive indication is the surprising statement, "There is no simultaneity."

The way in which relativists arrive at this conclusion needs some preliminary material. It relates to an attitude advocated by the German Physicist, Ernst Mach (cf. Mach as a unit by which the velocity of fast flying aircraft is measured). Mach was an extreme skeptic. He sought, particularly, experiments in which he would not be deceived. It was what he, as the observer, observed which has to be taken as truth. Correspondingly, Einstein insisted on calculating what the *observer sees* of events instead of treating the events. It was what the *observer sees* which counted and any back interpretation of why the observer received information which may be counter intuitive or illusional is less interesting (for any "interpretation" involves doubt) (Fig. 3.6).

With this in mind, then, let us proceed to find out how such an apparently outrageous statement as "there is no simultaneity" may be rationalized.

As is frequently so in discussion of relativity theory, the demonstrations involve imaginary happenings of near to impossible events. A corresponding attitude exists, e.g., in the theory of thermodynamics which uses extensively the concept of a "reversible reaction", defined as a reaction so evenly balanced in its tendency to go forward or backward that it can be sent in either direction "by an infinitesimal force". Clearly, such a balanced experiment cannot be realized in reality, - though one may approach it closer and closer.

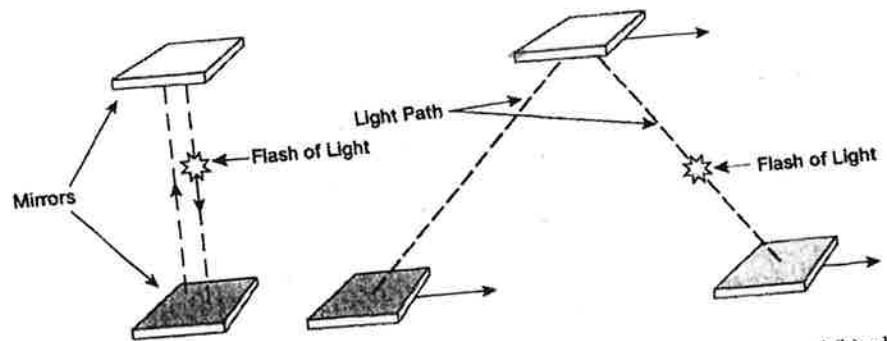


Fig. 3.6. Path of light by which observer sees object, (a) when object is stationary and (b) when it is moving. From T. Hey and P. Walters, *Einstein's Mirror*, Cambridge University Press, 1997. Reprinted with permission of Cambridge University Press.

With this preamble, then, let us assume a stationary observer of a space vehicle, traveling away from him at $0.9 c$. In this vehicle stands an astronaut with two identical pistols. He is exactly in the middle of the vehicle, i.e., its back and its front are at exactly the same distance from him. Further, this idealized astronaut has an observer on the space vehicle and he sees that the astronaut raises both his left and right hand, each containing identical pistols with identical characteristics, and fires both exactly at the same moment, as observed by this observer traveling with the astronaut on the space vehicle. Clearly, *within the vehicle*, the observer standing opposite to the astronaut observes the bullets striking back and front of the vehicle at the same moment. The apparent necessity of the observer being able to see back and front at the same time could easily be overcome by using an appropriately instrumented machine. Here, therefore, for the observer looking at happenings in the space vehicle, there is simultaneity.¹³ However, Einstein, following Mach's concept (the positivist viewpoint it is called) took the attitude that the only thing which mattered is what the observer saw on Earth, for this can be verified fact.

Now, for this observer, the collision of the two bullets with the front and back of the space vehicle does not occur simultaneously at all. This is because the observer has to wait for the information about the two shots (carried by light traveling at c) to arrive. Thus, for a vehicle traveling away from Earth the back of the vehicle is nearer to Earth than the front. Hence, the observer receives the message from the back of the vehicle a tiny fraction of a second before the light from the (further off) front arrives. As far as the observer is concerned, then, the shots were fired not simultaneously but he finds that there are two shots, fired successively. An alternative attitude (against Mach's principle) would be to conclude that an error was introduced into the stationary observer's impression because he has to wait for the light to bring him the message, traveling further from the front of the vehicle than from the back. He could then calculate that the bullets did indeed arrive simultaneously at back and front.

¹³ To be accurate here, it must be assumed that the space vehicle is very far from any big object, e.g., the planet Mars, - which might interact by gravity with the bullets slightly differently, in their movement towards front and back of the vehicle.

3.8.5 The Effect of the Velocity of a Moving Object on the Time Measured by a Stationary Observer ("Time Dilation")

Consider a box with a mirror at either end (44)¹⁴.

Thus, an observer, standing at O, is the source of a flash of light directed vertically upwards, towards the mirror at M, and he will have to wait:

$$T_{\text{obs}} = \frac{2L}{c} \text{ sec.} \quad (1)$$

for the return of the flash (i.e., the message), where L is the vertical distance O to M (cf Fig. 3.6). Now, the object takes off and travels in a straight line at $v \text{ cm sec}^{-1}$ for t sec (cf Fig. 3.6).

The time it takes for the flash emitted at O to reach the moving object is clearly:

$$T_{\text{obs},v} = \frac{2\left[L^2 + \left(\frac{vt}{2}\right)^2\right]^{1/2}}{c} \quad (2)$$

Now,

$$(ct_{\text{obs},o})^2 = 4L^2 \quad (3)$$

Hence,

$$4L^2 = t_{\text{obs},v} (c^2 - v^2) \quad (4)$$

Or,

$$(ct_{\text{obs},o})^2 = (t_{\text{obs},v})^2(c^2 - v^2) \quad (5)$$

$$t_{\text{obs},v} = \frac{t_{\text{obs},o}}{\left(1 - \frac{v^2}{c^2}\right)^{1/2}} \quad (6)$$

Here, $t_{\text{obs},v}$ is the time as observed by a stationary observer, of the object, traveling at v and $t_{\text{obs},o}$ is the time for the observer to see the object when it is stationary.

Hence, the time it takes for a message to reach a stationary observer is greater when the observed object is traveling at v compared with the time needed when the object is stationary.

The evaluation of the result (6) has been made in a simple way (44). However, it gives the essential result. Basically, it states that, if an object is moving, the time it takes for an observer to see it, is greater than the time taken if it is stationary. Relativists expanded

¹⁴ These and the following deductions owe much to material given in the Appendix of the book on Einstein's contributions to Relativity by Hey and Walters (44). This book presents easy-going ways of obtaining several equations central to Einstein's contribution.

this simple conclusion to the following generalization: According to a stationary observer watching a moving vehicle, "time passes more slowly than when the object is stationary."¹⁵ To see eqn (6) in action, let us take a practical value of v , say, the 600 mph of a jet aircraft.

Then $v = 600 \text{ mph}$ and $c = 2.9979 \cdot 10^{10} \text{ cm sec}^{-1}$. After conversion to the same units, $\frac{v^2}{c^2} = 10^{-12}$. Thus, one can see that observers, of a fast moving (real) object experience a time dilation which, for all but atomic clocks, is unobservable because it is so tiny.

Hafele and Keating (50) flew round the world with an atomic clock and then flew back again in the other direction to compare the time registered by their clock, which had traveled at $\sim 600 \text{ mph}$ around the world twice with the time registered by atomic clock which had remained stationary.

It was necessary to take into account the effect of gravity on the speed of the clock. Gravity is very slightly weaker at a height above the Earth so that, on this ground, the flying clock goes a little faster. The final result calculated after correction for this effect agreed with (6) to within about 10%. Other tests have been made (50).

The extremely small time dilation indicated by (6) for normal fast speeds are transformed dramatically for what might be called cosmological speeds. Thus, there are objects in very deep space which are calculated, according to the Big Bang theory, to be traveling at substantial fractions of c , relative to the Earth. If one considers a galaxy retreating from us at $\frac{c}{2}$, then (6) shows that time as seen by a stationary observer is 16% greater than the time observed by the observer of a stationary object.

Would the observer on board a hypothetical spaceship moving at $\frac{1}{2}c$ see his watch go slower? No. The time dilation is what the stationary observer sees about the moving object. To a stationary observer, it seems that the clock on the space vehicle is running slow. This phenomenon of time dilation is the origin of a thought experiment devised by Einstein. It is called the twin paradox. Twin A takes off in a super-fast space vehicle traveling at $0.99c$. Twin B stays at home. The time dilation factor according to (6) is now about 7 times. According to the waiting twin, the journey will be seen to take seven times longer than the time perceived by the twin on the space vehicle. If the traveling twin thinks he has been away for 2 years his brother registers it as fourteen years.

This twin paradox has been argued about ever since Einstein suggested it - nearly a century ago. There are several factors which one has to take into account (e.g., acceleration and turn round of the vehicle from its destination compensatory effect, on the return trip). However, the consensus is that the prediction is true, - although a test might have to wait till the next century (51).

¹⁵ This conclusion (a result of the longer time taken by light to reach the observer) is called "Time dilation."

3.8.6 Velocity Addition (44)

$$v_{\text{Rel}} = v_1 \pm v_2$$

Relativity predicts that Newton's Law of addition is incorrect for a hypothetical vehicle which travels at velocities near to that of light.

Consider a train moving in a straight line.

We consider an observer standing on the track, stationary and ask what he sees.

Now, there is another observer, - this time on the train.

The observer on the train starts a strange race. He projects a bullet up the corridor of the train. At the same time, he projects a beam of light on the same pathway. There is a mirror at the end of the train and the beam is reflected backwards towards the observer on the train. If this observer has science fictional glasses, he sees, the bullet slowly making its way up the corridor while the light ray zips to the end of the corridor, zips back again and stops when it meets the slothful bullet. Let it be supposed that the returning light meets the bullet at a fraction f , of the length of the train, as measured from the front.

Now, we have to find f . It is an objective and definite quantity. Hence, the observer in the train and the observer on the track must agree on its value.

To find out what f is, we make use of three observations.

(1) The distance the bullet has moved until its encounter with the returning photons.

Let us take t_1 as the time it takes for the photons to reach the front of the train and t_2 as the time for the photon to return to meet the bullet, f from the front of the corridor.

Then:

$$w(t_1 + t_2) = c(t_1 - t_2) \quad (7)$$

where w is the speed of the bullet, as seen by the observer on the train.

(2) We now consider the distance the photon has covered in going from the back to the front of the train. As the photon always travels at c , the distance is simply:

$$L = ct,$$

where L is the length of the corridor.

The observer on the track sees the bullet as having covered the distance:

$$L + vt,$$

where v is the speed of the train and L is the length of the corridor/

Hence:

$$ct_1 = L + vt_1. \quad (8)$$

(3) How far has the photon moved in going from the mirror back to the bullet? It appears to the stationary observer as:

$$FL - vt_2 = ct_2 \quad (9)$$

Here, v is the velocity of the bullet as seen by a stationary observer on the track.

Equation (7) can be rearranged (44) to give:

$$\frac{t_2}{t_1} = \frac{c-w}{c+w} \quad (10)$$

If one takes (8) and (9) as simultaneous equations, one can eliminate L , the length of the train. One finds an alternative relation for t_2/t_1 :

$$\frac{t_2}{t_1} = f \frac{(c-v)}{c+v} \quad (11)$$

(10) and (11) are equal and hence:

$$\frac{c-w}{c+w} = f \frac{(c-v)}{c+v}$$

$$f = \frac{(c+v)(c-v)}{(c+w)(c-v)} \quad (12)$$

Or,

This gives us f in the view of the stationary observer *on the track*. How about the fraction f (i.e., the fraction of the length of the train at which the bullet meets the returning photon) from the point of view of an observer on the train? We now do it all again, for an observer on the train. He sees the bullet traveling at u .

$$f = \frac{c-u}{c+u} \quad (13)$$

Now, f doesn't vary with the train's speed. Hence, (12) and (13) must be equal:

$$\frac{c-u}{c+u} = \frac{(c+v)(c-w)}{(c-v)(c+w)} \quad (14)$$

We solve these equations for w , the speed of the bullet as seen by an observer on the track. The answer (44) is:

$$w = \frac{u+v}{\left(1 + \frac{uv}{c^2}\right)} \quad (15)$$

If the velocity of light were infinite:

$$w = v + u$$

To reiterate the definition of the velocities:

v is the velocity of the train seen by the stationary observer on the track.
 w is the velocity of the bullet, seen by the stationary observer on the track.

u is the velocity of the bullet, seen by a stationary observer on the train. It is usually said that the Einstein equations "disprove" those of Newton. However, the formulas given show that up to the case of a body moving at, say, $0.1 c$ the difference which results from Newton and Einstein is for most purposes negligible.

3.8.7 Time

It has been demonstrated that a stationary observer, looking at a *moving* object, will think that an event taking place on the moving object would take a longer time than he would observe the event to take if the object were stationary.

Einstein took the attitude that, because a stationary observer would see an event on the moving object at a small time *after* he would see the same event if the object were stationary, as justifying the statement: "time itself is relative".

Is the statement "Time is relative" a reasonable description of what we have deduced in equation (6)? This is the case if attention is always focused on what the stationary observer sees. Indeed, one might ask, - what else is to be expected if he has to wait for the message carrying light to reach him.

Thus, the attitude taken in Relativity theory is not to explain that the observer has to wait for a message to get to him. One could as well say: "The time of an event occurring on a moving vehicle appears to a stationary observer to be slower than it actually is." Relativists do not say that these effects are created by the fact that it takes time to deliver the message. For, according to Mach, it is what the observer sees which counts, never mind how it occurs.

Thus, there seems nothing simpler for the stationary observer who sees the traveler on the train doing 80 mph, walking away from him at 4 mph, and to get the impression that the man on the train is doing 84 mph. However, according to equation 15 an observer sees the movement of the man at a tiny bit less than 84 mph.

Putting the numbers into equations (6) and (15) shows that at all realized speeds for objects one meets on Earth (outside particle accelerators), the difference between time as seen flowing steadily and the time seen in an Einsteinian relative way is in all practical ways, undetectably small. But the equations may have practical application in observations which astronomers make on objects traveling away from the Earth at speeds calculated according to the Doppler theory of the red shift as near to c .

3.8.8 Momentum

The equation for momentum (mv_o) in terms of the Relativity Theory is

$$p = \frac{m_0 v}{\left(1 - \frac{v^2}{c^2}\right)^{1/2}} \quad (17)$$

where m_0 is the mass of the vehicle at zero velocity (rest mass) and v is the velocity of the vehicle seen by an observer at rest.

Thus, momentum increases with velocity and tends to ∞ at v approaches c . At all practical speeds, the momentum is just the Newtonian one. The exceptions would be particles in accelerators and (perhaps) galaxies at the edge of the observable universe.

3.8.9 Mass

Some people take mass to increase with velocity, as well as the momentum. They write:

$$m_v = \frac{m_0}{\left(1 - \frac{v^2}{c^2}\right)^{1/2}} \quad (18)$$

where m_0 is the mass at zero velocity. Thus, again, there is no difference at attainable speeds but there will be a meaningful difference for objects portrayed in the Science Fictional literature.¹⁶

3.8.10 $E = m_0 c^2$

This famous equation arises from considerations similar to (but more complex than) those given above. Although the equation is attributed to Einstein, others had earlier deduced a similar equation in special cases. One of these was J. J. Thompson (52), who, already in the 19th century had shown the energy of an electron in a magnetic field involves mass as energy divided by c^2 . Another was from the work of Hasenöhrl (53) who published a similar deduction (before Einstein's) for an electron in an electrostatic field.

What does $E = m_0 c^2$ mean? The energy described by $E = m_0 c^2$ is the energy to annihilate a mass, m_0 . What is meant by "annihilate"? It means to convert a body of mass m_0 , entirely to energy in the form of radiation. This is a difficult thing to do. However, it can be achieved in the case of subatomic bodies in a discharge tube. In certain collisions the particles are annihilated and only radiation is left over. The energy of such a reaction, where the mass is literally "no more", is $m_0 c^2$ (where m_0 is the sum of the masses of the two particles, each at rest).

Consider, for example, one gram atom of, say, gold. 197 grams per gram atom is the rest mass of a gram atom of gold. The rest energy is - using the well known equation - comes to -1.7×10^{13} kilojoules. For comparison, the heat of sublimation is 3.7×10^2 kilojoules per gram atom.

Alternatively, consider a gram atom of uranium undergoing a nuclear reaction involving a change in energy of 5 Mev, then the mass consumed during the reaction is this

¹⁶ We shall not again mention the galaxies alleged to be traveling near to c , because the idea that there are such objects depends on a theory which is itself shaking (See Big Bang section).

quantity divided by c^2 and comes to about 6 milligrams. The mass of a gram atom of uranium is 238 g.

It is sometimes said that Einstein was a pioneer in nuclear energy and in particular that the atom bomb depended upon $E = mc^2$. However, nuclear reactions were discovered by Rutherford and Chadwick in 1919 (54). Their work was to investigate the effect of neutron bombardment of light elements whereupon a new atomic species resulted. Measurement of the energy change in nuclear reactions of the heavy elements was first accomplished by Otto Hahn and Lise Meitner in 1937 (55) in work which involved the bombardment of uranium with neutrons. (They hoped to create trans-uranic elements.) It was then realized that, under certain conditions, such reactions would lead to a break up of the uranium into atoms of smaller atomic weight, - and, moreover, produce more neutrons than had been initially used to bring them about, i.e., there was a positive feed back effect which would lead to a rapid acceleration of the fission reactions as each step would produce four neutrons each of which would cause a fission reaction yielding four more neutrons. This series of ever increasing reaction rates would produce heat so fast that it would give rise to an explosion of a magnitude not before seen: an atomic bomb explosion.

Thus, the atom bomb (and, later, the slowed down and steady state use of these nuclear reactions to produce useful energy) was not brought to fruition because of $E = mc^2$, though the tiny amount of mass consumed in them ($\sim 10^{-3} \%$) can be calculated from the equation.

Einstein came importantly into the picture later, when he wrote a letter to President Roosevelt, bringing his attention to the new type of reaction and to the possibility of its use as a weapon of unprecedented power (and this letter prompted action which led to the Manhattan Project and the creation of the first atomic explosion at Alamogordo, NM, in 1945). The political consequence has been that we have been free of major wars since 1945 (for powers having nuclear weapons fear to use them because of the terrifying possibilities of a counter strike.)

3.8.11 The Effect of Gravity on Light

Looked at in 1915, it seemed an unlikely proposition that gravity affects light, - i.e., that light passing by a heavy body, e.g., a star, should be deflected in its path. One can make a heuristic discussion of the matter in a very simple way.

The classical formula for the gravitational force of attraction between bodies of mass M and m is where R is the distance between the centers of the two bodies and G is the gravitational constant, while M is the large mass attracting the small one, e.g., a photon. However, $E = mc^2$ (a relativistic result) and $E = hv$, a quantum mechanical result. On equating these two energies, one obtains an equation for the effective "mass" of a photon:¹⁷

$$m = \frac{hv}{c^2}$$

where v is the frequency of the light concerned.

¹⁷ The result may be thought to involve a paradox because the photon must travel at c and a body traveling at c has infinite mass. However, this result depends on a finite rest mass. This is zero for the photon.

Thus, with (19): and realizing the heuristic nature of the calculation (Einstein's differed by a factor 2), the gravitational force on one quantum of light is:
Thus, there must be a tendency for a body of mass M to attract (i.e., change the path of) a light beam of frequency, v.

A result having the same meaning as this had first been obtained by Soldner in 1803. Einstein derived a similar result as part of his General Theory of Relativity and drew attention to his equations as though they presented a new thought (for doubtless the idea of gravitation affecting light was new even to cosmologists at the time, 1917). There was much curiosity about the possible verification. It was realized that, - if true, - it would have relevance to astronomy and the location of stars (for, earlier, it had been assumed that light would arrive from stars without disturbance of a straight line path).

However, it is not easy to set up a situation in which - as calculation shows, - the effect of gravity on light would be significant.

It turns out that it is only if M is the large value typical of a star that the effect is large enough to be observed. An eclipse of the Sun was chosen as the time in which a test of an equation similar in result to (20) could be made, for then, light from a heavenly constellation behind the Sun can be observed passing very close to it. In 1919, Eddington, a cosmologist of renown from the University of Cambridge in England, led an expedition to the remote island of Principe off the coast of West Africa, an area of the world from which (he said) it would be possible optimally to observe the eclipse. Eddington was able to take two photos of the apparent position of a star, the light of which could be seen to "graze" the sun during the eclipse and, then, afterwards, he compared the apparent position of the star (which involved the possible distortion by the bending of light) with its position as known by a calculation made independently of the bending of light. There was a tiny difference, i.e., the light passing near the sun had been drawn towards it, thus distorting the apparent position of the star. Thus, *gravity does indeed distort the path of light*.

There was jubilation among physicists when the result was announced, because it seemed so novel. Physicists at the time did not realize that the verification was of a result already suggested 116 years earlier, and attributed it to Einstein, as though it was new. Their excitement spread to the press and gave rise to much hype. Einstein responded well to being thrust into the limelight for the first time. His deduction of the bending of light had come out of his equations in his 1917 paper on General Relativity and had not been an isolated deduction such as that which Soldner had suggested earlier, and he clearly thought the adulation justified. The press found Einstein a good subject for copy. He talked to them easily and even made jokes¹⁸ which could be printed, - thus avoiding too much of the heavy stuff about gravitational forces, photons, etc..

However, seen in the fullness of time, this jubilation, and the deification of Einstein which resulted from the press attention to him, was overdone. It was not only that the bending of light in a gravitational field had been discussed earlier! More serious was the

¹⁸ One of the stories told about Einstein typifies these. He liked boating and one day, off the coast of Long Island, he was accidentally thrown into the water, - and was observed, clinging to the boat. When the rescuers came, Einstein remained cheerful. He understood that it was thought by Americans that German men did not at that time bathe daily, and it would be presumed in America that this infrequency in bathing applied to Einstein. With this in mind, Einstein (while still in the water) shouted to reporters who had accompanied the rescuers: "And tell them that I take a bath."

fact that later examination of the results of Eddington's experiment showed that the observed changes were too small to be used to establish the theory (58). This did not deter the deification of Einstein and it was said by some that the formulae in his theory indicating the bending of light was his greatest achievement. Soldner's earlier work was forgotten.

As we shall see later, the press and public adulation¹⁹ of Einstein's presentations has led to a situation at the millennium whereby critics of the Relativity theory are dismissed as cranks and editors of leading journals refuse to publish their papers.

3.8.12 The So-Called General Theory of Relativity

The Special Theory of Relativity, which has been briefly discussed above, concerns the effect on a stationary observer of his view of bodies and how their velocity moving at constant velocity (when comparable to the velocity of light) affects the time at which he will see the body at a distance from him.

The General Theory of Relativity, introduced by Einstein in 1915 (59), develops the theory further, and in particular, takes into account the effects of acceleration and the

$$\text{Force} = \frac{GMm}{R^2} \quad (19)$$

results of the effects of heavy bodies (e.g., stars) on the path of light passing near to them. The Eddington experiment of 1919 was taken as verifying that light is bent by gravity. But Einstein took this result to a much more attractive (Machian) description, i.e., that time itself is changed (bent if you will) in the proximity of a heavy object, because the time it will take for the light from a star to get back to the stationary observer will be increased as a consequence of the deflection of the light.

3.8.13 Space-Time

One of the scientists who followed Einstein's work closely was his former teacher, Herman Minkowski (1864-1909), Professor of Mathematics at Göttingen. He pointed out an interesting (if obvious) thing. Thus, when one observes a star, - one outside our galaxy, -

¹⁹ As with most of us, Einstein was not averse to adulation. Much later, in 1954, when he was at Princeton, the gloss had faded. Physicists had left Relativity and were interested in other fields, - high energy physics, for example. Einstein spent the mornings in his room in the University, trying (as he had done since 1915) to work out a unified theory, one which united quantum theory and relativity. At Princeton in the 1950's, he was somewhat relegated to "that old chap at the end of the corridor, can't speak English properly."

I had become a Professor at the University of Pennsylvania, in Philadelphia, in 1953. Princeton is only 50 miles north of Philadelphia and thus, occasionally, people would drop by who knew Einstein personally, - or at least heard first hand the stories about him circulating in the Physics Department at Princeton. One such story (perhaps imagined) concerned Einstein's interest in standing in line at the cinema. "Ah!" he is reported to have said to a colleague, "let us go and stand in line at the cinema - people will say: 'There's Professor Einstein.'"

say, - the light from it may have been traveling at c for millions, sometimes even billions, of years. Indeed, when we study a star, it may long ago have burned out, and been reduced to an invisible neutron star. We are seeing it as it used to be in an earlier epoch.

Therefore, Minkowski (60) suggested, observations taken without reference to the time the light has taken traveling may be deceptive.²⁰ In space (and theoretically on Earth) the time at which an event occurs should not be taken as that at the instant of observation but referred to the estimated time at which the light left the light emitting object.

This, in turn, led to the introduction of a concept called space-time. The immensity of astronomical distances is well known. Thus, restricting ourselves to our own galaxy, this is such (about 10^{18} km) that it takes about 10^5 years for light to cross it.

It has, therefore, become important in cosmology to talk not about a certain place but a certain place at a certain time. Hence, time and distance - space - are linked together and it is more meaningful to refer not to space alone or time alone, but to space-time. Of course, again, the meaningfulness of the concept shows up only at astronomical situations.

Minkowski's idea can be understood (to a degree) if one artificially suppresses two of the three space dimensions, x , y , and z , and assuming that motion is only in one dimension, say, x . With this simplification, a space time diagram looks as shown in Fig. 3.7.

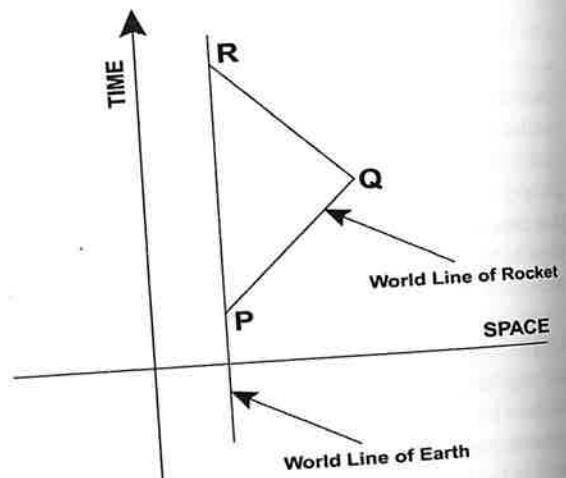


Fig. 3.7. Space time, illustrating the one dimensional travels of Laden and the stay-at-home decision of Hussein.

Now consider two colleagues, Hussein and Laden. They meet together at point P (which could be Baghdad), i.e., are at the same place at the same time. Hussein decides he will stay put, so that his time line is simply vertical in the space-time figure. Laden, however, decides to visit Kabul, Afghanistan, so his time line is P-Q. On arrival in Kabul, he decides he prefers Baghdad and comes back along Q-R to meet Hussein again, later, at R (Baghdad).

²⁰ It is curious that the real happening, independent of illusions connected with the velocity of light, should now be introduced in opposition to Mach's Principle. The reason is perhaps that, with astronomical observations, the difference for what is observed and what is really happening at the time of observation is very large.

There is much one could say about Minkowski's space-time diagrams, but the material is quite complex (e.g., it turns out that the time Laden's experiences in getting back to Bagdad (R) may be less (not more) than the time Hussein experiences traveling between P and R. In the next section, I shall mention some effects predicted by space-time which are very counter-intuitive.

In the era in which Einstein read Minkowski's result, it was thought that the galaxies must be uniformly distributed in space and that, therefore, light (and hence space time) would be bent towards the assumed wall of galaxies "at the edge of the universe" (bending of light by mass) (Fig. 3.8). This is the origin of the often made statement that "Space is curved." In fact, it resonates again with Mach's view that only observations count. What is meant is that space would appear to be curved, if there were a uniform wall of galaxies surrounding us.

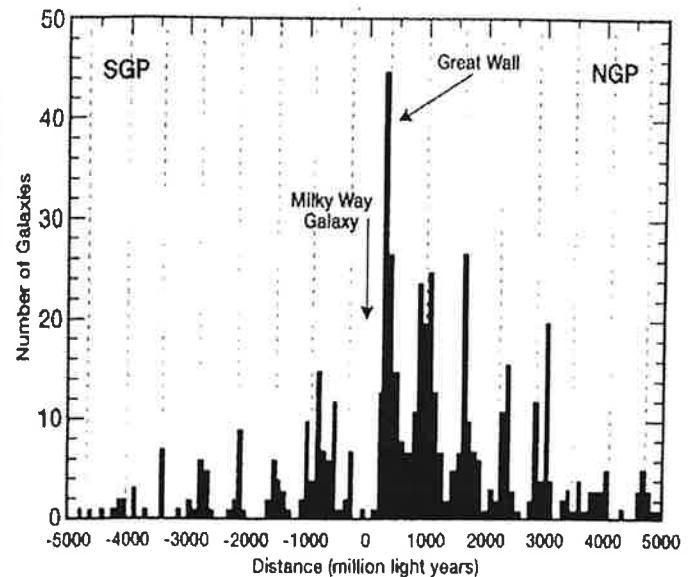


Fig. 3.8 Reprinted with permission from Paul La Violette, 1995, 2004, *Beyond the Big Bang*, Park Street Press, Rochester, Vermont.

The concept of evenly distributed galaxies "at the edge of space" is true with findings from the Hubble space telescope. In Fig. 3.9 one sees a map of the galaxies, as known at present, and it will be seen that galaxies are by no means regularly distributed but many form a "wall" in one part of the universe. The idea of curved space is hence more difficult to maintain.

The apparent curvature dominated by the mass of the galaxies, would be much distorted.

Likewise, the "General Theory" is associated with what is called a Theory of Gravity and this is also attributed to Einstein. However, the cause of the bending of light is gravity, which remains uninterpreted today as in Newton's time.

A map showing the locations of galaxies lying within half a billion light-years of our galaxy, which is positioned at the center of the circle. The nearest supercluster complex, named the "Great Wall".

Consists of an immense sheet of galaxies measuring about 600 million light-years in length, 200 million light-years in width, and 20 million light-years in thickness. Adapted from Geller and Huchra, "Mapping the Universe."

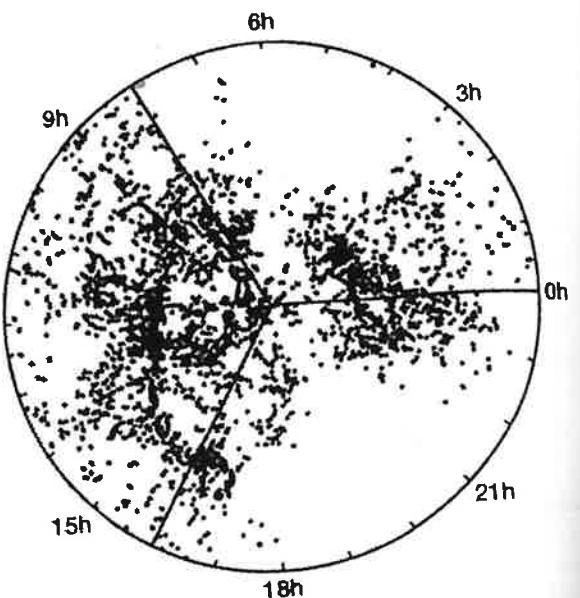


Fig. 3.9 Reprinted with permission of Paul La Violette, 1995, 2004, *Beyond the Big Bang*, Park Street Press, Rochester, Vermont.

Relativists continue to talk of Einstein's theory of gravity and the reason is as follows. Thus, in the so-called general theory, "curved space" comes out of considerations of the theory which shows that light is bent near heavy objects. Hence, it becomes a matter of choice. Should one say that light is bent by gravity or should one say that the bending of light near heavy objects is gravity? It seems that what originates the bending of light is what is basic, - the force of gravity.

3.8.14 Bending Space-Time

Have these considerations any effect on us? No. Maxwell's theory of light, for example, was an extraordinarily *seminal* theory, the basis of much of the world at 2000 (e.g., radio, TV, etc.). Minkowski-Einstein's theory is used in cosmology in spite of the fact that space is now known to be highly structured. The truth is that our observations of objects in space may be distorted if the light carrying their image passes by a sufficiently heavy object.

3.8.15 Who Originated the Theory of Relativity?

Most people - including scientists (even most physicists), - think that Einstein was the author of the theory of Relativity. There is no doubt that Einstein was an outstandingly clever physicist, who thought independently about the basic ideas of his day and was extremely self confident.²¹ He was also a great presenter of the ideas of Relativity (61).

²¹ For example, his most creative paper, a development of Poincaré's theory of relativistic mechanics, was written while working at the Swiss patent office. Except for his friend, Beso, it is not known that he discussed it with any colleague, before sending it for publication. (Although Bjerkenes (61a)

(several books) and was able thus to exploit the deification to which his name became subject after the apparent confirmation of the bending of light which he had predicted in 1919. His *appearance* (rumpled old sports jacket, bits of string hanging out of a pocket, rode an old bicycle to work) helped to create the present image of the creative scientist. And one must not forget the gravelly voice with the strong German accent.

HOWEVER, the truth²² is that (as with some other scientists) Einstein used ideas earlier suggested on which to form theoretical work (which he was not averse to it being thought to be due to him without the foregoing work, e.g., of Fitzgerald, Lorenz or Poincaré). Concepts associated with Relativity were the creation of several people. (See Table 3.1)

Einstein's part was to stitch it together into a whole, and present it with force and in a way able to reach, - and at the same time, to shock, - an un-understanding public.²³ The justification of these statements, is based on the information in Table 3.1.

3.8.16 Status of Relativity Theory

Although there are certainly serious and competent physicists who disagree with the development by Einstein of the ideas of Lorenz and Poincaré, the majority of modern physicists support Einstein's version of the theory of Relativity (even if they can seldom give an account of it).²⁴ In fact, this is an understatement: it has become one of the strongest pillars of the standard model - second in strength only to the Darwinian Theory of Evolution (1859).

quotes evidence to the effect that when the 1903 paper was first submitted for publication, its authors were stated to Einstein's first wife and Einstein.) After they were divorced, Einstein gave her the money he received from the Nobel Prize (given for his work on the photo-electron effect).

²² While we are attempting to give an objective assessment of Einstein's contribution to physics, let it be said that several recent books about Einstein have disclosed a number of happenings, summarized by the statement that, as a husband and Dad, he was not a good role model.

Thus, a story was again told me in Philadelphia in 1954 concerning Einstein's way of dealing with his second wife's death. He was a stickler for punctuality, arriving in the Physics Department every day at 9:00. One day, however, he arrived at 9:10. Passing the secretary, he is said to have glanced at his watch and said: "I am sorry - but, during the night, my wife died." Again, I do not know if this account is true but it is consistent with Einstein's character in which family life was sacrificed to his scientific work.

²³ Christopher Bjerkenes has pieced together with several dozen references the case that Einstein's work on Relativity was largely a rewrite of the work of others, - although these antecedent authors are not mentioned in the Einstein publications (61a).

²⁴ Paradoxically, the majority of these physicists will smile and say it is something to do with the velocity of light and admit they would not like to go further.

TABLE 3.1
RESULTS PRESENTED AS ORIGINATING FROM THE CONTRIBUTIONS
TO EINSTEIN'S RELATIVITY

Part of Work Concerned	Original Author
Relativity	Galileo, Lorenz, Poincaré (in earlier centuries)
Apparent length of a rod depends on its speed in a certain direction.	Fitzgerald
Time Dilation	Lorenz
Bending of light	Soldner (1803)
Space-time	Minkowski
$E = mc^2$	J. J. Thompson and Hasenöhrl had specialized equations preliminary to the general eqn derived by Einstein, and corrected by Planck
Big Bang	Le Maitre
Black Hole	John Michel (18 th Century)

However, the theory is far from secure²⁵ and it is necessary here, therefore, to say a few words about how such a situation of conviction based on relative ignorance can come about.

Readers who are not scientists deserve to be informed of the heavy pressures for conformity on scientists which now exist in a physics, which, at 2000 has the same fundamentals as those of 1926. Firstly, most scientists are employed in laboratories owned by the government or by corporations. Those in corporations are under great pressure to produce something concrete which may be profitable to the company within two years. They have all been exposed at one time in their careers to the reasoning by which Einstein's theory leads to a number of counter-intuitive results and the idea that one of them should go to the leader of his team and say he is beginning to doubt Einstein's contributions to Relativity theory is *unthinkable*. The likely outcome of such a misadventure would be (short term) strong encouragement to get back to his bench or computer terminal, *get on with something productive* ("for which you are employed"). Then, when the next phase in downsizing comes, the disbeliever will be one of the first to be let go ("Just dreams of all sorts of crazy things, - he even doubted Einstein!").

²⁵ The Italian physicists Monei and Monti, had accepted for publication in *Physics Essays*, a peer reviewed Canadian Journal for 2003 a remarkable (and entirely destructive) analysis of Einstein's contribution to Relativity Theory. Their paper is called "The Real Einstein" and is not only concerned with the unacknowledged use by Einstein of prior work but actually throws into doubt basic aspects of the physics he published and which is still strongly believed in U.S. universities.

If things are not quite so bad in government labs, it is still true to say that there is no funding of the work of a thinker whose thoughts go to something fundamentally new. The researcher may have to be focused on getting grant money to protect his family's well-being and there are no grants for work which questions Einstein's Relativity, which has become a part of Science, like Geometry or Thermodynamics.

This leaves the universities. Among the public, the idea is current that *that* is where the free thinking is done and that even if your work shows that Fascism is the best political system, tenure will protect your job. However, professors in universities suffer from two effects which limit their thinking (or, at any rate, thoughts which are written down).

(1) Pressure from other faculty

Universities are extremely hierarchical. There are unimportant young professors who haven't done much; middle aged professors who have tenure and are doing quite well with grants, and are hence "approved"; or middle aged professors with tenure with no grants who will be expected to teach more and not get salary raises, being encouraged to retire. Finally, there are the Top Cats, men often world famous within their research fields but even here there will be a Topmost Top Cat and he will pressure the Department Head (a person far below him in salary rank) to reduce the laboratory space available to any professor who wants to step out of line, i.e., who thinks new ("Has always published 'trashy nonsense on government funds'"). A good Top Cat professor is not going to lose his top position to some inferior person, getting half Top Cat's salary, who thinks he has an idea which contradicts the "good physics" in which each generation of physicists seems sure is a final truth.

(2) Factors Affecting the Award of Research Support

Although much of the pressure and rivalry among faculty members in universities is based on simple human qualities ("Power Politics") there is some excuse for action against a person who has ideas out of the mainstream (62). This may seem a strange statement to make but the point is that prosperity of a Science Department is fundamentally dependent on the research support getting abilities of the faculty members. There is a rough scale at 2000 that a faculty member should have at least \$100,000 in grant money to be viable. The reason for this is influenced largely by the fact that the university receives generous "overhead" (in fact a tax) from the grants obtained by faculty and this greatly decreases the burden of professors' salaries on the university's funds. A faculty member without research grants will be fired, if he is *before* tenure, or pressured to retire, if he has tenure. For he actually costs the University his full salary, whereas most active professors in Science Departments produce overhead which covers a substantial fraction if not all of their salaries.

But how does one get the all-important grants? The answer is: one writes Proposals and submits them to an appropriate agency in Washington, whereupon - perhaps - one may receive the vital life giving grant money upon which one's career (and those of the students and post docs who have elected to work with the professor) so vitally depends.

Consider, now, the Program Manager in a government agency, who decides whether a grant should be given to a certain professor. He also has a Boss and he will not fare well, i.e., get *his* raises, if the Boss finds he is giving money "to a lot of crazy ideas - why - even ideas which oppose Einstein".

So, the faculty member who believes he can disprove certain of Einstein's equations loses his aspirations, becomes sensible, thinks of his mortgage and children at school, and writes a Proposal which is a straight line development of what has gone before.

It is within the pale and unthreatening. It may have a chance of support, so long as he has built up solid, personal relations with colleagues, who, he guesses, may be his Proposal's referees. (Good relations with the Program Managers are, of course, even more important.)

It can thus be appreciated that NEW SCIENCE is more likely to arise from work supported by a private foundation (there are many in the USA) or in a university in some smaller country, such as Ireland (Hamilton, Fitzgerald) or Hungary (Van Kamen, Teller, St. Gyorgyi) who are outside the pale anyway.²⁶

3.8.17 Verification?

In spite of the super-high status of the 1905 theory of Relativity, it is remarkable that it has attracted over a century, little experimental support.

In respect to the Special Theory of Relativity, two "proofs" are usually discussed.

(1) The behavior of muons

Muons are super-heavy "electron-like" particles created in the upper atmosphere by the interaction between cosmic rays and nitrogen molecules. They travel on down to Earth's surface at a velocity near to that of light. Hence, according to the time dilation theory, their lives should be lengthened because they are moving so fast. In fact, some muons do reach the Earth's surface although the life time of the *average* muon is less than the time needed for this journey.

This sounds like evidence. However, analysis shows it to be questionable (63). The distribution of velocities among the muons has not been measured. Thus, the real fact is that some muons live long enough to reach the Earth's surface and some do not. Those which do may be muons at the far end of the velocity distribution and do not represent "the average muon". Thus, this evidence is equivocal.

(2) An atomic clock was flown round the Earth at jet speed and found to run slower than a stationary clock. Two experts in the field of relativistic physics have criticized the experiment which deals with very minute changes in time and various corrections for the effect of gravity on light. They concluded that there was no time dilation (64, 65).

Thus, both pieces of evidence for Einstein's 1905 theory are subject to discussion.

As far as the so-called "Curved Space" Theory goes (1915), there is certainly an effect of gravity on light, but this was known in the early 19th century (56).

As for "curved space", there is no experimental evidence for it. The assumed uniform distribution of galaxies at the edge of space (which would draw light to them) has been seen, via the Hubble Space Telescope, not to exist.

The question arises as to why such monumental attention has been lavished on a theory with no practical applications. One reason is extra-scientific. Thus, the field gives rise to much popular book writing. One of its ideas is that, if a star has collapsed because of its mass being many times that of our Sun, the radiation emitted will not escape its gravitational field and hence will not be visible to outside observers ("Black Hole"). This has been a wonderful theme for science writers who fantasize, e.g., space vehicles trapped by being too near a black hole, etc. There is a genre of writing which purports to be good

²⁶ This is not true of Italy or in the Netherlands, where all professors get "the rain", i.e., all get a small amount of research money which they can apply to anything which interests them.

physics but is in fact, near to Science Fiction. The corresponding books sell well. They provide the authors excellent royalties, and, for a few of them, fame.

No black hole has actually been detected *directly* at 2002, though observation of perturbations in the motions of stars in a number of star systems is being interpreted as indicating the presence of a nearby black hole. By 2003, there were many such examples.

The reason for the fame and status of the theory of Relativity seems based on the fact that few scientists have taken the trouble to understand it and to probe its origins.²⁷ In particular the fact that the major contributions were made before Einstein, and that the basis in Michelson-Morley (71) has been disproved, are never mentioned.

3.8.18 Paradoxes

The theory of Relativity gives rise to a number of paradoxes and we must be cautious taking them as evidence against the theory. Perhaps Reality is strange, as Bohr stressed in respect to the Quantum Theory.

(1) The Twin Paradox

H. Dingle (64) has pointed out that Relativity gives the option of choosing the reference "frame". Why not regard the traveling twin as the stationary observer and then the Earth is moving away from him and it is he (the one in the space vehicle) who will age and not his brother.

The paradox is said to be soluble if one includes the effect of acceleration - the twin in the space ship accelerates. However, Dingle pointed out that if the traveling twin is the observer, the Earth accelerates with respect to him (64).

(2) If one examines the consequences of Minkowski's idea of space-time, one sees space-time in the future and space-time in the past. Now space time appears to be "bent" by gravity and it is possible to show that (in the presence of sufficiently large masses and hence gravitational fields), the future space-time may be bent around to meet past space-time. Thus, a grandson could kill his grandfather. Such predictions provide food for thought and much questioning of their connection to Reality.

(3) $E = mc^2$

As stated earlier, this is the most famous of the results which Einstein is wrongly thought to have contributed to the invention of nuclear energy.

(4) Work of Ives

The respected Bell Telephone physicist, H. E. Ives (66) wrote a number of papers, published in elite US journals (66) which disproved the foundations of Special Relativity.

Ives recalculated the basic idea of Relativity, that the velocity of light in different frames would be observed to be the same and showed that this would come about only in an extraordinary circumstance depending on the coincidence of a number of factors.

²⁷ A story was told to me of the British cosmologist, Eddington. An attendee at a meeting started his question by saying that he had heard that there were only three people who understood Relativity. "Who is the other one?" was Eddington's reply.

Ives was convinced he had disproved Einstein's version of Relativity, but the theory continues to be taught in universities. Ives expressed the view that, by the 1950's, the continued acceptance of the theory had become a ritual without a scientific basis.²⁸

(5) The Quantum Theory

Einstein never accepted the Quantum Theory, at least in the version in which Bohr had presented it. On the whole, Bohr seems to have gotten the better of Einstein in the long drawn out battle between them. Thus, recent work seems to show that when two beams of photons earlier correlated (and from the same atomic species) are polarized in different ways, each beam "knows" what the other is doing. Thus, if one changes a property of one beam (e.g., its state of polarization), the other beam changes correspondingly, although there would not have been time for the message concerning the change made in the one beam to have got between the beams by means of the passage of light. Such a situation is called "non-locality".

This makes a difficulty for the Relativity Theory which is based upon the idea that information can transfer by means of electromagnetic radiation only, and not faster than c.

(6) Michelson-Morley

The Michelson-Morley experiment seems to have been the basis upon which Einstein assumed that light had the same velocity, independent of its direction with reference to that of the rotation of the Earth. Hence, there is no ether.

There have been several results contradicting Michelson and Morley over the years but "Relativity" (i.e., Einstein's version of it) is deeply embedded into the physics of the present paradigm and the presence of these new results has not been allowed to shift belief in the ancient result.

A strong piece of evidence for contradicting Michelson-Morley, was published by

D. C. Miller. It has recently been presented by M. Allais²⁹ (76). Miller (73,74) redid the Michelson-Morley experiment by taking his equipment to various parts of the country at various heights. The feature of his work was that he observed the velocity not only in respect to the direction of the light with respect to the Earth's motion but also in respect to the position of the Earth's movement (rotation) and the direction of the light. He found a variation, e.g., by as much as 20 km sec^{-1} as a function of the direction of the beam.

Thus, the velocity of light is not invariant with directions.

A more recent experiment is due to Ernest Silvertooth (46). He showed the one way velocity of light did depend on the direction of motion of the Earth at the place of measurement.

3.8.19 Dayton Miller's Ether-Drift Experiments: A Fresh Look (68)

The Michelson-Morley experiment of 1887 (71) must be compared also with the work of Sagnac, 1913 (44), and of Michelson and Gale, 1925 (72). These measurements did give a difference in the speed of light measured in different directions with respect to the

²⁸ Infinite Energy Magazine (67) has published a set of papers by physicists who challenge Relativity Physics and Einstein's contribution to it.

²⁹ Allais terms the neglect of Miller's work as a classical example of a cover up of an unwelcome new result, one which might affect the paradigm.

Earth's movement. They agree with the *real results* of the MM experiment of 1887. Thus, this is widely misrepresented as giving a null result, but in fact, it gave a small positive effect for the ether drift. Michelson neglected this 20 km sec^{-1} difference in value.

The theory of Relativity is dependent on the result: if there is a difference in the measured velocity of light in different directions in respect to the direction of the rotation of the Earth, the theory falls.

Dayton Miller's apparatus was greatly in advance of that of MM. His work (73, 74) ran from 1906 to the 1930's and consistently resulted in an ether drift of about 20 km sec^{-1} . In contrast, the MM work was completed in 4 days.

However, Miller's work is seldom quoted (75) today in spite of the superiority of the equipment and the thoroughness and duration of the enterprise (76).³⁰

3.8.20 Dingle's Question

Prof. Dingle was for long a professor of physics at the Imperial College of Science and Technology in London. I knew him by sight, overlapping with him between 1943 and 1946.

Dingle came to the conclusion that the relativity theory was inconsistent with certain simple reasoning. Thus, according to relativity, if one considers one clock stationary and moves the other away from it and then back again, the clock which is moved will run more slowly than the clock which has not been moved.

Dingle's argument against this was simple. One is dealing with *relativity*, - so how do we know which clock is considered to move? If clock B is the one which is moved relative to one on Earth, A, then we might as well think of clock B as stationary and clock A to be the moving clock. Then, each clock would be slower compared with the other and this is absurd.

Zeiman (77), a well known professor of physics at the University of Oxford, is quoted in *The Relativity Explosion*, as stating that Dingle's question is a perfectly reasonable question to which scientists should give an answer.

Dingle (78) published a letter in *Nature*, August 31, 1973, which pointed out that no distinguishing feature of Clock A and Clock B exists.

He failed to obtain a reply from scientists in the field, and so he wrote to Lord Todd who at that time was President of the Royal Society, but the latter replied: "there is little the Society can contribute towards your problem."

Dingle's campaign reached the Council for Science and Society and even the Archbishop of Canterbury. It was commented upon by a lawyer, Haymon (79), who wrote *The Economist*, 1977, April 16, p. 6, stating that "when two such authorities as Prof. Dingle and Dr. Essen (who had agreed with Dingle) assert that their criticisms are basic scientific ones having serious public implication, - but are consistently ignored, - citizens cannot help but feel apprehensive."

No one ever answered Dingle's question (80, 81).

³⁰ Miller, himself, was an outstanding man, a President of the American Physical Society, Chairman of the Division of the Physical Sciences of the National Research Council; and a member of the National Academy of Sciences, etc.

McCausland (58) ends a privately printed book by pointing out that we have scientists who ignore published rebuttals or retreat behind a statement that the points at issue have been discussed too much. We have *censorship*. We have appeals to authority and appeals to consensus of opinion, - but we don't have an interchange concerning the question (82).

3.8.21 Conclusions

- (1) The concept of the Relativity of motion springs from Galileo and was brilliantly developed by Lorenz and Poincaré. Einstein developed their theory and presented it extensively in books.
- (2) It is Einstein's development of the subject with its dependence on the Michelson-Morley experiment which has come to be doubted by some authors (Sagnac, Ives, Miller, Silvertooth).
- (3) There now seems to be a number of newer experiments and theoretical work, as given above, which should detract from confidence in the validity of the theory. The equivalence of all frames of reference is not consistent with these later developments. The continuation without critical modern analysis of Einstein's version of the theory of Relativity has become a ritual. Its long continued acceptance by physicists is similar to the faith shown in antiquity and until Copernicus in the theories of Ptolemy.
- (4) As to Einstein, there is no doubt that his name has been given an amount of attention - adulation - entirely disproportionate to his contributions in developing Lorenz's relativistic physics. He should be duly counted on a level with his renowned peers, Lorenz and Poincaré, Bohr and Heisenberg. These remarks should not obscure Einstein's considerable contribution to Physics, and, above all, his interpretation of the photoelectric effect,³¹ one of the feet upon which stands firmly the basic idea of energy as quanta. His long and unfinished battle with Bohr on the nature of the Quantum Theory is a contribution of great value in leading to an increased consciousness of its mysteries. He made original contributions to the theory of Brownian Motion and to the diffusion of ions in solution.

3.9 THE QUANTUM THEORY

3.9.1 Introduction

The Quantum Theory is the most basic theory in science and treatments of the micro-world of sub-atomic particles - the basis of Reality in the Standard Model, - depend upon it.

The origin of the quantum theory is described in detail in textbooks of Physics and Physical Chemistry. The anomaly, the solution of which produced the preliminary quantum theory of Planck, was the energy distribution as a function of wave length, in black body radiation. In the earlier theories, due to Raleigh and Jeans, respectively, energy was related

³¹ It was for this that Einstein was awarded the Nobel Prize in 1922.

to the frequency of oscillations of the particles in a body concerned and this frequency could take any value. Theories using this basic idea gave theoretical plots of the intensity of the energy radiated at a given wave length against the wave length of the radiation which differed radically from those of observation. Planck (1901) made his historic proposition that energy, instead of varying continuously with frequency, is divided into discrete packets, the energy of each of which is given by the basic equation

$$\epsilon_v = hv,$$

where v is the frequency of oscillation and h is a constant. Thus, the total energy of an oscillator would be

$$\sum_{i=0}^{\infty} n_i E_i,$$

where n is an integer, and having values 1,2,3... With this basic assumption, Planck deduced an equation for the energy spectrum of a radiating black body as the sum of the terms $e^{-nhv/kT}$ which did agree with experiment (83). Thus, was born what all physicists think to be the most seminal theory in Physics. It was speedily followed by a quantal theory of heat capacity (83a), which solved a problem, - why was it that most materials had a heat capacity values which at room temperatures, were much lower than the values which pre-quantal theory predicted.

3.9.2 De Broglie's Suggestion

Planck's postulate of the packet-like nature of energy was indeed seminal. However, an important and antiparadigmatic suggestion was then made in 1924 by de Broglie (85).

Thus, in respect to light, it is well known that various phenomena such as reflection and refraction are interpreted well on a model of light (due to Newton) in which light is pictured as a stream of corpuscles. On the other hand, other phenomena, in particular interference and diffraction, demanded that light be regarded as a wave motion. Then, if one uses the equation between mass and energy first derived by Hasenörl (53) (and wrongly attributed to Einstein), $E = mc^2$, with the Plankian equation $E = hv$,

$$mc^2 = hv \text{ and hence because } v\lambda = c, \quad mc = \frac{h}{\lambda};$$

De Broglie's intuitive inspiration was that this kind of equation should apply not only to photons but also to particles, although of course, c must be changed to v , the particle's velocity. Hence, came de Broglie's relation

$$mv = p = \frac{h}{\lambda}.$$

Thus, if an electron is moving at 10^5 cm sec^{-1} and having a mass of $9 \cdot 10^{-28} \text{ g}$, then, with $h = 6.62 \cdot 10^{-27} \text{ erg sec}$,

$$\lambda = \frac{h}{p} = \frac{6.02 \cdot 10^{-27}}{9 \cdot 10^{-28} \cdot 10^5} = 7 \cdot 10^{-5} \text{ cm}$$

a wave length in the region of visible light. In this case, λ is large compared with the size of the electron, itself, a condition which turns out to be that in which the wave properties of a particle become important in understanding behavior.

3.9.3 Davidson and Germer's Experimental Confirmation of the Wave Properties of Electrons

The obvious way to prove de Broglie's surprising suggestion was to examine a stream of electrons for diffraction phenomena which are typical of wave motion. Davidson and Germer (86) decided to try it out and see if a stream of (until de Broglie, solidly particulate) electrons underwent diffraction and thus had the wave-like alternative character which de Broglie had suggested. Diffraction phenomena are shown up by passing light through a thin foil of metal whereupon there appears on a screen, rings of alternate light and dark areas. Davidson and Germer found such rings for electrons as well as for light (G. P. Thompson, at Imperial College, likewise showed diffraction of electrons through a foil). Thus was established one of the great steps in Science: matter is not only particle-like but also may (if its de Broglie wave length is large compared with its linear dimension) exhibit a wave-like character as well, thus, resembling the dual (wave and particle) nature of light.

3.9.4 Schrödinger's Equation

Schrödinger developed de Broglie's (87) suggestion but instead of fitting a guiding wave into a critical length as had de Broglie, considered a system of plane waves. The classical equation for the amplitude, ψ , in respect to distance and time, is, then,

$$\psi_{x,t} = A e^{2\pi i(kx-vt)}$$

where $k = \frac{1}{\lambda}$.

Partial differentiation twice with respect to x gives

$$\frac{\partial^2 \psi}{\partial x^2} = -4\pi^2 k^2 \psi$$

Schrödinger made the fundamental assumption that measurable quantities such as energy and momentum of particles are associated with the quantity, ψ , the amplitude of the hypothetical wave which, according to de Broglie, is associated with the movement of small particles. Such thoughts led to "Schrödinger's equation" which is the starting point for most quantum mechanical calculations of the properties of materials.

Thus, from de Broglie's equation (2) and with $k = \frac{1}{\lambda}$

$$\frac{\partial^2 \psi}{\partial x^2} = -4\pi^2 \left(\frac{p}{h} \right)^2 \psi = \frac{8\pi^2 m}{h^2} \left(\frac{1}{2} mv^2 \right) \psi$$

But the kinetic energy, $\frac{mv^2}{2}$, is the difference of the total energy (E), and the potential energy, V .

Hence,

$$\frac{d^2 \psi}{dx^2} = -\frac{8\pi^2 m}{h^2} (E-V) \psi \quad (21)$$

This is the simplest form of Schrödinger's equation. It is the equation in one dimension. There are other forms but they are not essential for our mission.

However, one more thing must be presented. Differential equations such as (21) have an infinite number of solutions. To obtain useful solutions, one puts limitations on equation (21) which are to be "accepted". These limitations are ψ and $\frac{\partial \psi}{\partial x}$ are taken to be continuous, finite and single valued. When these conditions are applied, the resulting values of ψ are called Eigenfunctions ("proper functions").

The reasons for imposing these conditions relates back to Planck's original quantum theory and an application of it made by Bohr (88), a main point of which is the proposition that particulate electrons rotate around the nuclei of atoms in various "special" orbits. These orbits, in Bohr's theory, were arbitrary suppositions, made because they filled the facts of spectroscopy (the observation of special maxima in intensity of the spectra at characteristic frequencies). For simple atoms like hydrogen, Bohr's 1913 theory, allows a very good calculation of the observed wave lengths of the various spectral lines.

Now, in the "wave mechanical" version by Schrödinger, of Planck's quantum theory, the limitations arbitrarily imposed on ψ and $\frac{\partial \psi}{\partial x}$, lead to calculations which are consistent with the existence of discrete energy levels and shift back from the physical assumption of specific orbits of Bohr to mathematical assumptions about the properties of the probability waves which are supposed to be an equivalent expression representing electrons in an atom.

3.9.5 What Is a Wave Function?

As can be seen from the Schrödinger equation (21), the wave function, ψ , is the principal quantity upon which mathematical operations are carried out in quantum calculations. The wave function is the amplitude of Schrödinger's wave, and it is assumed to vary sinusoidally with distance at constant time. This is acceptable as a hypothesis. But it is reasonable to ask the medium in which such waves exist. Thus, one of the results of the theory of Special Relativity (based on the alleged null result of the Michelson-Morley experiment carried out more than a century ago) there is NO ETHER, so, what is the nature of the "waves" which are supposed to accompany (guide?) small particles? Thus, waves have to be waves in a medium. (A physicist, asked about the medium, will usually show impatience, pointing to the success of Maxwell's theory of electromagnetism of which the same question can be asked.)

A further (and most useful) interpretation given to the wave function in quantum mechanics originated in a suggestion of Max Born. He pointed out that, in the electromagnetic theory of light, the square of the amplitude of the wave is identified with the intensity of the light. Born suggested that a quantum mechanical version of this would be to take the square of the amplitude of the waves of quantum mechanics and call that quantity the probability of finding the particle concerned. Correspondingly, the probability

of finding a particle between x and $x+dx$ is $\psi_x^2 dx$.³² (Some wave functions are negative; the square is always positive).

Born's interpretation has for long been accepted without controversy. But it must be remembered that it is an *interpretation* based on an analogy and in any basic revision of the Quantum Theory, it must be subject to scrutiny.

3.9.6 Of What Does an Electron Consist?

This might seem like a remarkable question, even though the diffraction of electrons certainly established the (strange) fact that electrons may behave, under suitable circumstances, as waves as well as particles (86). It was this experimental work which supported the reasonableness of the de Broglie hypothesis and its development by Schrödinger (eqn 21), according to which the behavior of electrons could be rationalized by treating them in terms of waves and not looking, in this treatment, at the particle aspects. Thus, *electrons, and their behavior*, lie at the base of the Quantum Theory, which, in practice, is useful in application to sub-atomic phenomena.

At the same time, however, one needs to take into account the fact that electrons do have a definite mass ($9.1 \cdot 10^{-28}$ g), i.e., are particles. The *radius* of an electron is a more fugitive quantity and various ways of coming to it give $< 10^{-16}$ cm.

So, if one could *see* an isolated electron in motion in space, would it look like a sphere of the radius stated?³³ Quantum Mechanics is here quite unhelpful because, historically, it was decided (P. A. M. Dirac (90)) arbitrarily to take the electron as a "point charge" and simply *declare* that it is inherently stable.

The charge on an electron is $4.77 \cdot 10^{-10}$ esu. Accepting the uncertain radius of 10^{-16} cm, the charge density is $5 \cdot 10^{21}$ esu cm^{-3} . This is an extremely high charge density. For example, the surface electric charge density found on metals in contact with solutions (is 10^5 esu cm^{-2}). The corresponding problem exists in a much worse form for atomic nuclei, with radii about 10^5 times smaller than that of the electron, but here special "nuclear forces" are operative while no such forces appear available to keep the electron together. Why do not the extraordinarily strong electrostatic charges repel and disintegrate the particle?

A difficulty which has long faced the theory of the electron in a Bohr orbit around a nucleus is why there appears to be no radiation. For electrons rotating around a nucleus have a force outward from the nucleus and hence accelerate. But, in classical electrodynamics, accelerating charges radiate.

This problem has been swept under the table in the Quantum Theory. Bohr solved it by fiat: he postulated that in the various orbits of his atom, radiation from electrons did not occur! Then, when Schrödinger came with the wave equation, the idea of definite electrons rotating around nuclei became obfuscated into the wave mechanical presentation in which $\psi_x^2 dx$ gave the probability of finding the electron between x and $x+dx$. The presentation of orbits in terms of maxima of the square of the amplitude of the waves accompanying the electron allowed one to forget that there are nevertheless actual electrons in the atom and

³² More exactly, the probability is $\psi\psi^* dx$, where ψ^* is the complex conjugate of ψ .

³³ Much more will be said below about Reality and the quantum theory. The reader may be surprised to learn that, according to the now accepted view within the Quantum Theory, an isolated electron in space "has no reality" and becomes "real" only when measured.

that, to make them stable mechanically, they must rotate at high speed around the nucleus, and would thus be expected to radiate. This problem has long remained unanswered, although it may imply that there is a universal energy in a vacuum which supplies the electron with the energy it loses in radiation. A solution discussed by Puthoff involves the suggestion that the electron does not decay in energy because of absorption of energy from the omnipresent energy in the vacuum.

In recent times, some dissident physicists have presented an electron model which avoids some of the difficulties which attend the refusal to go beyond a point electron in quantum theory (91).

Thus, Bergman proposes that an electron consists of a loop of a circulating electric current "which will resonate with standing waves formed around the circumference of the electron. The stability is proposed to arise from the magnetic effects of the current in the current elements (currents in the same direction) attract each other, and this magnetic pinch effect is seen in Bergman's model as compensating the electrostatic repulsion between electrons in an atom which arises from the charge density on the electron.

A satisfactory theory of the electron is not yet with us. Bergman's model at least approaches the problem and suggests a solution to the instability which would be expected from the magnitude of the charge density.

3.9.7 Facing an Early Difficulty

It is helpful to face a difficulty which dogs many aspects of present physics after a century of use in physical theories. This is that the interpretation of experimental facts cannot necessarily be made by using "models" similar to things which we can *see*, or imagine, but instead only by mathematical propositions. These are clear, - and lead to equations which reproduce experiments often quite well. But the sacrifice is that we can no longer picture what we are doing, and, some would say therefore, that we no longer understand it in physical terms.

There are many examples of this trend (e.g., electrons are waves as well as particles; four dimensional space time) to the names of which we have become accustomed. But when confronted by a frank questioner, it is sometimes necessary to admit that we cannot actually imagine what is being discussed. Understanding in a physical, - as well as mathematical, - sense began to be lost from de Broglie (1924) onwards.

3.9.8 The Standard Model

What is now called the Standard Model in Quantum Mechanics arises from Niels Bohr, who must rate, along with Planck, Einstein, de Broglie, Schrödinger, Heisenberg and Dirac as a principal architect of the Quantum Theory. Between 1926 (the Schrödinger equation) and the mid 30's, a great deal of interaction and discussion occurred between these eminent physicists, but above all between Bohr and Einstein, who disagreed radically as to the physical interpretation necessitated by the Quantum Theory meant. Briefly, Einstein insisted on what might be called a classical (he would have said "realistic") interpretation of Quantum Mechanics, - beneath the strange results being observed, there was "normal behavior" of individual subatomic particles. The strange behavior was brought about by

some not understood (hidden) variable. Bohr, however, insisted on an utterly different view to which he attached a warning, - to the effect that anyone wishing to study the theory deeply should be ready to experience shocks. On the whole, it is Bohr's interpretation which has prevailed (though it never convinced Einstein).

What was the shocking interpretation which Bohr suggested? The argument sees an electron (or any sub-atomic particle) as existing *before measurement* in many superimposed and undefined states. To take the simplest example, the electron has two spin states and exists in its dual nature as wave and particle. From the quantum mechanical point of view, this means that a correct representation of the particle ("Reality"), there would be a wave function ψ_x , which would be the sum of the several wave functions for all states present. Reality, for the electron, must be represented in this complex way and were it possible (it is not) to find some way of observing an electron without disturbing it, the Reality of its character might be understood.

Bohr argued that any measurement made on an electron would destroy part of the true (or real) existence. For example, if the electrons are detected by impinging them from a single beam onto a screen after coming through a slit, then these would be electrons in a single state as particles. If, on the other hand, an electron stream is passed through a diffraction grating, interference fringes are observed so that the electron is now demonstrating another state, the wave-like state. But an electron has mass, is a particle.

Bohr talked about "collapse" of the wave function, - functions, - which do not show up in the measurement, because, as he saw it, measurement destroys the nature of a subatomic particle.

This is, then, the basis of Bohr's view that one cannot represent the Reality of subatomic particles in quantum mechanics, - the observations which can be made are simply what they seem to be, - observations. But they do not, - cannot, - represent the state of the particle *before measurement*, because that state is the sum of several superimposed states, all but one of which somehow disappears at measurement.

This reasoning rapidly led Bohr to maintain a more drastic version of his interpretation, i.e., that particles have "no existence" before measurement. In fact, this viewpoint is what is called the Copenhagen Principle.

Einstein was not bereft of a sense of humor. In reaction to Bohr's extremist viewpoint, Einstein puckishly asked Bohr if he really thought the moon was re-created every night by the first little mouse which emerged from her hole and saw it.

As to the views of physicists at 2000, there are three groups who can be recognized. (1) Those who do really profess the Copenhagen Principle and truly follow Bohr's interpretation (the view maintained in many physics textbooks); (2) Those who hold to the reality of the unobserved electron, and (3) Those (the majority) who take the attitude that Quantum Mechanics gives them a means for making calculations and publishing papers, the medium by which they are rated (and paid). As to what it means, most physicists prefer not to discuss that. At the Millennium, it seems that relatively few want to admit to supporting Bohr's idealistic view. Thus, every physicist is aware of the fact that Einstein died, disagreeing with Bohr.³⁴

³⁴ It is not that Einstein, - or anybody, - disagreed with Planck's equation and the packet-like nature of energy. "Quantum Wierdness," the idea which is supported by the majority of physicists, - is that

Bohr's view goes back to what is called the positivist philosophy in Science, which originated with the Austrian philosopher, Ernst Mach. Mach suggested that scientific concepts must only be founded on observations and not upon unmeasured suppositions. In Bohr's view, the measured electron was real but did not represent the electron before measurement. However, by definition (cf. Mach), the unmeasured, unobserved particle cannot be discussed and hence, as an extension of this viewpoint, is unreal, - not there. A less radical view would be to call it not measurable.

3.9.9 Is the Schrödinger Equation a Kind of Abacus?

The Schrödinger^{35,36} equation (21) would be agreed by most physicists to be the practical basis of Quantum mechanics.

Now what physicists do when proposing a solution to a problem (for example, calculating a bond strength between atoms in a compound), is to do what is called "solving the Schrödinger equation." Ideally, this would mean that one would reason out independently what is the wave function of the electron in the chemical bond concerned, and to calculate $\nabla^2\psi$ and then the lowest energy of electrons in the bond which is called the energy of the Eigenstate of its electrons. This energy is the energy normally thought of as "the bond energy" and many hundreds of bond energies are known from experiment.

Thus, the working physicist or chemist uses Schrödinger's equation without considering the questionable matters associated with its application to real problems. In Quantum Chemistry it is used to get out values of quantities, - basically, as an abacus to be used in structural physics and chemistry (89).³⁷

sub atomic particles obey different rules of behavior than do larger particles. This makes Einstein's quip against Bohr about the moon a bit unfair. As $\lambda = h/p$, and $p = mv$, the moon's de Broglie wavelength would be very much smaller than the moon which would, therefore, behave classically.

³⁵ Schrödinger wrote several short books explaining his concepts and one (92) is remarkable because it reveals that this physicist-philosopher, - whom some would see as the founder of a branch of Science which is its cutting edge, - was, in fact, a vedantist. Thus, the philosophy presented by Schrödinger in his short book is similar to that which would be stated by a Hindu scientist who was quite sure of Vedanta, the philosophy of his religion.

Schrödinger lived in Ireland after his departure from Austria before WWII. He lived in the northern part of Dublin - the more raffish part, - although married always to the same woman, believed firmly, that the burdens of the married state should be lightened by sharing them with assistant wives (93).

³⁶ As a young man of 22, I was on my second visit to Ireland, and full of pride in my very own deduction of the Schrödinger equation. I was brash enough to want to tell its original author about my triumphant ability. Boldly ringing the bell at the Institute in Dublin in which Schrödinger worked in 1945, I was readily admitted to the Presence and related the purpose of my visit. Regarding me with kindly humor, the great physicist told me "I don't think it needs any deduction, it is quite obvious."

³⁷ Here, it is relevant to describe a corridor meeting with a mature colleague - keen on Quantum Mechanical calculations, - who had not the friends to give him good grades in his grant applications and thus could not employ students to work with him. I commiserated on his situation, - a professor in a science department without grant money. How can you publish I blurted out, rather tactlessly.

3.9.10 The Situation Outside the Quantum Region

3.9.10 The Situation Outside the Quantum Region

The quantum theory applies in principle to all phenomena in nature, including biology. However, for problems not involving sufficiently small particles the difference between the results of quantum mechanical and classical calculations may be negligible. The condition which makes the application of quantum mechanical methods necessary can be judged from the relative magnitude of the de Broglie wave length, $\lambda = h/p$ (cf. eq 2) and the size of the object represented. If λ thus calculated is greater than the size of the object it represents, then quantum mechanical methods are essential. In practice, this means that the quantum region is that of subatomic particles (although protons show quantum mechanical properties in some chemical reactions.(94).

On the other hand, quantum theory can be thought of as lying behind macro situations. One is in processes in the brain, in which the balance of a decision could depend upon the behavior of a few electrons or protons in the microtubules suggested by Penrose (95). In this way it is possible to conceive indirect quantum effects in biology. Then, bonding in molecules depends on electronic energy states and hence quantum considerations. But the properties of materials depend on bonding between the constituent atoms, and thus on quantum theory.

Thus, concepts based on quantum mechanics are throughout Science and affect many practical situations. An example is the electronic energy levels in semiconductors, which then determine the behavior of an electrode in solution which is irradiated with light of a certain wave length. This is a practical situation for the solar irradiated electrode arranged in a two electrode cell may be used to dissociate water to hydrogen and oxygen, the first being a fuel in transportation, made without the evolution of CO₂ the most important Greenhouse gas.

3.9.11 About Quantum Indeterminacy

3.9.11 About Quantum Indeterminacy

In classical mechanics, positional coordinates and the associated momentum of a particle can vary independently and the differentials, dx and dp can be made as small as desired. However, in quantum theory, $\lambda = h/p$ and from such a base it is easy to comprehend that the lowest value of the product dx and dp which may have meaning is h . Hence, the limits in accuracy of measurement to which x and p are varied together is given by

$$\Delta x \cdot \Delta p = h.$$

$\Delta x \Delta p = h$
ic uncertain
mmediately
f p to any e
ome incrasin

$$\Delta x = \frac{h}{\Delta p}$$

where Δx and Δp represent the intrinsic uncertainty of the measured x and p . It can immediately be seen. The equation tells

The reason for the name can immediately be seen. The equation tells that one can reduce the error in the measurement of p to any extent, - but there is a penalty to pay, the positional coordinate x ($\equiv \lambda$) will become increasingly uncertain, according to

"Ah, but I have Lili" he said (I've changed his wife's name). I knew Lili, a pleasant European woman interested in obscure religions. She had a high school education but no university training. "But" ... I began to expostulate. "It's ok, ok", said my colleague. "Well, we buy the programs to calculate bond strengths, put it in the computer and I tell Lili the quantities and she writes down the answer the computer gives. Then, we write a paper." The program referred to is one which solves the Schrödinger equation and provides energy values, e.g., for bond strength in chemical compounds.

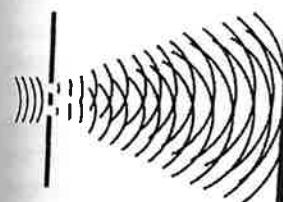
Correspondingly, of course, if x is measured with increasing accuracy, Δx is very small, the error in the associated momentum of a particle, in the same measurement, will be increasingly large.

The reasoning behind these statements arises from the basic considerations of the quantum theory shown. Moreover, it is found that the equation derived for dx and dp is only an example of the more far reaching Uncertainty Principle, - for a similar relation applies to any two variables into which h can be resolved. An alternative form of the Principle is given by:

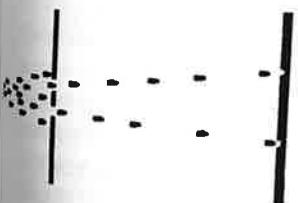
where ΔE is the basic uncertainty in a measurement of energy occurring in a time uncertainty Δt .

A simple example is given by a molecule which is constrained within a box of length of side, 1 cm. In classical theory the particle could have any momentum but in quantum theory, the minimum value of the momentum is $p = \frac{6.5 \cdot 10^{-27}}{1} \text{ gm cm sec}^{-1}$. The Cl_2 molecule weighs $1.16 \cdot 10^{-22} \text{ g}$ and hence its smallest possible velocity is $5.3 \cdot 10^5 \text{ cm.sec}^{-1}$, i.e., the uncertainty in the velocity is $5 \cdot 10^{-5} \text{ cm sec}^{-1}$. Trivial calculations with Heisenberg's equation shows that, in practice, it is useful only in the atomic, and particularly the sub-atomic realm. For any macro-consideration, - the uncertainty in position is to

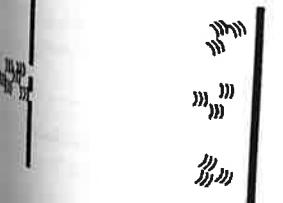
Interference Between Waves



No Interference Between Particles



The Quantum Version



Waves passing through a double slit are divided into two separate but related wave streams, which interfere to create a pattern of stripes. Bullets passing through two slits carry on independently in straight lines, with no interference. Quantum mechanically, the continuous classical wave is divided into bullet like photons, yet wave like interference still occurs.

Fig. 3.10 From D. Lindley, *Where Does the Quantum Weirdness Go?*, Basic Books, 1996.

of interest (for a 5 ton bus, at 35 (± 1) mph, the uncertainty of position is $2 \cdot 10^{-33}$ cm!). These limitations on the simultaneous determinations of two associated properties of an atomic or sub-atomic particle are absolutely fundamental and not dependent upon future improvements in measurement techniques. Nature is telling us not to look too closely.

3.9.12 Quantum Strangeness

Quantum strangeness is brought out well by what is called the two slit experiment (Fig. 3.10). If one sends a beam of electrons through a screen containing one hole, they can be registered on a second receiver screen as an expected blob of no surprises. If one now has two holes in the screen and sends a beam of electrons against the first screen, the electrons go through both holes, and head for the receiver screen. However, on the way there, the two beams may be made to interact. The electrons appear now to behave as waves and what turns up on the screen is the interference pattern which would arise if two beams of light (of the same frequency) were brought to interact. This is also understandable (cf. Davidson and Germer (86), and G. P. Thompson (97)).

However, it is possible to slow down the passage of electrons thrown against the screen, until one observes the behavior of individual electrons. Now a strange thing does indeed happen. For, if we regard the electrons in their particulate guise, each electron must go through one hole or the other. They cannot (per photon) go through both holes. Or can they? For, although we send each electron up against the screen individually and although they reach the receiver screen one by one, - alone, - lo, the diffraction pattern still turns up, - as though the electrons knew the kind of behavior is expected from them when two slits are there.

Other experiments comparing the behavior of electron beams will be described when we discuss EPR. Here, also, one finds behavior which is well described as quantum strangeness.

So, it is appropriate to leave this section somewhat undetermined. The Uncertainty principle limits our access to the accuracy of our observation in the subatomic realm. The reasoning behind it is very clear so that the existence of the principle and the results from it are not surprising. However, we have also described a strange and quite unexpected phenomenon in the two slit experiment and there are other, - even more surprising, - examples of quantum strangeness later in this discussion of the Quantum Theory.

3.9.13 Does Consciousness Affect Reality?

Before measurement the quantum particle must have been a multistated entity, - although we know nothing of its states and when it gets measured by collision with a screen, it is definitely a particle, no wave properties and one state, therefore one wave function. Two basic questions then arise (i) How was the state which turns up measured out of many possible states, chosen? (ii) The fact that we measure only one definite state but reason that before measurement, the particle has many states and is hence represented by a mix of wave functions, one for each state, gives the second question: where do all the unchosen states go? ("collapse of the wave function").

Related to this is a thought experiment due to Schrödinger³⁸ himself (1) who perceived the dilemmas offered by the interpretation of the Quantum Theory already in the 1930's. Schrödinger's thought experiment has a cat in a box containing two compartments. One is a comfortable compartment in which the cat lives. The other contains a poison in a flask and if the cat ventures into this compartment, she triggers the release of this poison, - and undergoes her demise.

Now, the two compartment box and its cat is regarded in quantum mechanics as like a two state system. The quantum mechanical representation of such a system must involve a representation of the two state cat and hence have two wave functions representing, respectively, the system containing the alive cat, and one containing the dead cat. They are added together to give the wave function for the system.

Each compartment has a lid and to make an observation of what has happened in the box, an observer must decide to open one box, not knowing in which box the cat will be found. He therefore finds either a fully alive or an entirely dead cat. He cannot find a dead-alive cat. But it is the dead-alive cat (the System) which the quantum mechanics represents. The *observer has chosen* one of the two states and therefore "collapsed" the wave function of the other (for it was there in an equation representing the system).

Thus, the observer (i.e., the experimenter) made a choice. He caused certain wave functions to collapse, i.e., disappear. He created what Bohr thought of as the only Reality we can know, the one we measure. In this artificial example one can see the idea that the observer creates his own reality and it is, then, reasonable to say that the choice came from his consciousness and to infer that the observer's consciousness collapsed one wave function (98).

Most working, quantum scientists regard this, Wigner's, explanation as spooky, almost spiritual. Its only touch with experiment is in the claim of some psychics to be able to affect external Reality at a distance (psychokinesis) and nearly all scientists refuse to accept scientific experiments on such phenomena because they are not compatible with their world view at 2000 and can only be done (as with advanced scientific experiments) by people with special training or abilities (See Chapter 5).

3.9.14 Does Quantum Mechanics Represent Reality?

Here, one comes back to what is called "the measurement problem." It is easier to discuss now, - e.g., in terms of the Schrödinger's cat thought experiment. It has been argued that the system is the dead and alive cat in the box and the measurement gets one or the other according to the experimenter's choice (which he makes by opening one of the two boxes). In this sense, then, quantum mechanical equations for the system, - both states accounted for, - do not represent the observed result because that requires only one wave function, while the system before measurement requires two. So, that which is treated by quantum mechanical theory is not what is observed in a measurement in the quantum region. For Bohr and the Copenhagen Principle (following the positivist philosophy of Ernst Mach), there is no reality other than that of observation, - and hence the quantum mechanical equations do not represent what Bohr, regarded as real, i.e., something measured.

³⁸ Schrödinger is so much remembered for his equation that it is seldom understood that he thought of himself more as a philosopher than a physicist.

One sees here a fundamental difficulty. It is largely in respect to the obduracy of the measurement problem that Feynman (99) is reported to have said: "If you really think you understand quantum mechanics, you know it must be wrong."

As stated already, the problem of measurement, and Bohr's insistence that only measured states are real, opens up a chasm in comprehension. If one decides to be a strict Copenhagen physicist (and most physicists follow that view), - one is led to a baffling conclusion: there is no reality to the outer world.³⁹ This seems absurd, and at present, professors lecturing Physics courses will tell their students all about these matters but often do not commit themselves to an opinion.

3.9.15 The Problem of Infinite Regress

One of the difficulties of the Copenhagen viewpoint in quantum mechanics is that it clearly involves an observer, usually a white-coated experimentalist, reading a meter. "The System" is not only a two compartment box with the cat in it but an observer who makes the choice of which lid to open. Bohr was always keen on mentioning an observer.

Now, according to the Copenhagen view, nothing is real until it is observed. Consequently, the cat in the box and its observer are themselves not real until they are observed by someone, who watches the first observer opening one lid and collapsing a wave function, etc., of the box-cat system. This man with video camera must in turn be observed, for he has become part of the system: cat in box, lid opening experimenter and man recording it all. However, the reader will rapidly see that the system of cat in box, lid opener, camera carrying observer and an observer observing them, is itself not real unless observed. So, one sees an infinite regress supporting by implication Bohr's conclusion that there is NO EXTERNAL REALITY.⁴⁰

There are ways of exhibiting that this is a difficult conclusion. There were no observers of the Big Bang so it would thus seem to be part of the Copenhagen Principle to conclude that it did not happen.

³⁹ There is a story from British history of the 18th century. Bishop Barclay, a philosophically inclined cleric, maintained an extreme position a couple of centuries before Bohr. His position is called Idealism. There is no independent outer reality. We are conscious of messages arriving to us through our organs, what is really out there is not known to us. Something similar arises out of certain kinds of oriental philosophy which encourages the idea of MAYA, - Illusion.) It lurks behind the writings of some modern physicists. However, in the case of Bishop Barclay, he was severely put down in a public encounter with the famous public figure of British 18 Century literary life, Dr. Samuel Johnson, well known for expressing himself in definite, thumping statements. In this case it is reported that, having heard the bishop, Johnson opined thus wise: "Sir, I refute you, so!" With this statement, he raised a heavy booted foot and gave a nearby stone a hefty kick.

⁴⁰ The lower case version of the Copenhagen Principle, that those things not measured are still there is denied by Bohr. Heisenberg thought that the unobserved objects "had a lesser Reality" than the observed ones. Long before Bohr and Heisenberg, the renowned German philosopher, Kant, expressed a view similar to that of Bohr. He considered that one cannot know "the thing in itself."

3.9.16 A Questionable Integrity in Some Quantum Mechanical Calculations

The idea that the Quantum Theory is a temporary expedient, that something fundamental is not right in it, would be reviled, and even ridiculed, by most professional physicists. In their view, it is at the apex of achievement in physics. If pressed to say why they think this, they might point to a string of successes, phenomena which could not be explained without the Quantum Theory.

Examples of this are not difficult to find. One would start with the problem of the distribution of radiation from black bodies (Planck, 1901); the theory of heat capacity and its diminishment towards zero at the absolute zero of temperature (Einstein, 1907); correspondingly, the theory of electrons in metals (Fermi, 1932); the explanation of radioactivity (Gamow 1928); of the penetration of energy barriers too high for particles to get over (Condon, Gurney, 1929); explanations of the force between atoms (Heitler and London, 1927); an interpretation of proton electron transfer from metal to particles in solution (Gurney, 1931).

Sometimes, university professors will point to the *numerical* success of the quantum theory, indicating that there are calculations (in spectroscopy, for example) where the degree of agreement between the quantum theory and experiment is correct to 6 figures, or better.

However, there are a number of things which actual theorists in quantum mechanics do which in retrospect look less impressive when looked at inside rather than outside. Bohr talked of being shocked by the Quantum Theory but he did not mean shocked by the things some quantum mechanicians do, and get approved by the acceptance of their papers for publication. Put rather crudely, they get the answer first from an experiment and then show that a quantum mechanical calculation can lead to it. Thus, as stated already, most quantum mechanical calculations begin by solving the Schrödinger equation to calculate, e.g., the various energies of a system. In an ideal calculation one would argue an expression (with associated parameters having numerical values) for the wave function of the System. Then, placing this wave function in the Schrödinger equation, one would solve it for the energies possible in the system. Such a calculation is what is called an *ab initio* calculation and is what is done by some physicists and physical chemists with varying degrees of success. But what is more usually done, is to adjust the wave function until, via the Schrödinger equation, one calculates back a result known from experiment. It is not that such a procedure is valueless because it does use quantum mechanical principles and shows that they are capable of leading to the right answer. To use a phrase from the 60's much of this is, however, done "with the help of some friends", - experimental results by which the theory can be "normalized." But a calculation which has to know the answer before calculating the answer, is clearly not the same as a calculation which gets there on its own.

Here is a reasonable place to bring up the subject of models. In an earlier time, the idea was that there is an external reality and the point of fundamental sciences is to work out how the atomic and subatomic particles are behaving (assuming macro behavior will be followed in the micro state). Using several likely guesses, or models, - one calculated the quantity to which each model gave rise - and if the calculation fitted experiment with model X and models Y and Z could not match this degree of agreement with experiment, the model X would be declared to be the best approximation for the time.

Quantum physicists think differently from this modeling view on the basis that the subatomic particles which inhabit the quantum region do not behave as particles in the visible world. One can start the exposition by citing the properties of the electron, now a wave, now a particle. In macrolife, an entity might be a wave or a particle but it can not be both. One example of strange behavior is the two slit Experiment given in Section 3.3.9 and more weirdness in the behavior of individual subatomic particles will be described below (Section 3.9.18).

Thus, the argument is that electrons and other sub-atomic particles cannot be represented by models which assume micro-world behavior is that of the macro world (this was the view which Einstein could not accept). How then shall they be represented? There is no clear answer to this question, but it is true that one is able to deduce theoretical equations which represent the behavior of sub-atomic particles in various phenomena. These equations seem to represent the quantum reality, - whatever it may be.

Hence, the quantum physicist represents the weird Reality with which he has to deal, with particles which, in Bohr's view, do not exist, in terms of equations, - and these take the place of the billiard ball-like models of atoms and molecules earlier representations in chemistry and physics.

3.9.17 EPR

EPR denotes the authors Einstein, Podolski and Rosen who proposed an experiment which would disprove (Einstein hoped) the quantum proposition that two photons which had been linked together with opposing states of polarization, say, would remain thus coupled, although separated by some instrument so that the photons polarized s (vertically) would go off in one beam and the photons polarized p (parallel) would go off in another.

Hence, according to Quantum Mechanics, if, by some means, it would be possible, after the separation into the two beams, to change the polarization state of one of the twins, the partner photon would "know" the change had been made and make a corresponding change so that the original state of two photons with opposite states of polarization was maintained.

Einstein thought this prediction of the quantum theory unlikely to be fulfilled. If it were fulfilled, he and his coauthors stated that they would find it spooky, for it would imply that, - in some fashion, - the photons were in communication.

3.9.18 Bell, Aspect and the EPR Experiment

In a now famous theorem, John Bell at CERN (104), - while on vacation, considered the relation between two systems of quantum particles which were correlated, i.e., had come from the same source. He deduced a limiting condition that happenings in one stream of electrons could affect happenings in another, on the basis that "knowledge" of the change in one beam could reach the other only at the speed of light. If this limiting criterion of Bell's were exceeded, one would have to conclude that Einstein's spooky happening did indeed occur. This would confirm Quantum Theory, where the relation of the state of photons which arise in a correlated way should occur, *independently of the space between the beams*.

Thus, Einstein expected the first of these results, i.e., that Bell's criterion for "proper" communication would not be exceeded.

An experiment to put this matter to test is surely difficult to perform. It was firstly done by Fry and Thompson (105) at Texas A&M University in 1976. However, their result had some loopholes and a more decisive experiment was made by Alain Aspect and his team in Paris, France in 1982 (106).

The experiment is complex and difficult to describe - the following is an oversimplified sketch.

Aspect had to begin by finding a source which would give him a stream of correlated photons. For this he used emission from calcium atoms and produced the two variable to be examined is the state of polarization of the photons, either vertical or parallel.

According to Quantum Mechanics, a correlation should exist between the states of polarization of these photons, independently of the distance between them. In this sense, if one changed the type of polarization of the one beam, by means of an instrument, the polarization of the other should change correspondingly, independently of the distance apart of the beam. In a famous theorem, J. S. Bell predicted aspects of behavior on the basis that a change in one beam could lead to a change in the other only after an interval calculated using c, the velocity of light, with concepts from Relativity that information can not travel faster than the speed of light.

In fact, Aspect's result did exceed Bell's criterion. Very reluctantly, it seems Aspect and his partners concluded that some form of contact must be occurring between the two particles at super luminal velocities. Such a conclusion, if it can be made, - has two consequences. Firstly, it verifies the quantum theoretical prediction but secondly - and much more tremendously, - it implies a communication at super luminal velocities between the beams. Some physicists (e.g., Stapp (107)) have pushed this to the far reaching conclusion that there is super-luminal communication between all particles in the universe.

There are two technical words used here. The first is "locality" and this refers to hypothetical systems in which that information transfer corresponds to Einstein's assumption of information being carried only at the velocity of light. The second is "non-locality" - systems in which information can travel faster than c.

A great deal has been made of the result of Alain Aspect's experiment, above all by physicists who wish to stress that, after all, quantum mechanics implies a strange world far from that assumed before 1982. On the other hand, Aspect himself, in an interview of 1992, gave an extremely conservative and questioning account of what he had done (108). He stated that information cannot be sent at super luminal velocities. However, in a following sentence, he says: "If you mean, you can include some kind of faster than light mathematical object, then, perhaps yes, it would be a possibility."

Super luminal communication is assumed by a number of physicists in the post 1982 era. It is based upon experiments which are developments of those of Aspect (106). It has been confirmed (106a) that change of the polarization state of the one beam does cause change in the polarization state of the other if both beams are entangled.

There are some hints of a super luminal transfer of information from cosmology. Thus, observations show a similarity in the structure of the universe (background radiation, etc.), in all parts of it. However, the age of the universe at 15 B years is such that two sides of it could not yet have communicated at the speed of light (106a).

In the application of Bell's theorem, and its experimental examination lie one of the most significant areas of physics at 2000. Its consequences seem extended to all parts of our dawning understanding of Reality described by the term wholism (106b).

3.9.19 Quantum Weirdness and Delayed Choice

When light strikes a piece of glass, some of its reflected and most of it is transmitted.

With this property in mind, one can split a beam of photons into two beams. Now, if the two beams are guided, optically, to recombine on a screen-interference will be indicated (109).

However, it is possible to obtain a surprising result with single electron experiments if one takes a detector and puts it in front of one beam and not in front of the other.

Directly one does this (tries to see if the single electron is really going down that path), the interference pattern vanishes. It is as though the system defends itself from close inquiry.

Now, let us make the two pathways very long. One can make things so that there is significant time, after the light has been split at the sheet of glass, and before the one beam is intercepted by the detector. One can wait until the beam has been split into two and then, after that switch on, or don't switch on, the detector.

Our choice, detector on or detector off, is made so that (if off) we find interference, if on, none. The point now is, the choice is made AFTER the photons have been split up and the interference, or no interference, takes place BEFORE the beam reaches the detector, and indeed, before we have decided to put the detector on (no interference pattern) or turned it off (interference pattern). How does the electron know what to do BEFORE we have made the choice which tells it what to do? This seems to establish behavior more spooky than the behavior of the two originally associated photons which always know (instantaneously) what each is doing.

3.9.20 An Improved Quantum Theory

Three quarters of a century after the publication of Schrödinger's equation, the Quantum Theory has two faces. Its outward face is beaming. It is the basis to sub-atomic science, the cutting edge of the investigation of Physics, used by all physicists, and Quantum Chemists, and even by biologists (110). This face of the Quantum Theory is confident and stable. However, with the other face, the one which looks inward, only observed by a few, the countenance is troubled, riven with self doubt and even conscious of death threats by advanced thinkers who ponder about just what the other confident physicists are doing.

Thus, Bohr seems to have been the victor in the long battle with Einstein (e.g., in the matter of the EPR experiment). Einstein wanted no mystery, no spooky stuff, subatomic particles would be expected to behave like visible ones, only that the Uncertainty Principle made their accurate measurement impossible. Anyway, they could only be in contact via luminal communication. Bohr's view was entirely radical. "Prepare for shocks," he had warned. Aspect's experiments again seem to confirm Bohr and introduce an immensely broader view into Physics, - indicating that fundamental particles coupled in the original source cannot be regarded as being separate: they remain correlated, - and indeed know each other by some mechanism faster than light.

However, Bohr's quantum theory and the resulting Copenhagen Principle brings with it much unwanted baggage.

(1) If something is not observed (i.e., registered in an instrument and realized by a human being) then Bohr seems actually to have meant that it does not exist! This view is clearly counterintuitive and, today, only the older physicists support it with enthusiasm. But many will opt for a less strong view, - that the particle may be there alright but, one cannot know it, - and its properties may not yet be "defined" (Heisenberg).

(2) The need for an observer to bring a result into Reality, - is also counterintuitive because it would class everything which occurred before the existence of humans (e.g., the Big Bang) as non-happenings. Further, carrying through the necessity of an observer, - counting him as part of the system, - puts one into the position of having to have an observer to watch the observer and then an observer to observe him, - and etc.

(3) Worst of all, is the "measurement problem." Quantum Mechanics leads to the idea that one cannot measure the "thing in itself" (Kant) but only a kind of emasculated version: the thing in a single state ("One dimensional existence").

(4) The state of the Quantum Theory is not like that of Evolution by chance changes in the genes (a theory which appears to demand impossible coordination between many acts); or not like Einstein's version of Relativity, where the repetition by several independent workers of the underlying Michelson-Morley experiment gives evidence inconsistent with a basic assumption of the theory. But it is a theory in confusion where the situation is well represented by Feynman's famous statement and where one has to struggle with statements such as "there is no basic Reality." It is tragic that those who consider themselves Quantum Physicists are kept hard at work making calculations, the physical picture behind which is not understood.

Here are a few words on ideas set up to avoid the Quantum Confusion.

(1) The many worlds theory

This is due to Everett (111). Everett suggested that we live in one universe but that there are countless other universes in which replicas of ourselves also live and with which we are in some way, not explained, in contact. Thus, - and particularly in the hands of David Deutsch (112), - if one can make one's self believe the model, mysterious phenomena can be interpreted. If single photons traveling separately, and with nothing to interact with, give interference patterns, that is alright because there are unseen shadow photons from one of the other universes and they could be imagined to interact with the single photons, so causing interference.

Most physicists regard this view as preposterous and the serious counter arguments are (a) That the idea is difficult to accept; (b) There is no evidence for any of the parallel universes; and (c) It is a theory not falsifiable and hence, - according at least to the view of Popper, - has no status.

(2) Bohm's Theory

Bohm (Bohm and Hiley (113)) have published papers and books on a comprehensive new Quantum Theory which has more claim to respect than the multiverse view. Thus, in Bohm's view, electrons are particles and entirely real. The mysterious content of the Quantum Theory seems to be lacking in Bohm's view, though we shall see in a minute, that it contains a substantial counter difficulty.

Bohm starts with de Broglie and not with Schrödinger. de Broglie's view was sub-atomic particles exist whether they are being observed or not and the wave acts as a controller. Schrödinger on the other hand was "all wave and the particle aspects are not featured."

Bohm adds to the Schrödinger equation what he calls a "quantum potential." This quantity is a new quantity in Physics, and has properties like no other. It is best explained in terms of an analogy supplied by Bohm. Large ships, he points out, are guided by radar interacting with satellites and giving the ship directions to follow a certain course. The radar has negligible power itself and the ship's propulsion system which has energy which drives the propellers and rudder, - but, at the behest of the radar which gives it instructions. This is what the quantum potential does - gives instructions. It is the actualization of the guiding wave of de Broglie. It actualizes Kant's "das Ding an Sich."

3.9.21 Decoherence - Good News

Measurements in Quantum Mechanics involve a big puzzle, it seems only possible to measure particles in one state, whereas in reality, they have many superimposed states.

But there is a good thing about measurements in quantum mechanics. It concerns the operation of instruments and the normal use of electrons (e.g., as in computers) when they are always measured *en masse*. Now it is so that the quantum weirdness (109) described is observed for single electrons or for a few electrons together if the system remains coherent. However, directly the system grows in numbers, a decoherence steps in and suddenly the system of electrons becomes a normal well behaving reliable system on which we base a good deal of our technology.

So, one should not introduce quantum weirdness into the decoherent macro systems in which electrons do their work. One has to delve deeply with the kind of experiments outlined above to find quantum nonlocality, or to find evidence which can be interpreted to infer conscious particles, etc.

3.9.22 A Summary of Varying Views of the Quantum Reality

A version of the Copenhagen view would be that the macro world is real enough but that it "floats" on an unreal world of sub-atomic particles. The word "real" means "measurable". Something not measured is termed "unreal."

Bohm's views represent an attempt to avoid "unreal." He regards a quantum particle, - an electron, - as fully real, - a particle. However, it is *guided* by a wave (cf de Broglie).

In Heisenberg's view, the world is two-fold. The two aspects are called actual and potential. The unmeasured (unobserved) world is entirely potential, i.e., it has open to it many possibilities (or potential states). When this world of potential possibilities is measured, - observed, - it becomes actual (real). But there is no deep reality because most of existence (or the sub-atomic particles which are its basis) is not observed.

Physicists try to avoid discussion of these possible views because they do not see a possibility of useful resolution.

However, Bell made a very useful contribution by deriving relations which allowed an experimental test to be made of the following quantum prediction: when two (sub-atomic) particles have been coupled together and then are made to part, they remain in

communication in the sense that a change of state executed on one by an instrument will bring about a matching change of state in the other. Experiment has supported this prediction and there is indication (106) that the time which it takes for knowledge of the change in particle A to reach particle B, is less than the time which would be taken if radiation.

This conclusion has been extended by Stapp as having two large possible conclusions.

- (i) Every particle in the universe is, in some sense, in contact with all others.
- (ii) The conclusion of non-locality is inconsistent with a basic assumption of relativistic mechanism, i.e., that the velocity of light is the fastest possible means of communication.

3.9.23 Conclusion

Enough has been said about the Quantum Theory. It is the main theory in Physics at this time, but it is clear that if one pokes into it a bit, it shakes. Its feet are on unsteady ground and discussion support the opinion of Penrose (95) that a new theory is needed.

3.10 COSMOLOGY: THE ORIGIN OF THE UNIVERSE AND THE BIG BANG

3.10.1 What Every School Boy Knows

All school boys know how the universe began: it started off as a gigantic explosion and has been expanding ever since.

This remarkable picture has caught the imagination of all those who think about the heavens. It is at present virtually universally accepted and is a hot item among astronomers who generally believe in the idea. In the USA hundreds of them are still investigating the Model and its consequences.

In this section we shall see to what extent modern data are consistent with this important basic concept.

3.10.2 The Big Bang and Theology

The concept for the Big Bang as the beginning of the universe originated in the mind of a Jesuit priest (see below). It is a positive idea from the point of view of the Jewish, Christian, and Islamic religions because it corresponds somewhat to the account given in the Bible: God created the world *out of nothing* in a very short time.

For this reason, the theory has been welcomed by theologians and they form (along with the Religious Right in the USA) a support group, apart from the scientists who, at present, generally accept the theory.

3.10.3 Origin of the Big Bang Concept

Einstein applied the principles of his general theory of Relativity to the creation of the Universe (114). To make the universe stable he found he had to add a repulsion term increasing with distance. However, Eddington (115), who generally supported Einstein's work, brought out other solutions of the Einstein equations (115), according to which the Universe will expand forever or, if there is sufficient mass in it, expand until gravity slows

down the expansion and the universe begins to contract to what was later called "the Big Crunch."

Calculations of various types of universes (expanding, stable, contracting), were made by a Russian mathematician, Alexander Friedman (1921-22)(116), using the equations of General Relativity.

George Le Maitre, a Belgium cosmologist and priest, was the first (117) to suggest that the Universe had begun from a primaevial "egg" 30 times the volume of the sun. This beginning entity contained everything and the Universe began when the "egg" exploded and spewed out the material of the present universe. It has been expanding ever since. It seems that Le Maitre did not know of Friedman's work, which contained, implicitly, the idea of a Beginning before his own work.

Gamow (118) developed the Le Maitre theory in some detail, - pointing out that the primeval egg would consist of neutrons, protons, electrons, and radiation. He made a critical calculation, - the ratio of hydrogen to helium in the Universe, according to the model, and found that this was 11, - in accordance with experiment.

One of the characteristics of Gamow's development was that he predicted a background radiation left over from the Big Bang, corresponding to a temperature of about 2.7°K.

The actual phrase Big Bang was originated by Fred Hoyle in a radio broadcast in 1961 (119).

As far as the confirmation of the background radiation is concerned, it is usual to quote this with two Bell telephone scientists, Penzias and Wilson, in 1963 (120). However, in fact, it was discovered earlier by a French graduate student (121) using surplus WWII radar equipment.

3.10.4 A Contrast with Origin of Life Studies

The difference in attitude towards the prospect for progress in studies of the Origin of Life and towards studies of the Origin of the Universe could hardly be greater.

In the Creation of Life studies, the situation is one of gloom and without a model to test. In the Origin of the Universe studies there is a vibrant model and hypotheses being based upon it have been taken up by main stream scientists for at least 30 years.

A degree of explanation for this great difference may be found in the differing nature of biology and cosmology. Biology is a clouded enterprise with an enormous amount of experimental data, more pouring in every year, and theory must fit all this. In cosmology no critical experiments are possible. Certainly there are facts, - above all the character of spectral lines from the various "galaxy clusters" and we shall discuss these and show how the present theory of the Origin of the Universe depends upon the interpretation of them. Thus, it is easier to put forward an imaginative theory in cosmology and maintain it for a long ride before it succumbs (as all theories do) to collision with facts (e.g., those being discovered by a space based telescope).

There is another aspect. The Origin of the Universe studies provides a field day for the computationalists and one with sparkling concepts and ideas which can be vividly presented. Books can be written, for example, Hawking's book (122), "History of Time" and Weinberg's (123), "The First Three Minutes" are extraordinarily vivid and exciting. Moreover, both have huge sales, and hence give large royalties to their authors. It hardly

matters that much of the material in such works is based upon speculation, and that the ideas described are likely to have vanished in a generation. The point is that the material can be made the basis of marvelous movies showing imaginary explosions and the development of atoms, stars and "galaxy clusters" in the early universe, all in color with thunderous background sounds.

3.10.5 The Doppler Interpretation of the Red Shift (Vesto Slipher, 1917)⁴¹

By 1909 it was known that there were "spiral nebulae", later called galaxies. The light from these bodies was shifted in wavelength away from that determined for the same spectral lines on Earth. This was first observed by Vesto Slipher in examining the Andromeda galaxy, the nearest one to our own galaxy, the Milky Way. Slipher found that this galaxy gave a blue shift with respect to Earth and from this shift, utilizing Doppler theory, he was able to calculate a rate of approach of the galaxy to the Milky Way of 300 km per sec⁻¹.

However, as work continued, Slipher (124) found that galaxies with blue shifts were rare and that most of them gave red shifts, i.e., that they are traveling away from the Earth. At first Slipher's calculations of the velocities of recession was quite reasonable, namely of the order of magnitude 1000 km sec⁻¹. But, the most important aspect of Slipher's contributions was the conclusion that he made from this data, namely that the Universe is expanding.

Le Maitre's idea was soon to have some support by the work (at this time little known in the West) of the Russian mathematician, Alexander Friedman (1921-1924).

According to Friedman (116), expansion or contraction of the Universe depended upon a characteristic parameter, Q, defined as the ratio of matter in the universe to the critical matter density which would be large enough to stop expansion. The remarkable result, - one of the more remarkable in all science, - was that the decision - expand for ever or contract, depended upon Q at one minute after creation.

The Big Bang was implicit in the work of Friedman. However, the Jesuit priest, George Le Maitre, was the first to describe an original "primeval egg" from which the explosion occurred.

The next step after Friedman was made by Karl Wirtz, a German astronomer, who in 1924, pointed out that galaxies which looked the smallest were in fact traveling the fastest (127). This result is consistent with the apparently reasonable idea that the material first of all thrown out at the beginning of the Big Bang is indeed moving the fastest, and is, therefore, the furthest from us.

This brings us to 1929 and to the introduction of the work with a man whose name, Edwin Hubble, is well known to the reading public because the first space telescope, produced by NASA has been named after him. Hubble had the considerable advantage of being able to use the Mount Wilson telescope, the largest (i.e., the most sensitive) in the world in 1929, - and he determined the velocity of recession of 39 galaxies and drew a graph of this velocity against their distance away from Earth. This linear graph gave rise to what is known as Hubble's law and is shown in Fig. 3.11). This relation supported the idea that

⁴¹This section and the following one owe much to the clearest and most detailed presentation made of these matters in a book by Paul LaViolette, called "Beyond the Big Bang" (126a, 126b).

the universe is expanding, - in accordance with the predictions of Friedman, the suggestion of Le Maitre and the results of Wirtz.

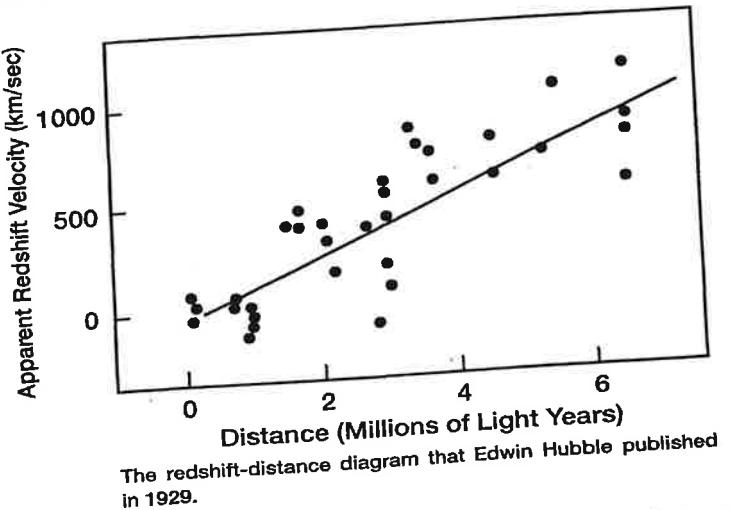


Fig. 3.11 The red shift-distance diagram that Edwin Hubble published in 1929. Reprinted with permission of Paul La Violette, 1995, 2004, Park Street Press, Rochester, VT.

All was well for some time, - roughly 1930 up to the 1980's, but during those 50 years better equipment made it possible to look at galaxies which were further and further away from Earth and therefore (cf Wirtz observation and Hubble's Law) were traveling faster. By the 1990's the calculated velocity of recession reached 94% of the velocity of light for the furthest of galaxies and this stimulated the emission of a Cry of Warning. Thus, a concept which led to the conclusion that these vast bodies, the biggest in creation, were traveling at such a super fantastic speed, - to put it mildly, - strained the bounds of reason. From 1990 onwards, doubts concerning the Big Bang theory and the expanding universe began to surface even among its supporters and enthusiasts. For it was realized that if observations could be made of galaxies still further out, Hubble's Law would indicate galaxies traveling faster than light - not possible according to Relativity.

3.10.6 The Tired Light Explanation of the Red Shift (Nernst 1921)

The famous⁴² German Physical Chemist Walther Nernst (128), proposed an alternative explanation of the red shift and hence an alternative cosmology, in 1921 (Vesto Slipher, 1917, Friedman, 1922, Le Maitre 1927, Hubble, 1929).

Nernst has a considerable claim to eminence in the cosmological work because he predicted the Hubble Law eight years before Hubble's publication. The Nernst proposal was that space was not empty, it was filled by a so-called "luminous ether". On passage through this the light from the galaxies would have some of its energy absorbed by the surrounding ether, thus explaining the 2.7°K background radiation observed at a later date.

Nernst's ideas (which were, of course, in contradiction to Einstein's 1905 conclusion consistent with the alleged result of Michelson and Morley, there is no ether) were developed by Fritz Zwicky in 1929 (126). The Universe is static and not expanding. As the light moves over the vast distances involved, there will be several causes for loss of energy, for example, a frictional drag between light and intergalactic gravity. Although at the time of Nernst's first paper, it was thought that space was empty except for the ether, it has more recently been found to be populated with vast clouds of dust and hydrogen, the so-called dark matter. In addition, even in the so-called vacuum of space, the average distance between particles is around (only) 1000 km. Photons traveling through space could collide with H₂ molecules as frequently as once every 10⁻² sec. A photon would find many possibilities of energy-loss events in a billion light year journey from a galaxy to Earth. Everytime the photons of the radiated light struck something, it would leave some energy behind. Of course, this decrease of energy of the photons would increase with the distance of the journey from the galaxy (i.e., Hubble's Law) and the decrease of energy would mean a corresponding fall in frequency ($E = h\nu$), and rise in wave lengths, i.e., the red shift.

Nernst's theory of tired light gets rid of calculated recessional velocities of galaxies near the speed of light. However, it changes cosmology for if there was no Doppler basis to the red shift, there is no expanding universe and if there is no expanding universe, there is no need to rationalize the expanding body as having originated in some primeval atom. Thus, in this view the universe is in steady state, a state similar to the that later suggested by Hoyle et al. (129) in which stars are constantly dying and others being reborn. The fact that this steady state model has been abandoned on the basis of the finding of the French student's discovery of the background radiation corresponding to a temperature of 2.7°K hardly seems to be justified because, there could be other explanations of this background temperature, including the heat caused by the absorption of some light on its passage from the galaxies.

⁴² Walther Nernst was Prof. of Chemistry at the University of Berlin in the days when professors received reverence and had great authority. Nernst was a "polymath" in the sense that he could indeed apply himself to various fields in science with great effect. He is known particularly in electrochemistry for the Nernst equation, - the first to relate the potential of electricity producing cells to the concentration of ions in solution in contact with the electrodes. He is more widely known for his Nernst heat theorem, a preliminary to the Third Law of Thermodynamics. His cosmological contributions were little known until he published them in a book in 1938. Nernst's famed abilities were coupled to a cold nature. The scheduled time for arrival of his research students was 7:00 a.m. Were one not in on time, he found a note on his bench reminding them of the number of students who were waiting to occupy his space.

3.10.7 Hubble's Change of Mind (130)

Although Edwin Hubble is always associated with the red shift and the Doppler interpretation of it which supported the expansion of the Universe and the Big Bang concept, in later years Hubble came to the conclusion that he had been wrong. Thus, in 1935, Edwin Hubble and Richard Tolman wrote a paper throwing doubt upon the Doppler mechanism and then in 1936 Hubble, himself, wrote a follow-up paper in which the basic conclusion was in favor of the Nernst and Zwicky theory. Hubble suggested that, in the absence of the Doppler red shift explanation, there could indeed be a static universe such as Einstein had suggested when he introduced his so-called cosmological constant for which he had little justification. In Hubble's 1938 view the universe would be Euclidean in its geometry, no "curved space".

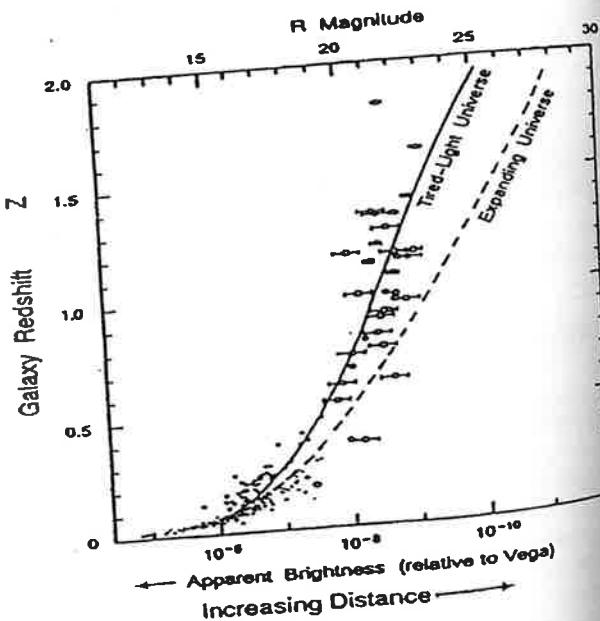
Hubble went on to comment as follows (130):

"If red shifts are velocity shifts which measure the rate of expansion, the expanding models are definitely inconsistent with the observations unless a large positive curvature (small, closed universe) is postulated. The maximum value of the present radius of curvature would be of the order of 470 million light years and the mean density of the general order of 10^{-26} grams per cubic centimeter. The high density suggests that the expanding models are a forced interpretation of the observational results."

But Hubble's later publications, his latter day conversion away from the Doppler interpretation of the red shift, made no difference to the mainstream astronomers. The Big Bang hypothesis was grandly attractive and it has lived lustily ever since, at the Millennium spawning imaginative books and fantastic movies. However, we shall see in the following material that, - at 2000, - the Big Bang theory is very difficult to maintain.

It is reasonable at this point to put forward some comparisons made of the two interpretations.

Fig. 3.12 The Hubble diagram test compares galaxy red shift (vertical scale) to distance (horizontal scale). Work of Kellerman. Reprinted with permission of Paul La Violette, *Beyond the Big Bang* (1995, 2004), Park Street Press, Rochester, Vermont.

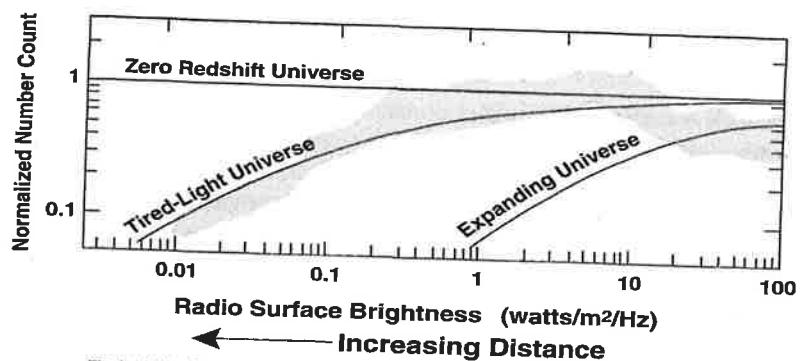


3.10.8 A Comparison of Doppler and Tired Light Theories for the Red Shift (126)

An informative table (La Violette, 1995) indicates a greater degree of agreement with a number of facts for the Tired Light rather than the Doppler interpretation.

In addition to this table, LaViolette quotes the work of Djorgovski and Spinrad (Fig. 3.13) and Kellerman (Fig. 3.12). In each case these authors have compared the Doppler and tired light explanations with facts of the red shift. Djorgovski work concerns the red shift as a function of brightness of the galaxies. Hickson and Adams plotted galaxy angular separation as a function of galaxy cluster and compares the amount given of these number count against the radio brightness, (i.e. distance).

These tests (126) favor tired light.



The log N-log S test. This test compare the number of radio-emitting galaxies and quasars found within an incremental volume of space located at a given distance from Earth (vertical scale) to the distance of that volume increment (horizontal scale). Tired-light makes a better fit to the data. Data is taken from Kellermann, "Radio galaxies, quasars, and cosmology."

Fig. 3.13 Reprinted with permission of Paul La Violette, *Beyond the Big Bang* (1995, 2004), Park Street Press, Rochester, Vermont. Galaxy Redshift as a function of distance. Work of Djorgovski and Spinrad.

3.10.9 The Age of the Universe, - and the Age of the Galaxies

It is easy to calculate the age of the universe from the Hubble graph (Fig. 3.11). It is H/c (where H is the slope of the graph c , the intercept) and depending on its value (which changes as new data arrives) the answers come to somewhere between 2 and 20 B years. At the millennium, the best estimate is about 15 B years (131). However, one of the difficulties is that there are objects in the universe, huge conglomerates of galaxies, which are too big to have been formed in a time of 15B years. These objects seem to be at least 60 B years old, and there are even stars in our own galaxy which seem to be between 4 and 7 B years older than the age of the universe as given by the Big Bang theory. Bruce Tully of the University of Hawaii (132) was the discoverer of the largest objects ever seen. These are concentrated in huge ribbons of matter in which as many as 1000 galaxies are grouped

together. Of course, these cluster complexes contradict a homogeneity in the distribution of galaxies, which would be expected if the galaxies resulted from matter thrown out from the explosion of Le Maitre's cosmic egg.

Then, in 1986, astronomers discovered galaxies a billion light years across (133). These would have taken at least 100 B years to form. The Universe as seen around 2000 is clumpy and irregular in respect to the distribution of galaxies, quite different from the regularity expected from the Big Bang. According to Hannes Alven, a Swedish cosmologist (134), the best way to understand the universe is in terms of plasma. His model of the structure of the universe includes consideration not only of gravitational forces but also of electric currents and powerful magnetic fields (135).

There is much to suggest that galaxies do not move faster than 1000 km sec^{-1} and on this basis, it would need at least 80 B years for the present universe to have come into its present structure. Thus, the Big Bang concept is incompatible with the age of many galaxies⁴³ for it implies an age of the Universe at least 5 times smaller than that necessary for their formation.

There is some confusion in distinguishing between "the known" Universe and the Universe. We can only know galaxies, the light of which has had time to reach us since the Universe began. But, of course, our knowledge of that (the 15 B year figure) is itself dependent upon acceptance of the Doppler interpretation of the red shift. The truth is - all ways of calculating the extent of the Universe depend on theories.⁴⁴

3.10.10 The Contributions of Halton Arp (136)

Halton Arp is an American astronomer who for the last 30 years has been accumulating facts which are inimicable to the standard model in astronomy: the red shift is a Doppler effect, and the universe began with a Big Bang about 15 B years ago.

Correspondingly, Arp has cited many other examples (136) which are not consistent with the standard model and one of them is the quasar markaren 205, and another is the galaxy in NGC4319. Arp found that they were connected by a bridge of light. On the other hand, the red shift of the quasar is much larger than that of the galaxy, so that, - on Doppler theory, - they cannot be together. But, the band of light appears to join them.

Mainstream astronomers attempt to defend themselves against Arp by applying the idea of the effect of very heavy objects upon the path of light ("Lensing"). Thus, an object may appear to be in a certain position, but suppose that there are invisible very large objects, - dead stars, black holes, etc. These would tend to affect the light and any interpretation,

⁴³ Milton (46) has used information on the errors (some gross) in radioactive-decay dating to throw doubt on the 4.6 B years given by most cosmologists for the age of the Earth (Section 3.7.3). He uses several series of facts to deduce a far younger age.

⁴⁴ Thus, our present ideas of the size of the Universe are based on the distance light can travel in 15 B years. If the Universe is older, we would be receiving light from further away than the distance we now calculate. If the Universe is expanding, it is doing so at near to the speed of light, but the rate of expansion, as a percent of present size, is still negligible because of the very large calculated size of the Universe. Thus, on the basis of a 15 B year age of the Universe, formed by Big Bang, the radius would be $\sim 10^{28} \text{ cm}$ and the expansion/century would be $\sim 10^{20} \text{ cm}$, - a negligible quantity in respect to the size of the Universe.

excluding lensing, - might therefore be wrong. However, such an explanation does not seem to give rise to an understanding of the many inconsistencies in the Big Bang model which Arp has brought out.

Arp has been, - as can be seen, - a thorn in the side of US astronomers for many years and instead of facing him with intellectual arguments to meet the inconsistencies he has exposed, they took the easy way out and allowed him no more telescope time! Arp moved to Germany where a more progressive atmosphere towards astronomical controversy than that in the USA appears to exist. He has pursued his career there with apparent success.

3.10.11 Dark Matter: What Is It?

There have been several views of astronomers concerning the nature of intergalactic space.

In the earlier view, the universe between galaxies was empty except for the ether ether was rejected.

As time has gone on, however, the degree of dark matter in the universe has become an important question. Thus, if the universe is eventually to stop expanding and come back towards the Big Crunch, there has to be about one thousand times more mass in the universe than there appears to be.

What, then, could be the unseen matter which would have to be present if the universe is not going simply to expand forever? It may consist of several things. There are of course many dead stars in the universe which one does not see by means of light based telescopes. Again, there seemed to be evidence (136) for vast clouds of hydrogen which exist from place to place and apart from this there are substantial collections of dust particles.

There are other relevant questions open at this time. Neutrinos do not have zero mass. How much do they contribute to the necessary mass? What of light? Photons have what is the total amount of it? Gravitation has mass but it seems to be negative mass.

The question of dark matter (i.e., how much is there?) is at present an open one, but the work of Marmet (136a) and others is more in favor of the tired light as an (126).

3.10.12 The Status of the Big Bang at 2000

It has been seen in this Section, and particularly in the collection of comparisons made by La Violette (126), that there is evidence which favors Tired Light as an explanation of the Red Shift in the spectra of light from galaxies.⁴⁵ If this is the case, then why is it that astronomers still stick to the Big Bang theory? Maddox, writing in 1989, thought the Big Bang would be gone by 2000, but it is still talked about and one reason may be that there is nothing so vivid to replace it.

However, there certainly seems to be an ultra conservatism about cosmological concepts. The conservatism is well exemplified by the astronomer's treatment of Halton

⁴⁵ But the Tired Light theory is difficult to make consistent with Arp's observation of bodies traveling together with different red shifts.

Arp. Another thing is that Big Bang theory is a complete model, it seems at first to explain everything, the red shift, the age of the universe, and above all, its beginning. It is much better in this presentational aspect than Tired Light for if that is a true explanation of the red shift, the universe is not expanding and all we can say is it is very very old, and we avoid the question of how it began. Thus, Tired Light gives no explanation of the creation of the universe, whereas the Big Bang theory can easily be brought to be some kind of scientific version of Genesis.

However, Maddox turns the argument around. What happened before the Big Bang? It is no use saying, coyly, as astronomers do that "space-time did not exist and was created by the Big Bang." There is another major difficulty and that is the idea of the singularity. Thus, Big Bang theorists picture the universe as being in its earliest stages of a size less than that of an atom! That appears to be as preposterous an idea as any in science and only allowed to exist perhaps because (as with Einstein's Relativity) few scientists understand what is meant.

3.11 THE SHAKING PILLARS

In this chapter we have looked so far, briefly, at four, but a Big Four, pillars of the paradigm which underlie the religion of the West.⁴⁶ Taken in order of dates they are Evolution by Natural Selection, Relativity, Quantum Theory and the Big Bang Theory of the Origin of the Universe. Let us leave out mathematics where the difficulties are intriguing but do not threaten the basic subject.

Most scientists are engaged in tiny sections of the entire enterprise. Those who spend full time in the professional study of the basic areas which we have reviewed are less than 1,000 the world over. The remaining scientists (physicists, chemists, biologists, engineers, etc.) assume that the basic fabric upon which their science rests is sound. This does not mean that the typical research scientist believes that all that has gone before (e.g., the pillars we have been examining) is set in stone or will not be developed further. Most scientists think that progress will continue and that the problems which we have discussed here may eventually be solved. But they assume these progressive changes will be carried out by a development of present ideas and not by a radical change in scientific thinking.

3.12 THEORIES OF THE CREATION OF LIFE

3.12.1 Introduction

Until the wave of Great Confidence in Science, - which characterizes attitudes in Western countries in the second half of the 19th century, - it was thought that there had been a supernatural act, - God made man, etc. However, with the advent of the triumphs of technology, - the railways, the telegraph, - there began to be raised the question as to whether in the matter of the Creation of Life, too, Science could answer the question with more certainty than could Theology.

This view became more widespread, particularly after the publication in (1871) of Darwin's second book, the *Descent of Man* (138).

⁴⁶ We omit mathematics here for the problems we discussed therein are like flaws in a perfect fabric. One does not think of abandoning the basic theory of mathematics whereas the other concepts we have examined seem to have a limited life.

Three preliminary matters may be mentioned, before embarking on a statement of the attempts at early theories.

(1) Bergson (139), a French philosopher, developed a theory called Vitalism. There was something essentially different about a living creature compared with the corresponding mechanical one. Bergson suggested that living beings possessed an *Elan Vital* - but what he meant was never spelled out in reductionistic terms.

Such a theory has been long abandoned for it is too vague to be discussed in terms of biochemistry, and in any case, it hints at some kind of direction in evolutionary progress, which biologists reject with emotion because it might lead inexorably back to a Designer.

(2) Driesch's Entelechy (130).

Driesch, a German biologist (1867-1941) (130), pointed out a fact which lies open in front of us. This is that the spontaneous growth of living creatures appears to disobey the Second Law of Thermodynamics, one of the bastions of Science. Thus, in a closed system, all spontaneous changes are supposed to give rise to an increase in disorder which physical chemists call "entropy". The development of a living system, however, is always disentropic. The phenomenon of the spontaneous development of order is what Driesch called Entelechy.

From the viewpoint of thermodynamics, the spontaneous increase in order of biochemical processes is a style easily vaulted over. Thus, the Second Law refers to *isolated* systems (chemical reactions in a vessel into which no new material may enter) and one can hardly say that living systems develop in isolation. Hence, the thermodynamist, - but then rather arm wavingly, - can point to all the surroundings in which, e.g., a rose bush grows disentropically, and claim that, if one were able to measure the corresponding positive entropy changes in its surroundings associated with its growth, one would surely find that they exceeded the negative entropy changes associated with the development of life. Thus, the Second Law of Thermodynamics is not formally challenged by a series of complex happenings, all disentropic, if one believes that the entropic changes associated in the system with the disentropic ones, lead to a positive entropy balance.

Although Driesch's entelechy has long been rejected, the fact remains that when life gets into inanimate material, it knows what to do, takes off on its development, its life course, and blazes away disentropically until life leaves it whereupon the organism obeys the Second Law in an unambiguous and simple way, breaking down spontaneously into a great mass of disorder (positive entropy change) without having to call for help upon entropy changes in the surroundings.

(3) Lastly, it is relevant to ask what are the criteria of life? This became a central question for NASA in the search for life on the moon and on the planets in the 70's and 80's,⁴⁷ and it follows from the last section that what they looked for was signs that disentropic processes were occurring spontaneously. Of course, this was one of several criteria, but it is a central one. Life always means $\Delta S = \text{negative}$ for the life inspired system, whereas for reactions in non-living the ΔS of spontaneous changes is positive.

⁴⁷ The essential result of NASA's quest for life in the solar system is that there is none outside the Earth. However, there might be bacterial life buried under the surface of Mars. Examination of the compounds found in some meteorites seems to show the chirality characteristic of life. The subject is well dealt with in Davies (144).

3.12.2 Oparin's Theory of the Origin of Life

It is reasonable that the first attempt at a molecular-level theory of the creation of life was given by a scientist working in the culture generated by materialistic Communism (1917 onwards), i.e., in Russia. It remains, today, the archetype of chemical theories of the Origin of Life and it is probable that, for scientists who have not been involved in Origin of Life studies, - it is imagined that "Life must have got started that way - or something like it."

So, what is Oparin's Theory (141)? It depends upon a model of the early state of the planet (Extreme volcanic activity, Earthquakes, a pounding by asteroids and meteors, no O_2). However, in spite of the inhospitable nature of the early Earth, Oparin suggested that, here and there, there would be quiet pools, - warm pools in fact, - and in one of these there might per chance be some amino acids. Now, proteins are made up of amino acids and Oparin took the attitude that, once he had explained the spontaneous production of proteins on the early Earth, he had taken the biggest step to explaining life. He did not try to explain cell formation, - indeed, - the formation of very complex biomolecular nature of even very simple cells is not completely understood to this day.

Scientists in general admit that much more has to be found, - but they point out the huge times involved. There is controversy about this Age of the Earth but mainstream scientists put it around 4½ B years and the very earliest single celled creatures as dating back to 4B years. Thus, there would have been ~ ½ billion years for things to happen in the warm pool and then allowing for a huge number of warm pools and chance collisions, it was not difficult to imagine, qualitatively, that proteins might form - and then, hopefully somehow on to cellular living beings.

Such a position is not now that of scientists who carry out Origin of Life studies. Among these workers, Oparin's theory is as rejected as are Elain Vital, and Entelechy. Thus, the reaction between amino acids in aqueous solution to form proteins cannot occur thermodynamically, i.e., the change in free energy attendant upon such a reaction is positive, and not negative as needed for a spontaneous reaction. Water plays a part in such reactions, and some workers have tried to insist that the great amount of water available might influence the balance favorably. However, it is the moles of water per unit volume which count in evaluating the probability of a reaction involving water and the availability of a vast amount of water does not change this.

Other reasons for denial of Oparin's theory arises from calculations made of the number of collisions needed to overcome the extremely low thermodynamic improbability of protein formation. In spite of the billion years available, the time needed to form the requisite proteins by means of chance collisions and then one celled creatures, is so many orders of magnitude greater than the time available that the probability that it can occur within the Oparin Model is simply zero.

3.12.3 Urey and Miller

Although Oparin's theory is part of the past as far as theories of the Origin of Life are concerned, it was given a revigorating pulse by some work carried out by the eminent American chemist Urey and his student, Miller. They confined in a flask a mixture of what they thought must constitute the essential constituents of the atmosphere of the early Earth (CH_4 , N_2 , CO_2 , H_2O) and subjected such a mixture to electrical discharge (cf. lightning).

This was reasonable because the probability that in the early Earth the intensity and frequency of thunderstorms is supposed to have been much greater than that at present.

To the delight of the junior author, and probably to the surprise of Urey, amino acids (not proteins) were found in the resulting mixture (143). This seemed to be a huge advance, right on course for Oparin. However, this opening has not widened and for the reason already stated. A scientific theory of life needs to show that from compounds reasonably supposed to be present in the early atmosphere, uni-cellular beings could arise.

This would need amino acids - and that's what Urey and Miller got. But the next step was the first to go wrong. Thus, there is a thermodynamic tendency for proteins to dissociate to amino acids. Urey and Miller's work was a waving flag in a sea which quickly froze over.

However, there was a sequel at Texas A&M University in the early 1980's. In the work carried out there, the basic idea was that, in the early Earth, oil covered the majority of the surface and on top of that came water formed by the impact of meteors. Could life have formed (with the help of the lightning) at the water-oil interface (the water possessing dissolved salts, would make an electrically conducting solution).

However, this work (in which I took part) was abandoned as a result of calculations of the negligible probability of forming complex proteins (at the oil-water interface) even over the course of a billion years, and even if the imagined oil-water interface covered the entire surface of the Earth.

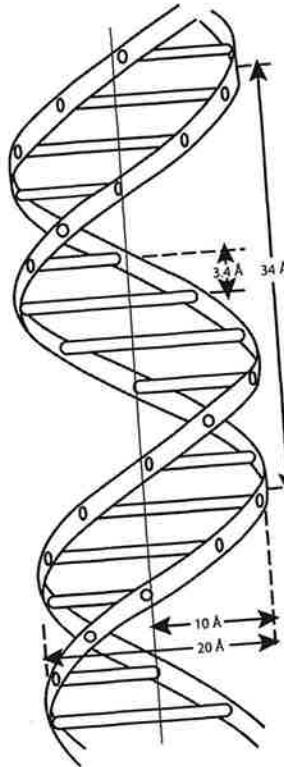
3.12.4 The Major Difficulty

One of the great discoveries of the past century has undoubtedly been the understanding of the structure of the biomolecule DNA (deoxyribonucleic acid) (143).

This is because this molecule, with its peculiar and complex specific structure, specific to a given species, is the essential molecule of inheritance, half of it from the mother and half from the father. Present thought is that the structure of DNA is effectively a code from which the physiological characteristic of the offspring are determined.

All living creatures contain DNA and the difference between them, is in respect to its length and hence the degree of its complexity, the simple bacteria having DNA consisting of several hundred atoms and human DNA containing as many as a billion atoms.

Therefore, any scientific theory of the beginning of life on this planet must explain the prior existence of this DNA, rationalized by the laws of chemistry, i.e., by chance collisions between simpler constituents, a main paradigm of Science being that there is no Teleology, no direction from above, no design.



The double-stranded helical structure of DNA, as first presented in 1953 by Watson and Crick. The framework of the helix is composed of the sugar-phosphate units of the nucleotides. The rungs are formed by the four nitrogenous bases adenine and guanine (the purines) and thymine and cytosine (the pyrimidines). Each rung consists of two bases. Knowledge of the distances between the atoms, determined from x-ray diffraction pictures, was crucial in establishing the structure of the molecule.

In order to be clear what we are talking about, Figure (3.14) shows one strand of DNA with its ladder-like structure, the ladder having appropriate rungs.

There are two kinds of structures in DNA. One concerns the ladder-like part which consists of a series of phosphate groups shown in Figure (3.15) and these are associated with certain (in fact, a specific four) nucleotides, which form the rungs. They are usually represented in discussions of DNA by the letters (T, C, A, G).

The number and arrangement of the nucleotide groups within the total length of DNA is specific for a given species. The DNA is therefore a piece of genetic information and direction, - and in principle, - the present scientific view is that new creatures are formed from materials, the structure of which is determined by the information contained in the structure of the DNA of the given species.

Fig. 3.14 Reprinted with permission from Worth Publishing. From H. Curtis, *Biology*, Worth, New York, 1988

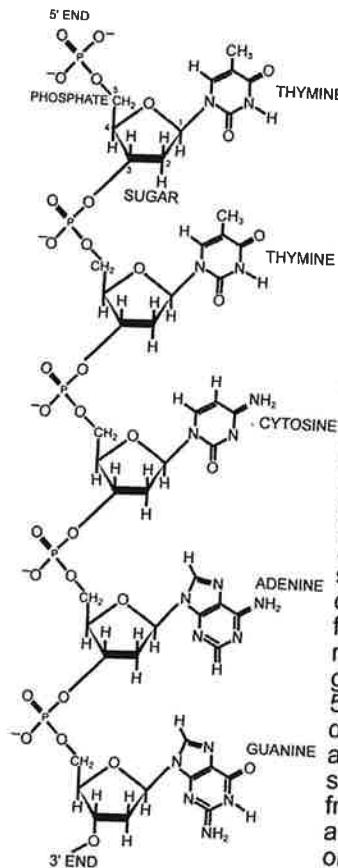


Fig. 3.15 Reprinted with permission from Worth Publishing. From H. Curtis, *Biology*, Worth, New York, 1988

The structure of a portion of one strand of a DNA molecule. Each nucleotide consists of a sugar, a phosphate group, and a purine or pyrimidine base. Note the repetitive sugar-phosphate-sugar-phosphate sequence that forms the backbone of the molecule. Each phosphate group is attached to the 5'-carbon of the deoxyribose sugar in the adjacent nucleotide. The sequence of bases varies from one DNA molecule to another. In the figure, the order of nucleotides (from the top) is TTCAG.

Thus, it is proposed that various parts of the DNA provide the template for the synthesis of proteins of specific structures, whereafter these specific proteins are used for building the various parts of a creature's body. The sections of DNA which are in use here are called genes (and each is related to specific functions in the body).

There has been particular interest in the structure of the genes because if a specific gene controls a tendency towards a specific illness so that if it were possible to analyze the DNA of a given individual in an early stage of growth, the serious fault might be eliminated.⁴⁸

What we are interested in, in the context of this chapter, is how this DNA could firstly have come to exist. We know that the compounds which were present in the early atmosphere were, - among others, - methane, carbon dioxide, nitrogen, water, trace amounts of phosphorus and sulfur, - and that in the presence of a high degree of electrical discharge

⁴⁸ However, as of 2004, this view is increasingly regarded as simplistic. Fritzof Capra, in a 2002 book entitled *Connections* (Doubleday) goes so far as to suggest that the strength of the concept of genes is weakening.

certain amino acids can be formed from a mixture containing them. However, the Urey and Miller work did not establish the synthesis thereby of the specific amino acids needed for DNA formation, let alone the problem of the thermodynamics of protein formation therefrom.

It will be appreciated that specific arrangements of the four amino acids in the many rungs of the DNA ladder can give rise to a large amount of information. The arrangement of these amino acids within the ladder of DNA has often been regarded as resembling the software in a computer (144). The simplest DNA, bacterial DNA, contains information which would take many volumes of books to write out were it to be replicated in plain language from a computer program (144).

Let us assume that from the first living creatures, - thus the first DNA, - some mechanism, - e.g., Darwinian evolution, - were present to change such one celled creatures and develop them gradually to complex beings, eventually man. However, for the synthesis of the first DNA to be consistent with the present scientific paradigm, it would have to be assembled by random chance processes from the simpler substances present on Earth before life was created.

It will be appreciated that the creation of a very long and complex organic molecule (with two intertwined strands) and having within it a series of amino acid arrangements each in a series of groups of definite order specific to the organism, is unlikely to occur as a chance happening. Thus, the specific amino acids forming in the rungs of the DNA ladder have to be such that they give rise eventually to specific proteins necessary for the building of the organism concerned.

However, many scientists who look at this problem qualitatively, without making the necessary calculation as to the probability of the formation by chance of such extraordinarily complex molecules, tend to say, "Ah, - but look at the time it's had for development, four billion years."

It is reasonable to subject this opinion to test. Thus, one can make a calculation to find out what kind of chance there would be for the specific amino acids to rearrange in concordance with the phosphate groups to come together in a ladder-like form and for just these four specific amino acids phosphate group to be arranged in a number of specific ways.

To communicate the significance of the result of such a calculation, it is better to take a simpler model and calculate the number of possible arrangements which could be made using DNA-like constituents. So, let us consider a small protein which might have within it 100 amino acids of 20 different arrangements. We assume that the twenty different groups of amino acids are formed from the four known to make up the structure of DNA. Hence, five of each of the four will be present in this protein.

It is easy to calculate the number of possible arrangements which would arise in the given simpler case of the protein with 100 amino acids, twenty different types. The equation for the number of arrangements for N things in which all things are different is given by $N!$ (the factorial of $100!$ is $100 \times 99 \times 98, \dots$).

In our case we have a lesser number of possible arrangements because of the 20 amino acids present, there are twenty groups of five and each of these five is the same, i.e., they are indistinguishable. The equation for the number of possible arrangement then becomes

$$\omega = \frac{N!}{\prod N_i!} = \frac{100!}{(5!)^{20}}$$

Thus, a specific arrangement has a chance of being chosen in a random selection of 10^{-114} .

equivalent to zero. In fact, it is 10^{22} times less likely to form by chance a 100 atom protein containing 20 amino acids in groups of five than to find, by random choice, a specific particle in the universe.

So, this is the Major Difficulty of a theory of the formation of DNA and up till now there has been no credible answer to how the first DNA, - and life, - got started.

An imaginative way to illustrate this has been given by the British cosmologist, Fred Hoyle (119). That life got started by chance is like saying that when a rubbish heap there arises a fully made Boeing 747 aircraft.⁴⁹

3.12.5 Number of Collisions in an Oparin Warm Pool in 10^9 Years

According to the well known textbook of Physical Chemistry by Atkins (145), the rate constant k of a reaction taking place between gas molecules is given in liters mole⁻¹ sec⁻¹ by

$$k = P\sigma \sqrt{\frac{8\pi kT}{\mu}} N_A e^{-E_A/RT}$$

where P is a factor which covers the fact that particles can only react if they come together at the appropriate angle so that certain directed bonds meet; σ represents the cross section of the reactants; μ is their effective mass; N_A is Avogadro's Number; and E_A is energy of activation.

It turns out that in practice the pre-exponential in the expression for the rate constant for a reaction between two molecules in the gas phase has a value of the order of 10^6 liters per mole sec so that k (the rate constant of the reaction) = $10^6 e^{-ERT}$.

It follows then that the rate of reaction between two molecules A and B is given very roughly by

$$\text{Rate} = 10^6 N_A N_B e^{-ERT} \text{ moles/liter sec}$$

⁴⁹There is another anomalous fact to explain and that is that all compounds which come from natural biological sources are left handed in the sense of the way they treat the light. This means that if one passes a polarized light beam through these compounds, they turn the plane of polarization to the left ("levo-rotatory") whereas a normal mixture does not rotate the light to the left or the right. How did this fundamental mark of living origin get made?

We take the concentration of the constituents as 0.01 moles per liter. The rate is then

$$10^6 (0.01 \cdot 0.01 e^{-ERT}) \text{ moles/liter sec}$$

In order to get some kind of idea of what the chance of forming such an extraordinary molecule of DNA would have been in the early Earth, we have to make a number of rough arbitrary assumptions.

The number of seconds in one billion years is $3 \cdot 10^{16}$.

A reasonable guess about the number of warm pools which could have existed in very early time on the Earth is one billion.

We make the arbitrary assumption that the pools are hemispherical basins of 25 feet in radius. The volume for the pool is:

$$\begin{aligned} 2/3\pi R^3 &= 31,250 \text{ cubic feet} \\ &= 8 \cdot 10^5 \text{ liters} \end{aligned}$$

or $8 \cdot 10^{14}$ liters in which the reaction could take place.

Thus, the total number of moles of material formed in the billion years, and assuming that $e^{-ERT} \sim 10^{-7}$, would be around 10^{26} .

In this calculation we have made assumptions which maximize the rate and number of collisions. We have assumed a *gas reaction velocity* whereas in solution the velocity would be several orders of magnitude slower.

However, directly the probability of forming a simple protein of only five amino acids is taken into account the probability of forming a protein in a billion years in Oparin's warm pools is $10^{26} \times 10^{-114} = 10^{-88}$ or zero. Of course, to form DNA would be many powers less probable.

3.12.6 Reaction of Scientists to Calculations of the Probability of the Formation of DNA

Calculations of the type given have been made for many years (Davies, (144)), and Morris (146)). However, scientists in the Origin of Life field continue to consider ways of forming DNA in spite of the results of the calculation of a much simpler case.

This refusal to react to counter evidence is not only taken by scientists in the field of the Origin of Life but, as we shall see, pertains also to archeologists working on the Age of Mankind, and to workers considering evidence for the Big Bang.

There is a clear human reason for this pattern of behavior and it pertains to the question of job security. A man who has worked for twenty years in research on the Origin of Life and is let go at age 45 because there is no more grant money coming to his field, has a much poorer chance of further employment in a scientific field, - he is too specialized to be considered for other work. So long as there is no breaking rank among people in the field, they can continue employment and to pay their mortgage, school fees, buy health insurance. Thus, they remain blind to counter evidence and if they mention it they call it "Difficult to explain," or "an anomaly."

3.12.7 Bacteria: Their Significance

It has been pointed out by Hoyle and Wickringsham (147) that the world belongs to bacteria. Their total mass greatly exceeds that of humans. Because they are self-

reproducing, they have a kind of immortality not given to beings who reproduce themselves sexually.

But there is a more telling aspect of bacteria (Davies 144). They have a remarkable ability to adjust themselves to extreme conditions. Thus, bacteria have been found near volcanic openings in the sea where the temperature is as high as 140°C. There are bacteria which have adjusted to radiations from atomic reactors which would have annihilated other types of living objects.

Moreover, Davies points out (144), - that bacteria have been found living several km under the surface of the Earth, as well as in the depth of the sea.

The Earth has been subject to many cataclysms since its origin. During the first billion years, it was frequently struck by comets and asteroids, disturbed by volcanic eruptions and tremendous storms. Throughout history there have been periodic wipeouts of creatures on the surface of the Earth. The most discussed example is the asteroid which led to the destruction of the dinosaurs and other large creatures some 65 million years ago.

The extent of these cataclysms has been demonstrated by the depth of the craters formed by such bodies (144). A 500 km wide asteroid would cause a sweeping of all the Earth's surface by fire, wind and other disturbances which would wipe out creatures on the surface of the Earth, but would not disturb bacteria several kilometers under the surface or living deep in the sea.

3.12.8 Experiments of Manfred Eigen

Of the many experiments attempting to create life in the laboratory, the experiments of Manfred Eigen (149) came nearer to the goal of attaining Life in the Laboratory than any other. Eigen started with a viral replication enzyme called Q_β plus the constituents of the four bases which make up the RNA rungs. Replication began, a very interesting result. What was very important, however, was that RNA was still produced *without any RNA originally added!*

Does this mean the synthesis of RNA by chance processes envisaged by Oparin has occurred? This is not the case because of the preence of the specialized enzyme, the Q_β replication enzyme, which itself, is a molecule many times more complicated than the simple protein for which calculations of chance formation were earlier shown.

This experiment of Eigen's was done in 1974 and since that time, there have been several more attempts to create life in the laboratory but none has so far succeeded. We will see, below, some conclusions coming out of that situation.

3.12.9 Panspermia

It was Lord Kelvin, a famous 19th century physicist, to whom we owe the absolute scale of temperatures (and also the supervision of the building of the first Atlantic cable) who first made the suggestion (150) that asteroids could have crashed into Earth at earlier times bringing elementary living creatures with them. The RNA or DNA so difficult to see as being made on Earth, could have been made, perhaps in an extremely old universe.

This idea has been developed by others and particularly by Hoyle and Wickringsham (149). These authors call the idea "Panspermia". They find a connection between the dates of the approach of meteors to the Earth and world wide epidemics. The meteors might sweep the Earth with their tails, and perhaps introduce bacteria which would

cause disease. If a case can be made for this, a similar pathway can be seen to the origin of elementary life forms on Earth.

Progress in favor of this hypothesis has been made in the last few years by means of the examination of fragments of meteors which sometimes survive the heat caused by entry into the atmosphere and land on Earth. They may be examined under the electron microscope for what organic compounds might be lurking in them (Davies, 144). Indeed, some workers (e.g., Nagy and Klaus (151)) reported they had found "organized elements" on board a meteorite called Orgueil. They hinted that meteorite carried materials which could be the Origin of Life.

Better than this were the findings on a meteorite which fell near the small town of Murchison, Southeast Australia, in 1969. The meteor broke into fragments before it reached the Earth, but examination of these manifested an odor of methanol which, in turn, suggested that there might have been an organic origin of this simpler compound.⁵⁰ Amino acids were also present on board the Murchison fragments and this gave rise again to the suggestion that there was life outside the Earth, and that perhaps the origin of life here was genetic material on board meteorites. The strongest evidence for this came from the fact that some of the molecules found on the Murchison meteorite had the tell-tale chirality (more laevo rotatory than dextro rotatory to light), - a fact which would indicate that the origin of some of the compounds found in the meteor had been living creatures.

Now, another idea brought out by Davies (152), - is that life might have got here from a planet. The planet Mars, which is nearest in its surface properties to the conditions on Earth might earlier have contained life. How would "bits of Mars" arrive on Earth?? This is not impossible because at an earlier stage in the universe, during the first billion years or so, there were probably immense volcanoes, Earthquakes, and collisions with asteroids and meteors with the planet's surfaces and these would have given explosive exodus of chunks of the planet into space. A tiny fraction of this exodus (152) could have struck the Earth (and of course, vice versa).

However, if it were proven that life came here on a meteorite, or asteroid, etc., the question is how did it originate, for the age of the universe as seen at present is quite a modest one, 4 or 5 times that of our solar system. This still would not give much time for any probability of formation of the complex enzymes and finally of DNA or RNA, necessary for life.

3.12.10 Alien Landings

The real presence of UFOs is still a matter for protective jokes in the USA which presumably serve to cover fear. The US Government continues to pretend that it has no evidence. Within academe, a good way to spoil the chance of tenure is to state that one seriously considers the reality of "flying saucers", - almost as deadly as admitting consideration of evidence for a Designer.

⁵⁰ That methanol could have survived for millions of years in space is acceptable because of the near 0°K temperature in outer space where the vapor pressure of the methanol would have been reduced to virtually zero.

However, a blue ribbon committee to examine the question of the existence of UFO's was established by Lawrence Rockefeller in 1997. Its task was to consider the evidence for UFO's and come up with an answer: Do they exist or not?

The head of this committee was the astrophysicist, Peter Sturrock, a Professor at Stanford University, with a splendid pedigree including the Cavendish Laboratory in Cambridge, England. Sturrock's committee consisted of physicists and astronomers, all of them hard science people who looked initially with a skeptical eye at the evidence for the existence of UFO's.

Nevertheless, the result of their examinations, published in 2000, was clear in giving a positive conclusion (153). Among the lines of evidence discussed in detail is:

- (1) Accounts given by airline pilots (not people to risk their jobs by relaying fantasies)
- (2) Photographs, highly scrutinized for their reality.
- (3) The examination of residues found after the alleged landings of vehicles

Another piece of hard evidence not examined by this committee, are the crop circles, complicated designs in wheat fields which have been appearing firstly in Great Britain, but have now spread to other parts in Europe and the United States. These circles arise within minutes, and their complexity and size are beyond the means available to us.

There was reluctance on the part of the members of the committee to go further than conclusions from hard evidence. The evidence for Abductions was not considered (although strongly supported by the Harvard psychiatrist John Mack (154) and the Temple University Historian David Jacobs) (155).

A corresponding strong line of evidence consists of the results of investigations by the French Government, where the question of UFO's is treated quite openly. Reports of the French Government UFO organization are available to the public. Military organizations of many governments have clear reports of UFO's (155a)

A good summary of the evidence for the reality of alien landings has been made by M. B. Woodhouse in his book, *Paradigm Wars* (156). The account includes quotation of laws connected with UFO's made by the US Congress. It seems unlikely that such laws would have been codified had it been thought in government circles that the phenomenon was a matter of illusion.⁵¹

There is the unsolved question of the time needed for extraterrestrial vehicles to get here. Astrophysicists point out that any other solar system is at least 4 light years away; that the time it would take for these beings to reach us is too long to be credible.

This is, indeed, a Problem. It is not without speculative solutions. This arises from general relativity according to which space time can bend round so that, instead of having

⁵¹ Why is it that the visits by beings outside the Earth is still denied in the United States but not in certain European countries? It is probably a matter of protecting the population from fear which might spread were the government to admit that flying vehicles penetrate our air space at will and which have a superior technology to that available to us.

The first exploration to the South American continent was made by Magellan in 1520. He described the sight of Patagonians on the beach near the sea shore, remarking on their nudity in cold weather. However, there is no mention of his visit in the history of Patagonia. Thus, to the Patagonians, vessels of 200 tons were unbelievably large and soon were rejected as illusions.

to go "round the circle" there might be circumstances under which one transfer between the two ends which could, in principle, involve much reduced times.

Another speculation is that of Space Life. There may be civilizations which have taken to space and exist in very large vehicles (153). From time to time, they send out the so-called flying saucers to examine Earth with the aim of stealing genetic material (155).

3.12.11 Modern Speculations on the Origin of Life

It is about 3/4 of a century since Oparin's theory of the spontaneous creation of biologically complex systems in warm pools. The Origin of Life has no acceptable theory although a great deal of attention has been given to the matter. It is reasonable to conclude that the Origin of Life was not by means of spontaneous generation on the Earth at least by means accepted within the present paradigm of Science.

In attempting to formulate a theory for the Origin of Life, we are boxed in by our present paradigm which is a starting point does not allow us to understand the formation by chance of DNA or RNA.

But, what, in practice, is the difference between a live and a dead organism? Let us forego for a moment the classical definitions of death (stoppage of the heart; cessation of electrical activity in the brain), and just regard a newly dead being, say, a few minutes after its decease. Decay at this time would be difficult to detect. All organs and the enzymes necessary for the functioning of the body are still there, - but the being does not live. What is the difference between life and death at this juncture?

Is there widespread life in the universe? We do not know. It is established that there is no life as we understand it in our solar system, though there might be primitive life deeply buried under the surface of the planet Mars. On the other hand, the presence of advanced vehicles flying in our atmosphere, - observed for ~ 50 years in modern times (153) with similar accounts going back for thousands of years, suggests that life exists beyond the solar system.

Suggestions made by Hoyle and Wackrasingham (147) (Panspermia), have been mentioned, and then later on by Crick (157). These workers agree that there is no possibility of explaining the spontaneous creation of life on this planet. They suggest that life came here extraterrestrially.

Prigogine is one of the leading names in modern studies of how life may have begun. He is a physical chemist who received the Nobel Prize (1977) for his suggestion concerning a mechanism for the spontaneous formation of order from chaos, about which he has written a book (157a).

For example, in the electrochemical process of corrosion, a metal atom leaves the metal to form ions in solution and reject electrons into the metal. Hydrogen ions in solution accept these electrons, creating molecular hydrogen. Each of these two processes has its thermodynamic laws of equilibrium (two different equilibria) and each has its own kinetics. But when they combine to act together, as described, they set up a new state, a steady state, a new state of stability (145).

This is an oversimplified example of the sort of thing Prigogine is getting at - several processes together (complexity) can interact to give stability, i.e., order.

According to Prigogine, systems may "leap abruptly to a position of ordered complexity". Does such an explanation give the basis to a possible a theory of life? There are two objections (Davies, 144).

Firstly, there are no confirmatory experiments. The key to the acceptance of a new theory is that it *predicts new unexpected experimental behavior*. Nothing in this category has been found from the theory of Prigogine.

However, as Paul Davies points out (144), there is a more fundamental reason for rejecting Prigogine's approach. We need to explain not only order among molecules in DNA but also to explain the *information* held in the DNA chain. This information is obtained by specific arrangements of the four acids, these arrangements change throughout the chain and the changes are consequent and information giving.

There are two other approaches which are worth mentioning although they may not gain easy acceptance within the present Paradigm. One is from the work of the French biologist, Nobel Laureate DeDuve (cf his book, Vital Dust, 158). DeDuve suggests that the universe is a "hot bed of life". He says that life "emerges as a natural consequence of the laws of nature." His view is that "life and mind emerge not as by some freak accident, but as a natural manifestation of tendencies in matter *written into the fabric of the universe*". One can see in this view the Triumph of Aristotle. Here is a model of teleology suggested by a modern scientist with a Nobel Prize in Biology.

DeDuve (158) refers also to the working of the Jesuit priest, - biologist, - Teilhard de Chardin (159), who wrote about an in-built drive to complexity in Nature. The difficulty for most biologists is that there is no explanation in reductionistic terms within the present paradigm to accompany these suggestions.

Correspondingly, Paul Davies (144) suggests that unknown natural laws may exist which make amino acids join up in a nonrandom way. He quotes G. Steinman and N. Cole (17a) who have carried out biochemical experiments which seem to suggest that amino acids do not couple randomly but in some such way which leads to life. The molecules "know what to do," i.e., possess a form of Consciousness.

Cyril Ponamperuma (161), a chemist, who spent his career in Origin of Life studies suggested that there was "inherent tendency" to life in biochemical reactions.

The views of DeDuve, Panamperuma and Davies have as yet no basis within present chemistry. However, it is important to note that around 2000 certain well known, established scientists are making such suggestions.

So, one should not become disturbed by the crude nature of these probings of DeDuve and others who are trying to change the paradigm to fit the facts.

Thus, one may mention a few ideas of science in which the norm was overturned by suggestions at first rejected and scorned, but which later turned out to be acceptable.

1. The proposition in mathematics that jk is not equal to kj (14).
2. The fact that energy occurs in bits and does not exist in continuous distribution.
3. Stones fall from "heaven", declared to be superstitious nonsense, - but later realized to be meteorites.
4. The movement of the continents, - apparently an absurd proposition by Wegener, - now an accepted piece of Earth science (161).

One has fearlessly to invent hypotheses to meet newly discovered facts, however much they are inconsistent with the paradigm of the time.

3.13 A SUMMING UP OF CHAPTER 3

This chapter is called Shaking Pillars of the Paradigm. The paradigm intended is, of course, the present, generally accepted paradigm of fundamental science, and the fields discussed are basic structures in that field.

In this chapter I have outlined some aspects of six fields which questions the trust which can be placed in present knowledge of these fields.

The most reliable among the sciences, of course, is mathematics. Nevertheless, there are surprising inconsistencies and puzzles even here and they are summarized in a quotation from Einstein (p.).

The Darwinian theory of evolution is a theory in trouble, although the realization of this fact has not yet reached the universities. A distinction has to be made as to evolution *within a species* which can be made to occur; and evolution under pressures of the surroundings to develop new species. This does not seem to occur. A basic reason for this is given in the biochemistry of the changes needed to go, e.g., from a bear to a whale. In the theory, a number of micro changes were thought to add up to form a new species. However, the reasoning for the effect of the changes is that they provide an advantage in breeding. To come to a new species requires many thousands of consecutive coordinated micro changes in molecular happenings and none of these gives any breeding advantage. So, when each occurs by accident, the offspring of the animal concerned should not have advantage.

The relativistic physics is regarded by most physicists as involving intellectual mountains too high for most to climb. The chapter shows that the special theory leads to results obtainable with freshman mathematics. However, physicists who understand Einstein's contributions to the Relativity Theory of Lorenz and Poincaré have not yet answered a disturbing question posed in the 1960's by Professor Dingle of London University. Moreover, the Special Theory involves the assumption of the sameness of the velocity of light independently of the direction of the measurement with respect to the motion of the Earth - and three series of experiments, - one extensive - by independent investigators, - have more recently obtained results inconsistent with this assumption. Einstein's contributions to the theory must therefore be reconstructed or abandoned.

The Quantum Theory is regarded by those outside it as the jewel at the heart of physics. However, there is no consensus as to the connection of quantum measurements to Reality. In fact, that version of the theory which dominates at this time makes assertions which cause surprised rejection by those first hearing them. I refer to the Copenhagen (Bohr) view of the reality of sub-atomic particles. Only after such particles have been subject to measurement are they real. Before measurement, the particles "do not exist."

The seriousness of this view is attested by its longevity - three quarters of a century. The burden it places on physics is that it appears to deny any attempt to deal, finally, with Reality. For upon what does the world rest, - it is an atomic-molecular world according to present Science, - and of what do the molecules and atoms consist? Thus, the world of appearances floats upon unobserved sub-atomic particles, the existence of which is regarded by the Copenhagen view as not real. The seriousness of the dilemma of sub-atomic physics,

- of the most basic physics, - can clearly be appreciated: physicists do not agree as to what physical reality the equations of the quantum theory represent.

Two other elements complete the six pillars, weaknesses in which are outlined in this chapter. The next is the model of the creation of the Universe and everyone has heard - the 10^9 galaxies and all the c. 10^9 stars in each of them, - was created out of - nothing.

This is an awesome picture, also at once preposterous in any but a purely religious ontology. It has been under attack for a decade and the reasons are given in this chapter. A central one is the interpretation of the shift in the wave length of light received from galaxies which seem to be further and further away. An interpretation of this shift was given by Hubble (1929) in terms of the Doppler effect. If this theory has run into new evidence, much of the trouble comes from the orbiting space telescope bearing Hubble's name.

How the Universe began may be one of the great question marks of our scientific world view but many might think a greater one is how we began, - the question of the creation of life. Here, there is no burgeoning theory, bright with fantasy and movies in color, and it is not too much to say that all is dark, - darker than it was a half century ago. In fact, both Hoyle and Crick have retreated to a suggestion already made in the 19th century by Arrhenius: Life came here from space (Crick says via alien landings).

So, that is the darker side of several basic theories of science at the beginning of the third millennium.

So, what does all this mean, - the Shaking Pillars of the Paradigm? That "Science" is wrong can never be because "Science" means knowledge. But it is necessary to keep an open mind about the truth of the assertions of scientists at any given generation, for scientific paradigms are temporary constructs, revised as new data arises. One must stamp very hard to expunge the dreadful hubris of the top establishment scientists of the day which leads its members to maintain that the theories they espouse are final truths.

The contents of this chapter have shown that the mighty edifice of the science of this day is on the shake, - and most of it seems unlikely to survive the century.

Thus, Science, as a Religion is a poor choice.

And now, - for the rest of this book, - let us discuss some of the topics which might be the basis of the evidently needed New Paradigm.

APPENDIX

A FEW NOTES ON PHYSICS AT 2000: INFLATION

Inflation is an idea which is toyed with. It comes from Alan Guth of MIT. He came up with this idea about thirty years ago.

The idea is that when the universe was very, very young, for example about 10^{-36} sec., it grew at a rate of about $10^{61} \text{ cm sec}^{-1}$ or much faster than light.

To rationalize this, it is necessary to assume that there is a force in nature which we have not yet espied.

GALAXIES

One of the difficulties with galaxies is that they do not have enough visible mass to keep the Universe together. Dark matter is supposed to give the mass which the universe needs if it's going to be stable.

If gravitation and kinetic energy are equal, this is expressed in terms of a number called Omega equal to 1.

The trouble with values of Omega other than 1, is that the Universe would long ago have dissipated or would quickly have collapsed to nothing. We are thus bound to have an Omega of 1 but physical theory at the moment shows that none of the calculations seem to give rise to Omega=1. Values of 0.04 are common and are not consistent with a stable universe. Martin Reece, England's Astronomer Royal, thinks that there must be some other type of particle in the Universe which he calls a wimp but the trouble is here that the wimps which we can calculate do not weigh enough to provide the missing mass.

The difficulty in judging the extent of the known universe is measuring the distance to a galaxy. The concept is that all galaxies are equally bright, - a shaky idea, - and that if one knows one single value of a distance one can calculate the distance of all the others from there brightness.

Hubble started off the standard with a variable star called a Cepheid. This choice has been found to be impractical. The other standards which are used are connected with super novas, but the truth is that all approaches to a standard "known" distance are doubtful.

Some astronomers think the expansion of the universe is speeding up. One explanation for this could be an as yet unmet repulsive force which Einstein guessed might exist at large distances (but he withdrew the idea later).

However, the calculation of this repulsive gravity made hitherto are too big and the dark matter calculations are very uncertain. The idea of an ether which seems to be so much suggested by work following up Michelson and Morley, is not yet with the physicists.

Three of the basic forces (electromagnetism and the strong and weak nuclear forces) are different manifestations of the same underlying phenomenon. The fourth force, gravity, has no known rationalization and cannot be integrated into the model.

At present, the basic model depends on arbitrary assumptions to hold it together and there is no place in it either for the wimpy of Martin Reece and little for dark matter. There is also only speculation for the matter/anti-matter difficulty.

Coming back to the particles, 12 of 17 standard model particles are ingredients in matter. They are known as Fermions. Six of the Fermions are quarks. They come in three pairs, only the least massive of which occurs naturally.

There are also insubstantial particles which are called neutrinos and which were originally thought to have no mass and no electric charge. However, they are now thought to have a small mass but one very difficult to measure.

The remaining 5 particles in the model are called bosons. Four are physical manifestations of the forces by which particles interact: photons carry the electromagnetic force and are familiar in the form of light, radio, microwaves, etc. W and Z bosons carry the weak nuclear force and gluons carry the strong nuclear force. The fifth is the Higgs' boson after Peter Higgs who first suggested it. However, it is uncertain whether it has been discovered or not.

The present ideas of the creation of the Universe give rise to the concept that there should be matter and anti-matter in equal amounts. Clearly the matter is very much more in evidence than the anti-matter. One concept is that anti-matter and matter in equal amounts were created but a certain amount remained over after meeting of the two types of matter and this is the matter which we now have.

THE STANDARD MODEL AGAIN

The most glaring difficulty about the Standard Model is that it has no place for gravity.

At this point an extreme measure is taken and that is to introduce extra dimensions. The number of dimensions in which people lead their lives might be a fraction of the total number of dimensions which exists.

This is an introduction to what is called String Theory. Thus, the Standard Model assumes that Physics deals with points but the String people argue that elementary particles are not points but they are, in fact, vibrating strings. They vibrate at various frequencies and harmonics of these frequencies. To make the theory fit reality, one has to have the presence of six extra dimensions in addition to the three familiar ones plus time. These extra six dimensions are thought of as being tightly curled up on scales too small to be measured. Indeed, they are so small that there will never be an instrument which could measure them obvious way in which it can be tested.

String Theory tries to deal with gravity by quantizing it and hypothesizing that a graviton is a boson.

Since the mid 1990's an important modification of String Theory has emerged. It is known as membrane theory or M for short. M Theory regards space defined by the dimensions of String Theory as being like multi-dimensional membranes which can be referred to as "brains". These brains float around in the 11th Dimension and it is here that gravity enters the picture. Some versions of this theory suggest that M Theory might come into 3-D Space over distances which are of the order of a tenth of a millimeter and experiments have been carried out to try to detect extra and unusual forces of these small distances. However, they have not yet been successful.

It is reasonable to state that the frontier in Physics at the beginning of the third millennium stormy and uncertain in the extreme.

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CHAPTER 4

SOME PHENOMENA DIFFICULT TO EXPLAIN

4.1 INTRODUCTION

The material of the first two chapters showed how Science became the Religion of the West and how the consequent engineering advances have led us to the beginning of resource wars. Chapter 3 looked at six basic fields in Science and found each of them, - though basic to the paradigm, - under criticism.

Before we go on to the really big mountains, recognition of which will, in my opinion, make the present paradigm obsolete, I present a few examples of phenomena, that are undoubtedly facts, yet which seem to be inconsistent with present Science. These are greatly varied in the significance - indeed I have chosen them widely (cf. W. A. Corliss), Science Frontiers, for around 1000 examples of phenomena as yet not understood). Of course, no scientist would claim that present Science could explain everything, - and the reader will have to judge this phenomenon by phenomenon whether an explanation might be in sight. But, at least, the section will illustrate that it is not only the Big Questions, - like the Origin of Life, - for which there seems no explanation, but in fact there are no explanations for such enigmas as the nature of electric fields or the abilities of some to affect nuclear reactions thousands of km distant.

The second part of the chapter exemplifies one reason why some phenomena pass into our knowledge base and remain there without explanation. It is the fact that scientists don't like people who discover facts which undermine the present paradigm. No better example here can be found than the reaction of the Science Establishment to so-called Cold Fusion phenomena, which show that nuclear reactions can be brought about in aqueous solutions.

The chapter closes with a brief account concerning members of the medical community who have tried to block a new cure because it threatened to derail a successful income producing cure.

4.2 ATTRACTION AND REPULSION

The basis of many calculations in physics involve an assumption of Coulomb's Law, that is, like electric charges repel and unlike attract and the forces of attraction and repulsion obey the inverse square law.

For centuries this law has been taught to students in physics and chemistry as a basic thing in which they had to believe. It is only in the last few decades that there has been some kind of model which would show why there is attraction and repulsion among charges. Correspondingly, we still do not have a model for gravitational attraction.

In the wisdom of establishment physics at the millennium, there is an explanation of repulsion in terms of virtual photons. A virtual photon is a photon which arises, lives for a time given by the Uncertainty Principle, and disappears. Thus,

$\Delta E \Delta t = h$

Hence, $\Delta E = h/\Delta t$, and, with $E = mc^2$, there is created a mass of $h/c^2 \Delta t$ for a time, Δt . $\Delta t = 10^{-30}$ sec could create the mass of an electron.

One envisages, then, two electrons, each emitting virtual photons. Under these circumstances let the one electron be considered an emitter of photons

and the other an absorber. When the emitter electron emits a photon in the direction of the absorber, it will experience a kickback and when the absorber electron receives the photon, it will be thrust back away from the emitter. However, in reality, the electron emits virtual photons in all directions, not only towards a nearby electron. The net kickback will be zero. When we try to explain attraction, there are problems.

Let us imagine that we have a negatively charged electron and a positively charged electron, a positron. Again, the source electron emits a virtual photon. But we are at sea because it has to be assumed that the absorber electron (the positron) when receiving the virtual photon from the emitter, moves towards the emitter and not away from it, as in the case of repulsion.

The question is how does the virtual photon "know" whether to push or pull?

There is no physical model which can tell us why attraction and repulsion occur, - a daunting difficulty because attraction and repulsion between electric charges are the basis of so much in physics and chemistry (1, 2, 3).

4.3 THE PLACEBO EFFECT

Placebo means "I shall please" (Latin). Greek physicians knew that treatments depended for their effectiveness on patients expectation of success. Indeed, much of medicine, even as late as 1940 (the introduction of antibiotics) must have depended on the placebo effect; the patient's confidence that the doctor would cure her (4). Hence, the importance of the doctor's confidence-giving bedside manner.

The effectiveness of dummy drugs proves how much hidden power humans have to cure themselves. Thus, Beecher (5) reported 15 experiments in which patients were given dummy medicines for angina pectoris, headache, common cold, etc. About 35% of the 1,082 patients were relieved of their symptoms.

The fact is that popular medical treatments come and go. In the rising phase, they are administered by enthusiastic doctors who inform the patients of the great virtue of the treatment. Then, more research is done and the virtues of the given medicine are seen to be ill-based, - the spell is broken, and the cure becomes ineffective and lapses into its declining phase.

In addition to experiments with the effects of dummy medicines, dummy surgeries have been carried out, the incisions made and then sewed up again (6). Patients thus treated have shown improvement comparable with those experienced by patients who have sustained corresponding proper surgeries.

Placebo effects are recognized by doctors, although present biochemistry provides no explanation at all. Of course, one can say the effects are "due to suggestion," but, then, what is the mechanism of that?

4.4 KIRLIAN ELECTROPHOTOGRAPHY

Semyon Kirlian was born in 1896 and worked with his wife as a medical technician in Krasnodar, Russia. In 1939 he was carrying out a medical treatment and noticed that the electrical discharge between a glass plated electrode and human skin varied with the physiological state of the skin (7). The Kirlians attempted to record an impression of the discharge, without using a camera. To do this, they exposed a photographic emulsion to a high frequency, high voltage field, and found it registered on the film (Fig. 4.1).

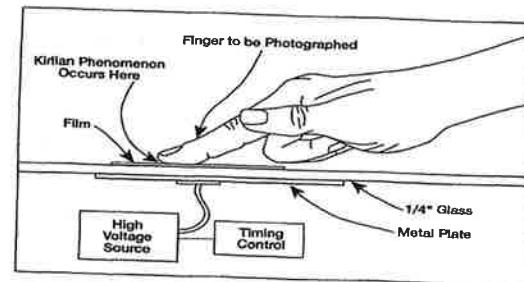


Figure 4.1 Kirlian Photography: Apparatus (10a) *Psychoenergetic Systems*, Reprinted with permission, Gordon Breach Science Publishers, part of the Taylor and Francis Group, edited by Stanley Krippner and Mary Lou Carlson, New York, 1979.

Kirlian placed a finger on the film (8) and obtained a certain kind of picture of his finger and hand. The Kirlians found they could obtain photographs of any object, using light from a corona discharge which appeared when the high frequency high voltage field was applied.

The experiments showed a characteristic flame-like discharge typically from "points" in the body - e.g., finger tips, etc. These discharges depended in strength upon the health of the living organism. As health deteriorated, so did the strength of the emission. At death, the emission faded.

Some Russian scientists called this health-dependent flame-like emission "the bioplasma" The unsolved question is, - how does it relate to the body and to its structure in the sense of a possible second body?

More recent studies have confirmed that the photographs show the flame-like emission from the point on living creatures. The pictures depend on the amount of water in the specimen and the suggestion (9) has been made that the emissions are "just corona effects." Of course, this only raises the question of the mechanism of a "corona" emitting from non-conducting substances. But reports (10) that Kirlian effects are seen surrounding inanimate objects are inconsistent with a spiritist explanation.

4.5 APPARENTLY PURPOSEFUL CONSTRUCTION BY TERMITES

It has been found in South Africa that there are large striped patterns of ridges and vegetation pans which have been made by termites. There are alternating ridges and gulleys, the ridges being two meters high and up to one kilometer long, and separated by about 50 meters.

The ridges are closely spaced termite mounds. The question, of course, is how the termites decided to build these mounds in long structured rows and how they maintain the strict parallelism, especially as they are blind. How could termites in the one mound know the intentions of their colleagues in the nearest ridge, 50 meters away?

The ridges help to channel the flow of water and thus the growth of vegetation. There are swathes of the country which have a corrugated appearance which arises from this termite activity (11).

In the northern territory of Australia, around 50 miles south of Darwin, there are large sections of the country which have columns up to 7 feet in height ("skyscrapers"), built

by ants. The area is called "Termite City" and the mounds have been constructed with ventilation which minimizes the build up of heat, and thus give a form of air conditioning.

4.6 HOMEOPATHY

Homeopaths state that substances causing symptoms of disease in a healthy person can cure a sick person suffering from the disease so long as the dose administered is very small. Calculation shows that the "solutions" finally used in homeopathic treatments have been diluted so much that no molecules of the original biochemical are present in a normal dose. Verification of such claims would cause some major aspects of biochemistry to be subject to revision (12, 13).

The most prominent name among those who research a mechanism for homeopathy is Benveniste, a French biochemist (14). Thus, Benveniste claims that a solution originally containing antibodies but diluted and shaken so that the presence of even one molecule of the antibody is unlikely, can still trigger a biological response from white blood cells (15). Early support for these contributions was given by D. Reilly (16), who found with double blind controls that solutions in which the concentration of pollen was effectively zero still reduced symptoms of an allergy.

Nature, led by its conservative editor, J. Maddox, demanded an on the spot investigation of Benveniste's results (17). In fact, *Nature's* investigators confirmed Benveniste's results, but complained that insufficient attention was given to the elimination of systematic errors. They also complained of the atmosphere in Benveniste's lab, as "being inimical to an objective evaluation of experimental data."

Nature's negative comments discouraged general investigation but Benveniste's results (18) were replicated in several laboratories, not only in France but also in other countries (19). *Nature's* investigation soon had a negative effect on the French government's funding organization and though at first the research administration withstood pressure to close his lab, it was indeed eventually closed (1990). Benveniste has formed a company and continues his work. Independent confirmation has continued to come in (20). Experimental results showed that a solution in which the histamine had been diluted out still affects blood flow in guinea pigs. Even more curious, the phenomenon can be affected by the application of a magnetic field (21).

In 1999, - speaking at the Albuquerque meeting of the Society for Scientific Exploration, - Benveniste presented the view that water could be "imprinted" with the shape of the bioactive molecule and that the pattern, not the molecule itself, affected the physiological action and brought about curative properties. He cited the fact that raising the temperature of the infinitely dilute solution to ~ 72°C destroyed the effectiveness in respect to physiological functions of the super-diluted water. This approach has recently been indirectly supported by the work of Tiller et al., who claim to be able by the actions of mediators to "imprint" information upon a solid object, which is then placed in water. The latter reacts to the imprinted suggestion (e.g., "lowers pH") (22).

An entirely different approach to homeopathy has been suggested by Wallach (23). He presents the effects in terms of "quantum interconnectedness". Wallach suggests that homeopathy may be related to examples of mind-matter interaction effects. Homeopathic research, says Wallach, should be carried out many times with cheap and simple experiments so that meta-analysis can be used to "tease-out the effect."

Thus, what Wallach is suggesting is to interpret homeopathic effects as non-causal, similar to those observed in synchronicity. The homeopathic remedy acts via quantum-interconnectedness activated by the preparations.

4.7 CROP CIRCLES

Crop circles are patterns made in fields planted with crops (24). The basic pattern is a circle. However, in the '90's, more complex patterns have been apparent and Fig. 4.2 shows the nature of some of these.

Fig. 4.2 Crop Circles. Barbury Castle near Chiseldon, Wiltshire, England. Reported 23 July 1999, by Stuart Dike (32a).

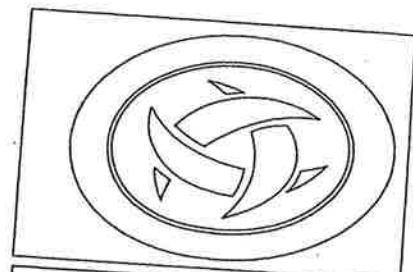


Fig. 4.2 Crop Circles. Wimpole Hall near Great Eversdon, Cambridgeshire.. Reported 23 July 1999 by Russell Stannard (32a).

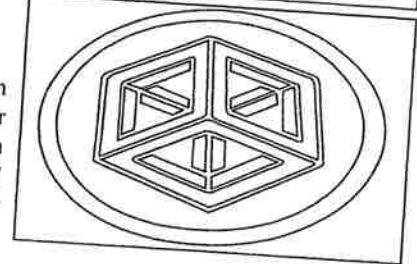


Fig. 4.2 Crop Circles (32a).The idea that an alien intelligence is attempting to remind us of their presence seems to merit serious consideration (32 - 37). Reprinted with permission from p.57 UK Crop Circles of 1999, vol 6, Number 6,Nexus, Australia.

The phenomenon began in the United Kingdom where more than 1,500 circles have been observed (25). A smaller number of crop circles have been observed in other countries including the USA and Japan.

There are confessions from hoaxers. Two people working together with a small tractor, can make simple circles in wheat fields during one night. However, a great number of the crop circles have been made in the UK (what gain would repetition by hoaxers have?) and the increasing complexity and possible "meaning" of the patterns seems to make hoaxing an unlikely general explanation. Some circles have been observed being formed in minutes.

Thus, meteorologists have suggested that naturally produced atmospheric vortices might be the origin of simple circles. However, the complexity of the patterns in Fig. 4.2 make a vortex explanation seem improbable.

The second line of suggestion is that the complex patterns originate from aliens. The journal Meteorology of the UK is the source for much of the data. Mainstream scientists are afraid to make studies of the new phenomenon because it does not fit the present paradigm (and is therefore defensively ridiculed).

Simple circles are 3-30 meters in diameter. Vegetation is crushed both clockwise and counter clockwise. There is evidence that atmospheric disturbances (but of what origin?) can form simple circles in about 30 seconds. The action is sometimes accompanied by a humming noise (26).

Eye witness accounts exist (24).

Although crop circles began to be reported in the media in the 1980's, there were reports of the phenomena as far back as 1936 (27, 28). Some of the more recent circles are in fact dictograms (29). Sometimes the formation of these patterns is accompanied by luminous phenomena (30). Reports of unexpected shapes are frequently made (31). Natural vortices in the atmosphere may play some part but cannot explain all the patterns seen in Fig. 4.2.

4.8 INFORMATION ON NUCLEAR STRUCTURE OBTAINED IN THE 19TH CENTURY

In this section a brief account is given of the findings made by Steven Phillips (38), a theoretical physicist from Cambridge University in England. He discovered that two theosophists, clairvoyants, had described the quark-like structure of atomic nuclei in 1895.¹

The two theosophists concerned were Annie Besant and C. W. Leadbeater. They claimed to be able to use a yogic technique known as anima which allowed them to attain knowledge of the small or the distant. A more modern term for such a technique is called micro psi in which the yogi is said to obtain visual images of extremely small objects.

The first studies which Besant and Leadbeater undertook were directed at oxygen and nitrogen and their first report was published in a journal called Lucifer, the Journal of the Theosophical Society of London, in 1895. Their work was added to and enlarged and a 3rd edition was published in London under the title Occult Chemistry in 1951 (the deaths of the authors occurred in 1933 and 1934 and this final edition of their work was edited by C. Jinarajadasa, an MA from Cambridge University) (40a).

One of the crucial observations made by Besant and Leadbeater was that a hydrogen atom was composed of 18 subatomic particles which they christened "ultimate physical atoms" (UPA). They reported that the atoms of other elements also comprised a certain specific number of UPAs and that the numbers increased in multiples of 18 (the material was originally published before Rutherford's discovery of the nucleus in 1911).

Bohr's atom published in 1913 and its elaboration by Schrödinger in 1926, provided no way of accommodating 18 particles in a hydrogen atom. For this reason the work earlier carried out by Besant and Leadbeater was dismissed. However, during the mid '70's, Phillips, saw a diagram of the hydrogen atom published by Besant and Leadbeater (38). He was astonished to realize that the clairvoyants had given out a quark model similar to that introduced independently by Gell-Mann and Zweig in 1963.

Phillips' interpretation of the Besant-Leadbeater model was that it could be put in terms of quarks and indeed subquarks (Srinivasan says that the concept of subquarks has not been accepted by nuclear scientists although it has been postulated not only by Phillips but by other theoreticians).

Phillips made a detailed analysis of the Besant and Leadbeater work which was published in a book entitled "Extrasensory Perception of Quarks, 1980" (a simplified version called "Occult Chemistry: Reevaluated" was published in 1982 by Lester Smith, FRS (41)).

¹ The account in this section is based predominantly upon that of Mahadeva Srinivasan (39) which appeared for the first time in the *Hindu Sunday Magazine*, October 30, 1994, but was reprinted in *Infinite Energy Magazine* (40). Dr. Srinivasan was, at the time of writing his article, Head of the Neutron Physics Division at the Bhabha Atomic Research Center in Bombay, India.

In 1991, a Canadian scientist, Ronald Cowen, read Phillips' book. He then tried to apply his own knowledge of Buddhist meditative techniques to visualize "microphysical atoms" and their constituent ultimate physical atoms (UPAs, - perhaps quarks). Phillips visited Cowen with samples sealed into capsules of the first few elements of the periodic table and Cowen was able to identify each capsule, reproducing some of the observations of Besant and Leadbeater.

Table 4.1 compares the atomic number of modern work with the estimates of Besant and Leadbeater and it will be seen that there is a remarkable resemblance between the two.

Table 4.1
A Table from the work of Besant and Leadbeater (1895) (40)
Reprinted with permission of Eugene Mallove

Atomic No.	Element	Symbol	Number Weight Hydrogen Scale (Deduced)	Scientific Atomic Weight Hydrogen Scale	External Form
1	Hydrogen	H	1.00	1.00	Ovoid
	Adyarium	Ad	2.00	—	Ovoid
	Occultum	Oc	3.00	—	Ovoid
2	Helium	He	4.00	3.97	Star
3	Lithium	Li	7.06	6.89	Spikes
4	Berryllium	Be	9.11	8.94	Tetrahedron
5	Boron	B	11.11	10.73	Cube
6	Carbon	C	12.00	11.91	Octahedron
7	Nitrogen	N	14.50	13.90	Ovoid
8	Oxygen	O	16.11	15.87	Ovoid
9	Fluorine	F	18.88	18.85	Spikes
10	Neon	Ne	20.00	20.02	Star
	Meta-Neon	mNe	22.33	—	Star
11	Sodium	Na	23.2	22.81	Dumb-bell
80	Mercury A "B"	Hg	198.66	199.1	Tetrahedron
81	Thallium	Tl	200.000	—	Tetrahedron
82	Lead	Pb	201.33	202.8	Cube
83	Bismuth	Bi	207.06	205.6	Octahedron
83	Polonium	Po	208.50	207.6	Cube
85	Astatine	At	210.50	208.3	Tetrahedron
86	Radon	Rn	221.00	208.3	Dumb-bell
	Meta-Radon	—	221.66	220.2	Star
87	Francium	Fr	224.00	—	Star
88	Radium	Ra	222.55	221.2	Spikes
89	Actinium	ac	227.06	224.3	Tetrahedron
90	Thorium	Th	230.00	225.2	Cube
92	Uranium	—	232.61	230.3	Octahedron
			237.06	236.02	Tetrahedron

There is much else to report in the work of Besant and Leadbeater, but it is sufficient here to draw attention to the fact that these workers were able to calculate the atomic weights at an early time, and seem to have preempted present science by some 30 years in their discovery of fundamental particles in the nucleus.

There have also been micro-psi studies by Geoffrey Hodson in New Zealand as well as those of Ronald Cowen referred to above. A good discussion of this work is given by Steven Phillips with criticism by Y. H. Dobins of Princeton University (and rebuttal by Phillips) (42, 43, 44). It turns out that Besant and Leadbeater were not the first to claim an ability to see atoms and the micro-structure therein. Srinivasan reports a book by Edwin Babbitt, "Light and Color," published in 1878. He says he has seen a diagram in it which is similar to the UPA based structures of Besant and Leadbeater.

4.9 CHANGING THE HALF LIFE OF RADIOACTIVE ATOMS BY A QI GONG PRACTITIONER

Qi Gong is a discipline practiced largely by people in China. It bears some resemblance to the yoga originating in India. Among the practitioners of Qi Gong exist so-called "Masters" who have been witnessed as being able to carry out feats difficult to rationalize.

The present vignette refers to the work of Yan Xin, a Master who has subjected himself to testing by workers at the Institute of Body Science of China, and the Institute of Biophysics, Academica Sinica, both located in Beijing. The work summarized here has been published by Z. Lu, R. Zhu, C. Ken and J. Hu (45).

The type of experiment described describes action at a distance in which, e.g., Xan Yin, transmits the force called Qi and affects the behavior of chemicals held at the Institute of Body Science in Beijing (46). The object of the experiment described was (1) changing the half life of the radioactive element 95, americium; and (2) affecting the absorption spectrum of water.

Two circular plates were supported by three poles, 2 cm apart. The americium was fixed at the lower face of the upper plate and a tracking detector fixed to the upper face of the lower circular plate. The detector was covered with a 3 mm thick plate containing a hole 16 mm in diameter through which the α particles from the americium pass.

The Qi emissions from Dr. Van Xin were active from 2:00-5:00 pm December 9, 1990. Prior to this, a blank had been measured. The americium couples were then exposed to the supposed emissions from Yan Xin (AII and BII). Both the blank and treated samples were then etched in 6.25 m sodium hydroxide and the α track count measured.

For the first experiment, the counts from the samples before exposure to a supposed emission from Yan Xin were 24,101 and 24,151, respectively, but after exposure 24,559 and 24,588. Hence, the difference in count rate was 1.85% (Error limit $\pm 1\%$).

Subsequent experiments showed significantly greater differences in $\frac{1}{2}$ life between samples treated and untreated. The greatest difference recorded was 12% ($\pm 1\%$ error).

Dr. Yan Xin's effect upon the uv absorption spectrum of de-ionized water was also reported. Spectra of the blank and "treated" samples are given in the paper and the difference in spectral absorption intensity lie between 5 and 10%.

A still more remarkable witness-ship originates from the well known medical investigator, M. Eisenberg (47). While attending a conference in Beijing in October, 1988, Eisenberg invited a Qi Gong master to his hotel room (47).

He came equipped with an electrical volt meter and a simple wiring device. The device was no more than a plug attached to two wires with live ends. He put the plug in the wall and demonstrated its current by lighting lightbulbs, and then tested the current on his hand-carried volt meter. He then licked his thumb and forefinger

of both hands and grasped the two live wires. I was horrified and worried he would quickly be electrocuted. He was not. Moreover, he convinced me that he could light a lightbulb by touching it with fingers of both hands. More curious still was his ability to regulate voltage across his hands, at will, simply by touching the voltmeter with the ground in one hand, the meter device in the other. On several attempts he regulated the voltage from 0 to 220 volts, or held the voltage constant, at any value in between, upon my request.

Because I had grown skeptical of such claims, I asked him how I could be certain he was in fact conducting electricity and not simply fooling me by means of some high technology trick. He offered to touch me with his hands while he was connected to the wall socket. I declined, but a colleague with me at the time volunteered. When touched on the shoulder by the Qi Gong master, my colleague's trapezius and biceps muscles went into spasm. Moreover, the Qi Gong master could control the electrical current so as to induce the spasm or not. I allowed the Qi Gong master to touch me for a split second, long enough to feel the live current emanating from his forefinger. He was "live" all right.

As a final proof, the Qi Gong master produced two metal skewers and a pork chop, which he cooked on the skewer by means of the electrical current running through his hands. "I was astounded," said Eisenberg, "and have no adequate explanation for why the Qi Gong master did not injure his skin or cause a serious heart irregularity, seizure, or other damage to his person."

4.10 THE MAHARISHI EFFECT

During the 1970's, a yoga expert from India, Maharishi Mahesh Yoga, advocated a technique of mind training entitled Transcendental Meditation. The technique made the ancient technique of meditation, practiced for thousands of years in eastern countries, easier to practice - and particularly for hurrying westerners, full of nervous tension.

Much was claimed and some of it confirmed (48) for the technique, - which essentially calms the mind, minimizes mind-wandering, and distracting thoughts when the practitioner wishes to concentrate his mind on a certain goal.

Now, the Maharishi has founded a number of universities in the West. In the USA, there is a Maharishi University in Fairfield, IA, where science, including fundamental physics, is taught but from a vedic view point, which involves the recognition of the role of the observer's Consciousness in the event. Some of the Sidhis associated with the practice of Yoga are also taught - among them, levitation. Classical, long term, levitation is not usually observed but there is some evidence that properly prepared students may remain above the ground during jumping for a time inexplicable by normal physics (49).

One of the techniques claiming sociological importance is to use group meditation aimed at achieving a certain positive effect upon a population. Typically, the technique has been applied to bring peace to warring groups. The minimum number of meditators necessary is claimed to be the square root of 1% the population to be affected. Thus, if the population is 10^6 in number, one needs 10^2 working together.

This work has been continued sporadically for about 20 years and a few more recent examples are given in Table 4.2

TABLE 4.2. THE MAHARISHI EFFECT IN SOCIOLOGY (50)
Reprinted with permission from communication between Dr. Bockris and the Maharishi Institute.

#	Citation	Experimental Design	Findings	
1	Cavanaugh, K. L., Orme-Johnson, D. W., & Gelderloos, P. (1989). The effect of the Taste of Utopia Assembly on the World Index of international stock prices. <i>Scientific Research on Maharishi's Transcendental Meditation and TM-Sidhi Programme: Collected Papers</i> (Vol. 4, pp. 2715-2729).	The "World Index" of 1,100 securities from 19 countries was studied using transfer-function analysis for the impact of a group of 7,000 TM-Sidhi experts gathered for three weeks.	World stock market index rose at an annualized percentage rate of 85%, while in the three-week periods both preceding and following the assembly, the rate was - 1% ($p < .005$).	Study 1: A behavioral index was computed based on monthly data from 1970 to 1986 on U.S. motor vehicle fatalities, suicides, homicides, accidental death, notifiable diseases, alcohol consumption and cigarettes taxed and analyzed as a dependent variable, with TM-Sidhi program participation as the independent variable using Liu and Hanssens linear transfer function. A similar statistically significant effect, 31.6%, was obtained in the replication for Canada.
2	Dillbeck, M. C. (1990). Test of a field theory of consciousness and social change: Time series analysis of participation in the TM-Sidhi program and reduction of violent death in the U.S. <i>Social Indicators Research</i> , 22, 399-418.	Box-Jenkins autoregressive integrated moving averages analysis and transfer function analysis were used to assess the impact of the MIU TM-Sidhi group on US weekly violent fatalities due to traffic accident, homicide and suicide across the period 1979-1985.	Violent death decreased 5.5% due to the influence of the TM-Sidhi group. Thus, 63% of the total decrease in violent death is attributable to group TM-Sidhi practice ($p < .0001$). In the model each additional participant in the national TM-Sidhi group reduced annual violent deaths by 3.8 lives.	Simultaneous transfer function modeling was used to study US-Soviet relations over the years 1979-1986. Content analysis of articles from the Zurich project was analyzed using Azar's coding rules. Analysis yielded $p < .00001$ for the positive effect of the TM and TM-Sidhi programs on US-Soviet relations. Both monthly and weekly data were assessed, with comparable result. US actions towards the USSR improved after the TM-Sidhi group exceeded threshold. USSR actions toward the US improved 2- to 4-months after the TM-Sidhi group reached the significant figure of 1,700.
3	Dillbeck, M. C., & Rainforth, M. V. (1996). Impact assessment analysis of behavioral quality of life indices: Effects of group practice of the Transcendental Meditation and TM-Sidhi program. <i>Proceedings of the American Statistical Association, Social Statistics Section</i> (pp. 38-43).		Study 2: Data collection and analyses in Study 1 were replicated for Canada.	
4	Gelderloos, P., Cavanaugh, K. L., & Davies, J. L. (1990). The dynamics of U.S.-Soviet relations, 1979-1986: Effects of reducing social stress through the Transcendental Meditation and TM-Sidhi program. An abridged version of this paper, entitled "A simultaneous transfer function analysis of U.S.-Soviet relations: A test of the Maharishi Effect" published in the <i>Proceedings of the American Statistical Association, Social Statistics Section</i> , 1990, pp. 297-302.			

5	<p>Goodman, R. S. (1997). The Maharishi Effect and Government: Effects of a national demonstration project and a permanent group of Transcendental Meditation and TM-Sidhi program practitioners on success, public approval, and coherence in the Clinton, Reagan, and Bush Presidencies. <i>Dissertation Abstracts International</i> 58 (6), 2385A.</p> <p>Transforming political institutions through individual and collective consciousness: The Maharishi Effect and government. <i>Proceeding of the 1997 Annual Meeting of the American Political Science Association</i>, Washington, DC</p>	<p>Study 1: A Maharishi Effect intervention group called the National Demonstration Project (NDP) was created in the US capital. Predictions were lodged in advance with government leaders and newspapers. The research protocol was approved by an independent Project Review Board comprised of criminologists, sociologists, and political scientists from six independent universities as well as civic leaders and representatives from the police department. The first study used time series structural break analysis.</p> <p>Study 2: ARIMA times series transfer function analyses was used to measure the effects of large groups practicing the TM and TM-Sidhi programs (the independent variable) on the Clinton, Reagan, and Bush administrations.</p>	<p>Study 1: Variables showed a significantly changed trend in the predicted direction toward greater positivity after NDP began, p values are one-tailed:</p> <p>Clinton's approval rating showed a net increase ($p = 5.29 \times 10^{-8}$).</p> <p>Media positivity toward Clinton showed a net increase ($p = .01$).</p> <p>Emergency psychiatric calls decreased ($p = .009$).</p> <p>Hospital trauma cases decreased ($p = .02$).</p> <p>Complaints against the police decreased ($p = .01$).</p> <p>Accidental deaths decreased ($p = .05$).</p> <p>Quality of life index improved ($p = 3.22 \times 10^{-5}$).</p> <p>Study 2: All p values are one-tailed.</p> <p>Bi-weekly data showed statistically significant increase of approval rating and media positivity for Clinton (from $p = .03$ to $p = .0005$). Bush and Reagan (Reagan media positivity not available) monthly data showed similar results ($p = .035$)</p>	<p>Orme-Johnson, D. W., & * Gelderloos, P. (1989). The long-term effects of the Maharishi Technology of the Unified Field on the quality of life in the United States (1960-1983). <i>Scientific Research on Maharishi's Transcendental Meditation and TM-Sidhi Programme: Collected Papers</i> (Vol. 4, pp. 2634-2652).</p>	<p>A reversal of long-term decline in U.S. quality of life occurred as large number of US population began TM and accelerated sharply when the square root of 1% threshold was exceeded.</p> <p>Crime rate fell for the first time in 20 years by .78%, 4.3%, and 7.6% in 1981 to 1983, the first three years of the TM-Sidhi group.</p> <p>Civil cases reaching trial dropped 11.5% in 1982-83.</p> <p>Infectious diseases declined 7% in 1983.</p> <p>Infant mortality reached all-time low in 1983.</p> <p>Suicides have fallen from 1977 peak.</p> <p>Hospital admissions began a decline in 1981.</p> <p>Cigarette consumption showed largest decline, 6.2%, in 1983.</p> <p>Alcohol consumption began a steep decline from 1981 onwards.</p> <p>Drug abuse reversed trends starting 1982.</p> <p>GNP per capita rose 2.3% in 1983 marking the end of the recession.</p>
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Orme-Johnson, D. W., Dillbeck, M. C., Bousquet, J. G., & Alexander, C. N. (1989). An experimental analysis of the application of the Maharishi Technology of the Unified field in major world trouble-spots: Increased harmony in international affairs. *Scientific Research on Maharishi's Transcendental Meditation and TM-Sidhi Programme: Collected Papers* (Vol. 4, pp. 2532-2548).

In 1978 a total of 1,400 TM-Sidhi experts went to 5 world trouble spots - Lebanon, Iran, Rhodesia, Kampuchea, and Nicaragua--for 10 weeks to create the Maharishi Effect. 14,567 events for 1978 were recorded in the Conflict and Peace Data Bank, the world's largest such resource. Contingency table analysis of COPDAB data against a 10-week control period, against a 1-year baseline, and against a 10-year baseline all showed improvement. Time series analysis showed the project had a strong and statistically significant effect world-wide. Investigators report trouble-spot areas experienced noticeable decreases in violence and disorder upon arrival of the group, and, in general, a return to previous trends upon their departure.

Compared to a ten-week baseline, world-wide trends improved.

Hostile acts, as a proportion, decreased nationally 16.7% ($p < .002$).

Verbal hostilities, as a proportion, increased nationally by 3.5% ($p < .01$).

Cooperative events, as a proportion, rose nationally by 13.2% ($p < .007$).

The number of cooperative events increased 115%.

Compared to a one-year baseline, world-wide trends also improved ($p < .001$).

Hostile acts decreased 8.4%.

Verbal hostilities decreased 5.7%.

Cooperative events increased 14.1%.

Compared to a ten-year baseline, world-wide trends again improved ($p < .001$).

Hostile acts decreased 2.8%.

Patent applications reached highest level ever in 1982.

Degrees conferred per capita begin to rise in 1982.

Divorce rates reversed a steady increase beginning in 1982.

4.11 MAGIC

Magic is the name given to impossible acts which, as a parent, one pretends to carry out for, at first, the mystification, and, later, the amusement of one's younger children. Belief that there are actually people, - in modern times, - who are able to create things out of the air, or appear and disappear, would be thought of by nearly every adult (and most parapsychologists) as a sign of insanity.

However, - and marvelous to relate, - there are people living now who are able to demonstrate acts which justify the description "magical."

It is easy to describe half a dozen examples of magical acts.²

1. Tony Agpoa, a well known psychic surgeon in the Philippines, lines up the patients of the day, and passes in front of them, pointing suddenly with an index finger at each ("waving a magic wand"). Lyall Watson, a western investigator, duly lined up and received the distant thrust (51). He found a small hole in his shirt and underneath a tiny pin prick - bleeding.
2. Several among the Philippine psychic surgeons have been closely examined by competent western investigators (52). They have been observed to use slight of hand. However, some well known parapsychologists maintain that they also do things which are impossible in terms of natural forces, without involving trickery. For example, they cause a very thin cut to appear in a focused part of the body, while the knife remains several inches from the flesh (western observer 2-3 feet distant) (52).
3. Ted Owens, as observed by psychic investigator Jeffrey Mishlove, could create a storm (thunder and lightning), more or less at a promised time (53).
4. One person, - Thomaz Morton, - a Brazilian psychic, has demonstrated that he can cause unfertilized hen's eggs to yield live chickens as a consequence of his intense gaze onto the eggs (54).
5. Another person, - Sai Baba, - casually materializes complex objects, - e.g., religious figures, up to 11 inches long, with appropriate inscriptions, in a time of a few minutes (observed by Erlendur Haraldsson, an internationally known parapsychologist (55)). Baba has demonstrated many hundreds of complex materializations (and not a few dematerializations) (55).
6. William Tiller (56) and his colleagues have shown (cf. the work of Benveniste (14)) that it is possible to imprint thoughts upon objects which then can, e.g., transfer an actualization of such thoughts to water (e.g., "lower pH by one unit").

With the exception of Tiller's work (exempt because of his long-term reputation as a material scientist), all these magical actions have been witnessed repeatedly by westerners, doctors, psychiatrists, and parapsychologists.

In the absence of such intense examination and confirmation, accounts of the actions described above would have been regarded as incredible. The question therefore naturally arises as to the reality of the acts magicians of legend, described in many societies.

² From the dictionary point of view, magic is an act, regarded as impossible in terms of natural forces.

Because much of the continent has not yet received the blessings of civilization, Africa is a likely place to find accounts of wonder works by African psychics, contemptuously referred to by colonials as "witch doctors" (in other societies: shamans). For example, according to legend, if you have an enemy you wish to demolish, it is unnecessary to use a knife or gun, - the western way. One simply makes an effigy - doll sized - of the enemy person and sticks a pin right in the heart area of the effigy. It is useless to do this calmly and coolly, as in a scientific experiment. If it is to be effective, - give your distant enemy a mysterious and fatal heart attack, - the act of sticking the pin in the effigy must be done with full hate and venom, not feigned but real.

Brenda Dunne (57), of the Princeton Engineering Anomalies Research Laboratory (PEAR), carried out experiments on distant injuring which she described at a meeting of the Society for Scientific Research in 1997. Of course, Ms. Dunne did not carry out the full act of hate and venom but she made pseudo acts which were indeed registered as stabs of pain in a distant target.³

Many accounts, some more remarkable than Ms. Dunne's, come out of Africa, and anyone who has lived there (even in civilized South Africa), know some. I relate here only one.

This account originates in 1938. Eric Wier was an acquaintance of my mother. He was 25 when I was 15. He chose the colonial service within the widespread British Empire (at the time in charge of most of Africa). Picture him as a figure you have seen in movies about Africa: characteristic hat or helmet with cloth protecting the back of the neck from sunburn. Baggy khaki shorts, khaki shirt, most of it buttoned up. Such men had enormous territories over which they were supposed to rule and their power depended on the native population's fear of the King. In 1938, the monarch in England was George VI, - an unwilling sickly king who stuttered badly when trying to make speeches on the radio. The Union Jack flew over the district commissioner's cottage and he commanded a small force of maybe 6-12 unarmed "soldiers," who did double duty as part-time policemen.

According to Wier's story, it came to pass that a message was brought to him by a runner - a distant village within his territory had revolted. They had put it about that they cared nothing for the King, far off in London, - and from that time onwards would develop in their own native way, including practicing the cannibalism the British were trying to stamp out, and claiming, so ridiculously, to practice "magic".

Wier started out with several of his soldiers. Of course, there were no roads and to get the 100 miles or so in three days it was necessary to trot (6 mph) for lengthy periods, some of it in the dark. Because of this, Wier took a bicycle lamp fueled with acetylene which shone weakly on the way ahead. Much of the time, journeys of 100 miles relied on a compass.

Arriving eventually in the rebellious village, Wier said that he put on his magistrate's face and demanded to see the Tribal Chief. When the latter appeared, he attempted to rid himself of the mighty danger he thought he faced, - the King might come not with 6 but 600 soldiers. "It is the witch doctor's fault" he said. "He pulled down the flag." "Where is the witch doctor" asked the glaring District Commissioner. The Chief

³ Russian investigators relate an experiment with baby rabbits, held in a submerged submarine. Sacrificed, - the mother rabbit, duly wired up and under observation in a Moscow lab, registered a knick on her EEG at the moment at which her babies died (58).

lowered his eyes and his voice and said "He in the crocodile, Master." "In the crocodile! What Nonsense! Where is this crocodile?"

The Chief led Wier to a nearby inlet from a lake and sure enough, a large beast was lying on the bank of the pool, asleep, its huge jaws wide open.

Wier had the night to think about his situation and before dawn had devised a plausible scheme. He asked for a large hunk of meat, soaked it in the calcium carbide brought for the bicycle lamp⁴ and crept down to the pool, attached the meat to a rope, chemistry, - when the calcium carbide in the meat came into contact with aqueous fluids in the croc's stomach, acetylene would be evolved in large amounts and burst open the crocodile and the white man (and the King) were all mighty masters after all.

The intended event occurred and there was a sizeable "thrump", - heard in the village. "Now, we'll got and find the witch doctor", Wier said, maliciously.

The Chief, the Chief's assistant, the Assistant Chief, Wier and the soldiers, moved towards the pool down a path which was rather dark because the sun was kept out by the overhanging foliage. Wier was in the lead, - and suddenly, he could see something. It was lying on the path. A lot of colored feathers. A head dress. A body. Yes, it was the witch doctor - and his stomach was blown open.

A story such as this would not have been pushed away with laughter in Africa as a ridiculous horror story fit for 9 year old boys. Experienced adult Africans and British what we now know occurs, the events I remember of Eric Wier's story may indeed have actually occurred.⁵

4.12 REMARKS ON THE FIRST PART OF CHAPTER 4

The aim of this chapter is to show that there are events observable at the present time which cannot be interpreted with the aid of the available science. Some, for example, the Kirlian phenomenon, may be eventually interpretable in terms of the present paradigm but a number, for example, psychic healing, and the actions of individuals who perform materializations, are unlikely to be described in the present science.

In the next section we will exemplify some of the persecution which scientists go through when they try to bring out new experimental material which is not capable of being explained in the paradigm of the time.

⁴ Before 1950, in the remote parts of Africa where Wier's kingdom lay, batteries (also radios) were not in common use. Calcium carbide (a powder) reacts with water to produce acetylene, a gas, which turns on a wick with a steady blue flame and can be used in torches (for sometimes, the trot had to be kept up in the dark).

⁵ Before he went to Africa, I used to see Eric Wier frequently, he mentored me, played soccer and laughed a lot. But I never saw him laugh again, after he came back, five years later. I remember the above story though he told it to me in 1938, I've fictionalized the march towards the pool but not what Wier saw and when he looked at the witch doctor lying on the path to the pool. The substance of the story is, undoubtedly, what Wier told me.

4.13 DIFFICULTIES FACED BY ORIGINAL THINKERS IN FUNDAMENTAL SCIENCE

The task of those who wish to modify essential elements of the scientific thinking of the time is not, to put it mildly, an easy one. In the summer of 1994, the BBC held a program which was called Heretics and consisted of a description of the work of five persons who had come to the fore and caused a furor in science with resulting reactions against them. Among the five was the famous and twice ennobled chemist, Linus Pauling (59), who was a most praised chemist until he began to proselytize the giving of mega doses of vitamins. This was against the paradigm of the time (tiny doses of vitamins) and instead of listening to his reasoning, it was assumed that he was receiving some kind of reward for increasing the sales of companies who made the vitamins and he became in his declining years a spurned figure. Thirty years later, his results are being put into practice.

One of the more well known psychologists of the second half of the 20th century was Hans Eysenck, who worked in the Maudsley Clinic in London, the most well known psychiatric clinic of the UK, and he attracted much hate because he was the first to suggest that, instead of the development of the character depending upon the happenings in childhood (the Freudian view) a stronger influence came from inheritance via the genes within the new DNA formed by the parents at fertilization. His views were said to lead to racism and he, too, became a rejected figure.

A more recent scientist to shake the paradigm is Rupert Sheldrake, formerly a biochemist from Cambridge University, who has pointed out gaps in explanations offered by present biology. For example, we still don't understand how it is that, although the actual materials which make up organisms change many times during the life of the organism, they always change in such a way that the form, - the nose on the face, - etc., is maintained. Perhaps the most remarkable example of all is also the most commonly observed, - that the worm turns into a complex liquid mixture out of which, phoenix-like, there emerges a butterfly.

To explain some of this, Sheldrake put forward the idea of "formative causation". He suggests that there must be invisible information fields which surround cells and exert influence on them to go to a certain shape. He suggests that there is transmission of information between organisms over long distances over time and he has some evidence for this, which seems to support the idea.

It is more difficult to assess the acceptance of Sheldrake's ideas but they seem to have received acclaim among forward lookers, thought of course regarded as impossible by the "true scientists."

These examples of Heretics from relatively modern times must be looked at with a background of more famous examples from the last few centuries. Copernicus, one of the basic formers of our culture, never suffered for his heliocentric view because he was careful to suppress his own work until a few years before his death and then to publish it in far off Poland, thus diluting the effects of the wrath of Rome. This did not apply to Galileo who, because he supported Copernicus (and although he was a friend of the Pope) and lived in Rome, had to spend the second half of his life under house arrest.

A good example of premature rejection is that of Wegener (60), from whom we get our idea of floating continent. At first, Wegener's concepts were found to be utterly impossible until evidence was found for sea floor spreading.

Semmelweis (61) represents a tragic example of what happens to a scientist whose ideas contravene those of the ruling elite. The idea of hand washing before operations and particularly in obstetrics was unknown to surgeons before the 1880's. Semmelweis was the head of a group of charity wards delivering babies of the poor people. He insisted, however, that his physicians wash their hands before carrying out deliveries and it was soon seen that the records of his group were much better than those of the surrounding obstetric groups, some of which were for women of higher social status, who paid more.

Semmelweis had done the unacceptable: his work threatened the financial status of his superiors and they consequently raised a furor of ridicule, - against him. He lost his job and without means of support, decided to end his life.

Correspondingly, Alexander Graham Bell (61) tried to sell his ideas of the telephone to Western Union but he was turned down by that company because it was thought (rightly enough) that the telephone would damage their sales. Marconi (61), correspondingly, tried to interest the Italian government in his ideas of radio communication company there.

What is the origin of this repudiation of him who brings the new idea? It is largely Hubris, - that exaggerated pride in one's own achievements which means that, - and this applies in particular to professors at universities, - those whose careers have been built upon certain theories, - existing view points, - and who have taught a science based on these, are horrified to learn that they may not have been speaking the truth.⁶ Alternatively, particularly in drugs and medicine, the hate arising from injury to pride has added to it the fear of financial loss. Great amounts of money are finally to be made from a drug which has passed through the hurdles placed before its acceptance by the Federal Drug Administration and once it gets into the money making phase, it is regarded as very damaging if an alternate and better drug seems to be approaching approval.

The poorly named Cold Fusion (in fact the occurrence of nuclear reactions in the cold) is an example of both of the motives of hubris and potential financial loss.. On the one hand, there was dismay and horror among nuclear chemists at the claim that nuclear changes could be produced easily in beakers, because it was doctrine that the nucleus was sacrosanct, that only extraordinary energetic particles could break through and change it.

But replication of Cold Fusion brought with it also a strong fear of financial loss. Hot fusion is one of the most supported areas of research in the world receiving more than \$1B per year of support. The machines involved have reached great size and cost, although without success for research beginning more than 50 years ago (62).

It is easy to see, - assuming a family of four, - that some 25,000 people depend upon the influx of the good funding for hot fusion and on this basis there is plenty of spare money to support a lobbying effort in the Congress to maintain the blessed flow. It becomes, then, important, to impress upon the budget makers that the competing (and exceedingly low cost) "cold fusion" has no validity whatsoever, and research in it should not be supported. Of course, unless government research funds flow, the new field will die out,

⁶ It is one of the anomalies of science that each generation believes it has the final truth and the concept that science is always changing, and that little in its theories is permanent, seems to be an idea whose time is yet to come.

- to the satisfaction of hot fusioners who will remark that they had always said it was nonsense.

One of the more effective means of suppressing new ideas in science is the peer review. The practice of the scientific journals is to send out the papers received by them for critical review "by the authors' peers", - the scientists in the field corresponding to those of the authors of the paper (63).

Of course, in a perfect world the people asked to comment would do so with quiet objectivity, evaluating the good and the bad of the proposal. But, men and women are not objective, and act according to their own emotional conditions, when writing of what is in practice a secret report.

A few examples may help to underline the dark side of the system and they all come from an article by Patrick J. Hannan (64).

The first example is the work of Kebubian and Caine who wrote an early paper on the biological effects of dopamine. The paper was rejected by Science whose referees announced that the paper would not be publishable in any journal. By the year 1994, there had been more than 3,000 quotations of the paper, which had indeed been published in another journal (64).

B. Majav and Z. Polad published an article on the mechanism of the biological action of histamines. It was rejected by the *Journal of Experimental Medicine*, but published elsewhere and there were 600 references to it by 1994 (64).

The best example of the extremes of the emotion shown in peer review is the rejection of the paper of Rohrer and Binning (65) on scanning tunneling microscopy. The referee's report in the first attempt to publish it included the statement "This paper is devoid of conceptual discussion, let alone conceptual novelty. Why be interested in the results of this paper?" Rohrer and Binning were awarded the Nobel Prize for the invention of a device which enables one to see individual atoms.

On the whole, an unfortunate amount of peer review (perhaps nearly all of it) is influenced by the feelings of the reviewers for the authors, disguised as a critical evaluation of their work.⁷

4.14 REICH: PERSECUTION, IMPRISONMENT AND DEATH

Wilhelm Reich, an Austrian, worked firstly in Germany. His interest in psychoanalysis led him to the conclusion that an important condition of health was the frequency and strength of the sexual orgasm. He advocated that sexual education should be given to people independently of their married state, so that their experience of orgasm could benefit their health.

Reich set up in Germany information centers where young people could learn to obtain sexual education. These activities brought Reich (1930's) into conflict with the

⁷ It is in fact the program officers who really decide the acceptance or rejection of a Proposal. Except for authors in their Freshman Phase as proposers, they know who is friend and who is foe to the author. The program officer also has his likes and dislikes (rationalized as evaluations of the work proposed) and he becomes influenced by these in choosing reviewers. The morale of course is to do all you can to feature favorably the work of the program officer and his cronies in the proposal.

national socialists in Germany. He was characterized as a degenerate, his books burned.⁸ His expulsion from the International Psychoanalysis Society followed.

Rejection by the Nazis led to Reich's leaving Germany and he attempted in several locations to establish a stable life where he could work in peace. He finally settled at Rangely, Maine, in 1949.

Throughout many changes of residence, Reich continued to carry on work in the general area of psychoanalysis, sexuality, and health. He published extensively in these (66).

In 1949-1954, Reich was able to work undisturbed in Rangely, Maine, and built there an observatory and education center. One of the results of this work was the orgone energy accumulator, a device inside which persons could sit for the purpose of absorbing "orgone". The idea here was based upon Reich's concept of orgone, an energy apparently similar in properties to the prana of the Indians and the chi of the Chinese.

The free life of study and education in Rangely lasted only until 1954 whereupon the US Food and Drug Administration filed an injunction against Reich, the object of which was to discredit his work. It was maintained that the existence of orgone was not known to the medical profession, and as far as the offering of a device for accumulating it, this was an attempt to obtain commercial gain on a fraudulent basis.

There is no evidence that anyone in the FDA was given the task of reading Reich's scientific research papers and understanding the basis of his concept.

Upon the receipt of the injunction Reich asked the FDA for a collaborative investigation of orgone, but the FDA refused his offer (which would have involved expenditures much less than the investigation which followed). According to documents established by the Reich Museum, the investigation lasted 7 years and cost several million dollars.

Reich finally took the reasonable position that the government agency had no authority to pass judgment on a scientific matter until they had investigated it. On this ground he refused to appear in court to answer the complaint. Instead, he sent a letter to the court in which he acknowledged that his refusing to appear ran a risk of his being "enjoined" in all his activities. He insisted on the right of scientists to learn and investigate new ideas and be safe from persecution in doing so (66).

The court rejected Reich's response and issued the injunction for which it had earlier applied. Any activity connected with the concept orgone, and particularly for selling the orgone accumulator, was regarded by the court as an attempt to obtain money by false pretense and from the issue of the injunction was strictly forbidden.

The court then had some of Reich's writings burned; while others were ordered to be destroyed under the supervision of the FDA (August, 1956 and March, 1960).

Reich was the only scientist whose books had been burned by both the Nazis and by an American government organization.

In spite of these unexpected and unique attacks on his research, Reich continued to work. He had become interested in desert formation and went on a trip to the Southwest

⁸ Reich was a prolific author and a few of his books may be cited here. There is *Character Analysis*, 1952; *Children of the Future* (the prevention of sexual pathology), 1953; *The Function of the Orgasm*, 1953; *The Psychology of Facism*, 1954; *Bioelectrical Investigation of Sexuality and Anxiety*, 1956.

of the USA to make observations there. While he was away, one of his students, unbeknown to him, took some orgone accumulators from Maine to New York. The FDA regarded this as contempt of court and ordered Reich to be arrested and sentenced. He was sent to the Federal Penitentiary in Lewisburg, PA, and died there on November 3, 1957.

The cause of Reich's death has not been established. It seems reasonable to conclude that the FDA's persecution of him, for following up a new idea, indirectly contributed to his death.⁹

Between 1957 and the present time, there has been a degree of change in the Western world with regards to knowledge of Eastern beliefs, and of course, these involved prena and chi. Some knowledge of these makes Reich's work easier to accept the concept than it did in 1957 (66).

At present there is work to test Reich's concept being carried on by James DeMeo, the Director of the Orgone Biophysical Research Lab, in Ashland, Oregon.

According to De Meo, the building of an orgone accumulator box involves the following.

"The orgone accumulator has a special construction composed of alternating layers of metal (preferably iron or steel, ferromagnetic materials) and organic/insulator materials (preferably those with a high di-electric constant, such as fibre-glass). The interior layer is always sheet metal, while the final exterior layer is the organic/insulator, made of masonboard, and covered over with natural shellac. The walls of the accumulator consist of such materials in a sandwich form. When a sheet of metal is placed next to a sheet of organic/dielectric material, De Meo maintains that it sets up a displacement of the orgone energy from the organic side towards the metallic side. Making a box-shape enclosure of such an arrangement of materials increases the density of orgone charge inside the box to levels higher than are found outside the box."

The basic observation of a person who sits on such boxes is a stimulation of the parasympathetic nervous system. People experience a feeling of warmth and relaxation which is demonstrably greater (from controlled blind trials) than what is experienced from merely sitting quietly inside an enclosed all-wood box. Physiologically speaking, De Meo has written that there is a systematic slight increase in body core temperature with a measurable moderating of blood pressure and pulse rates. Healing of severe burns is the most dramatic effect, and Dr. Jorgos Kavouras in Germany, who runs a clinic says "Failure to relieve severe burns with the orgone accumulator constitutes medical malpractice." Cancer patients using the accumulator have seen the disintegration of tumors, but one of the most readily-apparent effects is the reduction or elimination of pain and pain-medicines, along with a return of appetite and overall vitality. The orgone accumulator is in use by

⁹ There is resemblance here to the earlier death of Ronald Gurney, after WWII. Gurney, one of the earliest to apply the quantum theory to chemistry and physics, had been caught out of England at the beginning of WWII and spent most of the time during the war in Russia. He traveled eastward, stayed for short periods in various Russian universities. When he reached New York in 1946, he was attacked by the Immigration and Naturalization service and accused of being a Communist because of his four year sojourn in Communist Russia. He was found, dead, in a gutter in New York City. The direct cause was a heart attack, but it is again difficult to exonerate the persecution by US authorities for weakening him and leading to his demise.

health care practitioners and doctors in Germany, and "Orgone Accumulator Therapy" is recognized by the German government as one of three types of accepted "energy medicine," the other two types being homeopathy and acupuncture (67, 68, 69).

4.15 R. BECKER AND THE REALITY OF LIFE AS A RESEARCHER

Robert Becker has recorded a remarkable career in U.S. government science in the book called *The Electric Body* (70). His records are of persecution and constant frustration. He frequently had to fight for his job and those of his coworkers. The sin which turned the tide against him was that he wanted to introduce electrochemistry as an important aspect of biological organisms. Although "membrane potentials" had been in textbooks for a century, Becker extended the scope of application electrochemical phenomena in the body and did currents in organisms up to the salamander.

What so irked colleagues and made them turn against him was that this was something new and different from the theories and models of biological organisms which were current in textbooks at this time and had his ideas become established, there would have been a far reaching change in direction of thinking in biology which no one wanted. This would have cast a shadow on the wisdom and abilities of the established scientist.¹⁰ There was another reason for the violent treatment of Becker and his laboratory throughout his career in NIH and other research organizations of the government. He was one of the first to bring up the question of electropollution, the idea that the presence of alternating currents in wires carrying electricity would give out electrical and magnetic fields from which there was some evidence of cancer causation (73).

Becker's book, *The Body Electric* (70), gives a blow by blow accounts of some dozen incidents which were heaped upon him during his career, each of which was meant to make him change course and give up this preoccupation with electricity in the body and nonelectrical.

Becker had an early baptism of the real world of research in institutions. His first days as a researcher, were as research assistant to Dr. Co Tui at New York University School of Medicine. They worked upon the separation of individual amino acids from proteins with the longer term objective of concentrating food to send to the starving. Together, they also developed an assay technique which could be used to study changes in body proteins caused by surgery.

When walking to work one morning, the young Becker found that the contents of his laboratory had been deposited on the sidewalk. All its equipment, including notebooks containing his results, had been placed in a pile. The secretary of the group informed Becker

¹⁰ The happenings with Becker were largely in the 1970's and his laboratory was closed in 1980. Since then, - and partly because of his work, - there has been a change in viewpoint and there is now an electrobiochemistry growing up in which the membrane potentials are gradually being replaced by the recognition that enzymes adsorbed on the surface of membranes contain sites which make them a function, to a degree, as electrodes forming up cells, some of which act as fuel cells (71, 72). Herein, the conversion of chemical to electrical energy occurs within the body (71). Such thoughts, which have been developed more recently by Srinivasan, Gutmann and others, have also received a comprehensive treatment by Bjorn Nordenstrom who has turned largely to the practical side of electrochemical surgery, applied largely the destruction of cancerous tumors (73).

that he and Co Tui no longer worked there. They had been fired overnight. The explanation given to them constitutes the first example of a series of actions which were fraudulent. Thus, it turned out that the chief surgeon of the group had lined up a \$1M donation from a wealthy patient, but he, the surgeon, was only willing to see to it that the donation found the right home, - in the group on experimental surgery, - if he could choose the person to be the professor of experimental surgery. This meant the ousting of Prof. Co Tui and his assistant (Becker) and the installation of a new man, a friend of the surgeon wielding the weapon of a million dollar grant.

The end of Becker's career at NIH has been described in some detail (70). It involves a crafty piece of politics going on for several years and leading eventually to the withdrawal of research money from his group so that he could no longer function, an excellent example of the fact that support money to a research group is like air to an organism.

The story here begins with an article which Becker had published in the *Saturday Review* in 1978, describing the work on the electrogeneration of new limbs in animals who had lost them. This was attained by passing the right kind of electrical current into the damaged part of the limb.

After the publication of the article in the *Saturday Review*, a letter was published which originated from a "great man" in the embryology section of Purdue University. The article accused Becker of "bad science". The photo of the regenerated frog's leg which was in Becker's article, was said, in fact, to be an intact leg. It was pointed out that Becker's article had avoided peer review and its content made difficult the lives of "real scientists".

The letter was copied and sent to a major overseer of NIH funding with the intention that it would lead to a defunding of Becker's lab. Attacks by this "great man" continued into the 1980's, when he persuaded the Purdue University Office of Public Information to put out an article praising his statements and the stance he took "against myths". The article accused Becker outright of the publication of fraudulent results. In reply to this Becker wrote the President of Purdue, outlining his employees actions against him and threatened to sue not only the Purdue embryologist but the President of Purdue University. The result was an immediate phone call from the "great man" who told Becker that he had never really meant what he had written (and doubtless said) and that it had all gotten distorted in the press. Becker asked for an apology in writing and this was indeed obtained, with an admission of the primacy of Becker's work on regeneration (70).

However, while this apologetic behavior was going on, the Purdue embryologist was also refereeing the proposal for the grant upon which the future of Becker's electrochemistry laboratory depended. His report gave rise to the turning down of the proposal, on the simple and undeniable grounds that Becker was its director (an example of extreme prejudice).

His proposal denied, Becker offered to retire and to turn over the laboratory entirely to others, who would then employ his assistants so he would save their jobs. But the powers that be did not want an electrical component to enter into the thinking of biology (for it would be against the paradigm) and it was thought less disturbing to the reputations of those in the field if work on electrical currents in the body could be suppressed. Further, there was a financially threatening idea around, namely that electropollution could be carcinogenic and both these trends were being promulgated by Becker.

As a final insult, his two coworkers were offered jobs as "night administrators" (70).

Becker writes in his book about the misunderstanding which the public has about people in research. His writing seeks frankly to diminish the public's misunderstanding of scientists as the priests of the religion of science. The public regards scientists as having less feeling than those in other professions but this is not the impression which Becker received in his career, - and indeed, which I myself have experienced. Becker mentions the characteristics of greed, power hunger, pomposity, - and, - when faced by someone who may publicized, would cause a repulsion among the taxpayers which might eventually work through to a proper reduction in the myth of objectivity which at present attaches to scientists.

Until sometime around mid-century, the truth of a scientific controversy did emerge after many battles,¹¹ several letters exchanged in the journals on both sides; but by now the Establishment's view weighs down the scales so powerfully that it is extremely difficult to get past it and make a change. Ideas in Science have taken on a great inertia. The reason is basically economic for research depends on the giving of government grants, and this in turn, puts power into the hands of referees who may regard the Proposal before them as a threat to their own funding.

It is little realized by the public that in university and government laboratories even the yellow pads of paper which one needs for the first draft of a Proposal are paid for from a grant which the researcher must earlier have obtained. The reaction becomes Pavlovian. Scientists know very early in their careers what gets the funds and they are not going to write anything which threatens the Paradigm. The easiest way to get funds is to write a Proposal which will express strong appreciation of work already done by those whom one expects will be the referees; and to propose a linear extension of a situation already described.

It is therefore difficult to have anything radically new within the fundamental sciences published. If a new idea within the fundamentals of Science does get out into the press, then the word goes out that the money which was used to do the research should be turned off. Referees are not to pass any paper which the authors of the new concept tries to get published and, of course, if there are no publications, the research will not be refunded.

Occasionally, - as in the case of Cold Fusion, the scientists will take their case to the public (62). Then, the gloves are off and the reaction of the establishment scientists becomes much rougher. It will include a vilification campaign, a spread of rumors which will nullify the confidence given to the person who dared to publish the new.¹²

Finally, after 20-30 years the iconoclast may be proved to be right. The reaction is quite smooth and satisfactory for the Establishment. The ideas are then described at first

¹¹"Battles" over scientific matters can be intense in Anglo-American countries but are usually carried out with a journal editor as referee and the scientific public as jury. In some other countries, the sounds of battle may be louder. In Communist Russia, the loser would be condemned to a government apartment with one room, not two. As late as 1950, I came across scientists in Germany who (while working in the same Institute) had not addressed each other for decades due to an earlier conflict concerning interpretation of data.

¹²What is meant by "the new" here refers to new ideas such as that electrical currents in the body are an important part of the biological model. It does not refer to advances in engineering or pharmaceuticals or medicine which extend and apply the present paradigm and where there is a vigorous competition between companies. We shall see in examples later in this chapter the difficulties of new ideas in medicine which compete with those already providing income.

as applicable "occasionally" and hence unimportantly. Let a year or two pass and an Establishment figure will claim indeed that spurned ideas are true and have been hinted at earlier by this Establishment figure himself. The third stage of development is that the new idea is obvious that only a fool would still trust in the earlier idea which now becomes worthy of ridicule. As to a mention of the true originators of the new ideas, though spurned and rejected, persecuted, they may finally be given a recognition in the footnote.¹³

A further five years and only the Establishment man's name is mentioned. He brought about the wonderful progress to which the New Idea gave rise. He may if sufficiently supported by influential friends who are mostly unaware of the nature of his work, succeed in receiving the Swedish Award.

4.16 BOCKRIS: ATTEMPTS TO DE-TENURE A TENURED PROFESSOR

The account I give here is what happened to a scientist, - and one holding the rank of Distinguished Professor¹⁴, - who reported new anomalous facts inconsistent with the existing paradigm. It is understandably more detailed than the parallel accounts of rejection of the new in other examples (74). My own university, - Texas A&M, - may be a particularly conservative institution with a strong background in the training of military officers, but it is not unlikely that similar events might have transpired had I remained at the University of Pennsylvania (an Ivy League institution), where I served as Professor of Chemistry from 1953-1972.

The general drift of my story at Texas A&M is that I was expected to find it acceptable to continue to plough the furrow made by others, but if I sprang out of it, - suggested concepts outside the present paradigm, reported experimental results deemed impossible in the paradigm of my time, - then firstly I was subject to ridicule, then rejection and finally persecution with an intense effort, - lasting some three years, to persuade the university to break my tenure and fire me.

4.16.1 The Quantum Leap in Solar Conversion Efficiency, - How to Make a Professor Seem an Unreliable Boaster

In retrospect, I now realize that there were three attempts made to diminish my status at Texas A&M (where, after two years, I became a leader in the Department of Chemistry, as measured, at that time by the magnitude of research funds which I was able to bring in for 19 years).

There used to be (during the 1980's) a member of the news gathering organizations at the university who would periodically visit active professors in the Sciences for something to publicize. In the 1980's, I was working on splitting water photoelectrochemically, the idea being that this could get hydrogen to be used as a clean fuel, replacing the fossil fuels,

¹³ There may be a footnote referring carelessly to "early experiments of a similar nature were carried out by so and so, with a daunting uncertainty as to their validity." One reference will be given and the other two thousand which have been developing the idea in spite of Establishment ridicule go unmentioned. The true country of origin of the work is important. The Breakdown of Symmetry was discovered (officially) by Li and Li working in the USA. They received the Nobel Prize. However, evidence for such an idea had been put forward earlier in Australia.

¹⁴ 1-2% of faculty are titled "Distinguished."

use of the combustion of which as energy sources gives rise to CO₂ and planetary warming. At the time of the events to be described (1982-83), the basic experiment of splitting water in a photoelectrochemical cell by irradiating an electrode had been achieved by several groups but the efficiency of conversion of the light to hydrogen was too small (~ 1%) to be of practical interest as a source of clean fuel. In my group, we followed up work done earlier in my Australian group, decorated the semiconductor electrodes with noble metal islets and found it gave an increase in the efficiency of the conversion of light to hydrogen of more than ten times. When the publicity seeking gentleman came around next time, I was exuberant with our result and told him we had made a "quantum leap" in progress towards cheap hydrogen as a fuel from inexhaustable solar energy and water. That was all I said and the next day went off to give a lecture at the University of Connecticut. I was away for several days. I got home late and wanted to go straight to bed. I thus paid little attention to my wife's report that there had been a phone call in the evening and someone had said that I "wouldn't know what hit me" when I got into the university next day.

Shortly after I arrived in the Chemistry Department, the publicity gentleman was back again and he asked me if I might step over with him to his office for a few minutes to go over what I had told him the week before about the Quantum Leap. However, he led me not to his office but to a larger room nearby which I found packed solid with reporters. It was the classical scene of popping flash bulbs, pointed movie cameras, microphones offered to me, etc. I realized these people had been gathered to hear about the fuel, the hydrogen, which would solve planetary warming, etc. I found myself at the blackboard drawing diagrams and trying to get over to some fifty men and women who had had perhaps one year of chemistry a decade or two back and were being told about energy gaps in semiconductors, electron deactivation, absorption of photons and the like. There were, of course, a burst of questions and inevitably a repeated one was "how much it would cost." I explained that we were basing all on laboratory experiments a few weeks old on bench top glass cells and that there was very far to go before one could make a meaningful estimate of what might be, eventually, - the cost of the photo hydrogen. I then made a crucial error. I told the assembled representatives of the press that, hydrogen made from the action of steam on coal, looked as though the cost might be as low as \$1 for an amount of hydrogen containing the energy of a gallon of gasoline. \$1/gallon! This was what came over to the audience and although they had come to hear a professor describe how solar energy could give a new fuel, the \$1/gallon stuck and appeared the same day on newspaper placards in Detroit, - doubtless elsewhere. "Professor says solar gives fuel for \$1/gallon."

The first sessions in the morning lasted 2-1/2 hours. During the lunch hour, back in my office, I called the publicity gentleman and suggested I had done enough and that I would like to get on with my work. But he was adamant. The President's Science Advisor was to arrive for the PM session. *The London Times* was flying a man down from Washington, etc.

So, I had it all over again in the PM. Meanwhile, the morning's lot of reporters swarmed into my laboratories, photographing the post docs who had done the experiments, and the apparatus used. (Also, photographing multiply, a young woman technician.)

The result of this over-hype was disastrous. The attitude my colleagues took was that I must have called the press conference; that the result of a ten times increase in efficiency had not been published and therefore might not be true; and, in general, that I had brought most unseemly publicity upon the Department of Chemistry, above all the ridiculous

claim that I could produce solar-based hydrogen for \$1/gallon of gasoline equivalent. It was said that I had "gone off half cock", and was from that point onwards not to be trusted.

The surprise and pressure of the whole event, - the noise in the meeting room, - all the press coverage, - overwhelmed me for a few days and I wrote several corrective letters to newspapers (none published) pointing out that \$1/gallon of hydrogen was from water decomposed by coal (and giving off CO₂) and not from solar (no CO₂ evolved).

But after a bit, I began to realize. Some inquiries gave rise to smiles, jokes and whispers. My sin was the phrase Quantum Leap. I had some very ambitious colleagues in Chemistry. They well realized that a professor who could devise chemistry to split water and make clean hydrogen economically might well be on his way to Sweden, and that was where several of my colleagues hoped to go, too. But no one was going to Sweden who claimed about things he could not prove; who called press conferences before publication; who was obviously a boastful self promoter who could not come through with his claims.

I was a sadder and wiser professor after the Solar Hydrogen entrapment. But at that point, I did not know how comparatively light the chastisement had been.

4.16.2 The First Proven Nuclear Synthesis in Water and How to Turn a Triumph to a Disgrace

When Fleischman and Pons made their famous claim of nuclear fusion in aqueous solution in 1989, there was, of course, tremendous skepticism and a very negative attitude throughout the scientific community. Indeed, the conclusion to which the two physical electrochemists (in respect to the excess heat they observed) was based on a "what else can it be" type of argument.

My own team at Texas A&M (with verbal agreement of sponsors) the day after Fleischman and Pons' announcement concentrated on attempting to detect tritium in a solution of deuterium oxide.¹⁵ Hydrogen consists of a proton in the nucleus and one orbiting electron. Deuterium contains the one proton nucleus and one orbiting electron but its nucleus contains a neutron, too. Tritium still has the one proton and one electron as has hydrogen, but it has two neutrons in the nucleus. Fleischman and Pons' experiment was done with deuterium oxide in place of water and if a nuclear reaction was the cause of the anomalous heat they observed, then the simplest nuclear reaction would be the conversion of some of the deuterium to tritium (one neutron in the nucleus to two). Find tritium and one has proven that a nuclear process has taken place in an electrochemical system at room temperature. Because tritium is radioactive, its detection and measurement is not difficult (75, 76).

Nigel Packham, a student from Imperial College, London University, doing his Ph.D. with me, was the first to find tritium in the electrolysis of deuterium oxide and in unexpectedly large amounts (77).

The result was, of course, regarded as one of great potential significance (first direct unambiguous proof of a nuclear reaction at room temperature in aqueous solution), and it was not unexpected that a journalist, Gary Taubes, soon visited me seemingly with the idea eventually, of writing up the event and all that surrounded it, in a book. I accepted Taubes

¹⁵ We firstly, cautiously examined eight possible non nuclear explanations of which Fleischmann & Pons had observed. (77)

as a sincere man and told him everything about our experiments, showed him notebooks, told him of my accompanying researches and in general gave him all he asked for. I invited him to return for another discussion and when he got near the writeup of the book about Cold Fusion for which he had a contract from Random House.

Taubes did indeed return for the second interview but I did not know when it began that in the meantime he had flown to London to trace back Nigel Packham's career at Imperial College, - he found he had been a lab technician there on the way to a Ph.D. study which was never completed, - and to visit his parents. Further, Taubes' second visit to me turned out to be his third one to Texas A&M because he had made a second visit in between the first and second to me without any one of my colleagues warning me of the hostile plans for which he sought support. Thus, at this time, Texas A&M was in receipt of monetary support for several projects connected with Cold Fusion and one professor, who was also in Chemistry, - was putting out a great effort to find tritium, too. He failed and why he and his students could not replicate Packham (and those outside Texas A&M who were replicating his tritium) is still speculative. Thus, the latency time before development of the nuclear electrolysis: the professor who did not succeed was a particularly dynamic and thrusting younger man and waiting around for three weeks for something to happen may not have been his thing.

Failure, of course, is unwelcome and there has to be a reason found. Packham must have added the tritium from a bottle of tritiated water which was indeed available in my room. It was this idea, - a rumor, - which was in the Department and much supported by Professor Kevin Wolf, a highly respected nuclear chemist with much government support harbored other thoughts. Wolf's concerns about tritium were more difficult to comprehend. However, Wolf worked in the Cyclotron Institute at Texas A&M and he and his colleagues were all bona fide nuclear men and women, of the classical type, resolutely opposed to the new idea (which would follow from verification of the tritium work) that all the giant equipment, the reactors, the solar temperatures, might be unnecessary and that their own existence (fighting the last war, so to speak) might be deemed superfluous were this impossible development to be accepted into mainstream nuclear science.

Kevin Wolf came upon a subtle exit from his position, which seemed similar to that of Daniel in the lion's den. He gave rise to a report in the *New York Times* that he had dissolved the palladium electrodes by which he had earlier claimed to have produced the tritium independently and found there to be tritium inside the palladium before electrolysis, i.e., he had not produced it after all.¹⁶

With this idea as a weapon, journalist Taubes returned for a second visit to my office. In the first he had been the gentleman journalist. This time he was the raging lion. He told me that I had been deceived, the only tritium was in that bottle of tritiated water. Packham worked at night a lot, must have gotten a key to my room, etc. I remained calm

¹⁶ Kevin Wolf's method of detecting the tritium was subject to examination by Fritz Will, a former president of the Electrochemical Society. He found an error in the analysis method Wolf had used. Further, Will purchased palladium from various sources and examined it before it had been subjected to electrolysis, finding no tritium inside any sample.

with this and invited Gary to spend time alone with Packham. "Let him show you his lab notes" I suggested. This happened and before I saw Taubes again (all the same morning), Packham came to see me. He was disturbed and as he entered the door to my inner sanctum, cried out: "This man wants blood." Taubes had told him to confess. If he confessed his fraud, nothing would happen to him for 9 months while the book was being published: by that time Packham could perhaps have found a job in Albania. If he didn't confess there and then, his fraud would be in tomorrow's New York Times.

I thought this decidedly strong but never the less, invited Gary to lunch at my club. My intention was to offer friendship and complete openness. But Taubes clearly had other ideas. The atmosphere at lunch wasn't really relaxed, although we did get to talk about Gary's part-time activity as a Hollywood script writer.

The union of the dynamic younger professor, Kevin Wolf, and Gary Taubes made a potent mixture. The dynamic one wanted an explanation for his inability to replicate the tritium; Wolf wanted to re weld himself back into his anti table-top fusion colleagues; and it seems reasonable to speculate that Taubes would welcome a scandal which is known always to help sell a book. Together, they devised a plan of action. There could only be one basis for Packham to be claiming tritium: he must be adding it from the tritiated water bottle. Wolf suggested he could prove it. His friendly, helpful attitude to me and my coworkers gave him access to my labs and equipment at any hour. Without my knowledge, he removed from a fume hood a test tube, in the contents of which Packham had claimed to have found tritium, and analyzed it in his own lab for light water. What was supposed to be in the test tube was heavy water, deuterium oxide. If he also found light (normal) water, it would be strong evidence that Packham had indeed added the tritium from the tritiated (normal) water bottle. The telltale result was indeed found.¹⁷

All this, then, came to a head in a way which exposed me to academic flagellation. I was to be shown up as a fraud and a cheat (alternatively, a blind fool) in none other than Science Magazine (80), the most prestigious science magazine in the country. At this time (1990) we had biweekly meetings of all the Cold Fusion workers and at one of these Wolf calmly announced that the next issue of Science would contain a substantial article by Taubes, exoriating the Administration of Texas A&M for allowing the kind of work in which I had been claiming a nuclear reaction in a beaker could take place by electrolysis in the cold - an event which the nuclear chemistry in the books would rate as impossible. Wolf would be featured in a side bar telling the readers of Science that the work under my direction had evidently been sloppy.

In the end, the gale stopped blowing. For one thing, results from many other labs, including that of the prestigious Fritz Will came in, and they all reported tritium (78). By

¹⁷ But the manager of the program in EPRI wrote to Wolf and suggested that, as the test tube with deuterium oxide had been in the fume hood for about 6 months, closed with a cork but unsealed, it could well be that the water arose from the surrounding moist air. Experiments we did, did indeed support this argument. We took a beaker full of deuterium oxide and exposed it to the laboratory air. In about three weeks it absorbed 26% water.

1994, I had collected 47 independent reports of tritium formed during the electrolysis of deuterium oxide. People began to speak with me again.¹⁸

It is not really necessary to spell out the high stress which these machinations against me produced. The reader may think that only jealous colleagues were involved but I much regret to report that "the university" was involved in the shape of a Dean of Science and his Vice Dean. It turned out later that these men (one of whom I saw at least weekly) both knew about the forthcoming attack on me in Science. They knew all about it long before publication and the Dean admitted that he had been talking to Taubes on the phone. If they had told me I could have given the magazine reprints of my published papers on the production of tritium and this would have been likely to give rise to the modification of the article.¹⁹

There were some add-ons which were further strokes of the whip. Taubes tried to get an article on "fraud in the laboratory" published in Nature. Maddox, at that time the Editor of Nature had a very negative attitude towards Cold Fusion, called me one evening from London and told me he was considering publishing an article submitted to Nature about fraud in my laboratory. I asked him to fax me a copy whereupon I could comment. The night awaiting the faxed article was spent uneasily! But when I opened my office door the next morning, expecting to see the text of the article hanging down from the fax machine, nothing was there. Maddox called later and his attitude now reminded me of a pricked balloon. He had spent all day with the lawyers (his secretary told me) but they would not let him publish Taubes' article!

Another add on which tells wearingly of behind the scenes activity again refers to Packham's Ph.D. thesis (74). The examiners of his thesis passed it at the Oral (with a fight) and the Department Head shook hands with him on the success of his Oral Defense (which was half tritium and half work on the bacterial decomposition of water). We (Dept. Head, friendly Dean of Science and Professor Yeager) all had dinner at my club. But then, the next day, the seemingly successful candidate took his thesis to that same Department Head for final signature, whereupon the latter told him: No. Clearly, overnight, something, or somebody, had changed his mind - after the handshake and congratulations, and the dinner. He would only sign a rewritten thesis with the tritium half removed, - and that might not be enough for a Ph.D.²⁰

¹⁸ Kevin Wolf understandably did not to come to faculty meetings at which I was present. As is told below, he later seemed to become the co-discoverer of nuclear transmutation among metals in the cold (hoist by his own petard) and died prematurely in 1998.

¹⁹ My colleagues, kind men of course, doubtless sought to spare me suffering - until I saw the article in print.

²⁰ Finally, Packham got his Ph.D. "by the skin of his teeth." His thesis was now denuded of its main contents. However, the two bacteriologists on the Ph.D. Oral Committee saw fit to state that they judged that part of Packham's work which described the production of hydrogen from water by means of bacteriological action to amount to Ph.D. standard. My private opinion is that some silent influence was exerted by the two outsiders I had recruited for the examining Ph.D. Committee. One had been President of the Electrochemical Society and the other a Chairman of the Science Board of the US Government. Each had told me he had independently observed the electrochemical formation of tritium, one in his own lab and one in a lab he was visiting in Taiwan

In retrospect, how immobile the attitude of some of my colleagues seems to have been. They tell a tale, a tale repeated in many guises in this book. Their physics is frozen to what was in the book on which they trained. Troubling new findings are no longer wanted and everything up to the limit of the law will be done to stop their dissemination.

4.16.3 The Achievement of Nuclear Transmutation in the Cold: and the Resultant Threat of "Personnel Changes"

We had achieved a nuclear reaction in a beaker and thus had been the first to prove directly that Fleischman and Pons' proposition that the anomalous heat they had found in some cells must be of nuclear origin (74). But, if it was possible for deuterium to form tritium (and we had gotten tritium 18 times since Packham's work) I wondered if it might be possible to change the nucleus of one metal into another, too, and eventually perhaps to make noble metals from cheaper ones, said to have been sought by alchemists. (In fact, what the alchemists' called gold was a spiritual symbol).

It was an example of synchronicity that, in early 1992, a man turned up - he had called me twice on the telephone earlier - and said he had a process whereby, indeed, the alchemical process could be done. What is more, this electronic technician, Joseph Champion, had a financial backer, a William Telander (75), and he wanted to find a technical process to invest in for which the potential could be great even if the odds were poor.

At first, Champion worked in my laboratory alone. He had brought with him much complex equipment allowing him to assess the quadrupole moment of atomic nuclei which, if they existed, would be subject to a process reminding one of nuclear magnetic resonance. By irradiating the nuclei with their quadrupole resonance energy, they might be expected eventually to absorb energy to the amount needed for fission. The rate of reradiation was not considered. Briefly, experiments based on this approach failed. But Champion produced another process which he claimed already to have tested out in a university in Mexico. I refer to it as the impact method and essentially it consists of mixing simple metals of high atomic number - lead, mercury, - in the form of their salts, exploding them with a chemical mixture, waiting three days, and examining the resultant powder for new materials.

I insisted the experiments be done exclusively by two of my post docs, Lin and Bhardwaj, - experienced physicist and chemist, respectively, - and Champion was to keep out of the laboratory though be available for consultation.

Now, in negotiating financial support for this work with the university, I had been careful to name the project appropriately. I called it truthfully "Inorganic Reactions". However, I informed the Department Head, Michael Hall, of the objective of the work. Hall's attitude was cautious and pragmatic. As I, he was, of course, extremely skeptical that Champion's claims would be confirmed. He reasonably insisted that no announcement or report should be made about the work until (supposing the method worked) it had been confirmed independently (74).

Lin's and Bhardwaj's first experiment using Champion's impact method failed but the next three were successful! I was suspicious lest the wealthy sponsor might lean on the analyst so I sent the samples to analysts I knew in Canada, Australia and South Africa in

addition to an American firm in Nevada.²¹ The samples were sent in pairs, - the mixture before impact and then one after impact.

The results from the various analysts did not agree well, - they differed in fact by up to 50% (80), - but there was no doubt about the substance of the results: at a level of a few hundred ppm, there appeared to have been a transmutation of the lead and mercury to gold. There were also much smaller concentrations of other noble metals, which had not been detectable in the original sample (81).

Of course, this seemed quite extraordinary to us. Champion was triumphant but satisfied! He had at first represented himself as a person having a wish for disinterested inquiry. But his ambitions grew with the reported successes and he demanded more ambitious experiments on a bigger scale. He wanted grams of gold, and despised our few hundred ppm in a mixture. He withdrew and funded work in a commercial lab for scale up, where we shall not follow him.

Over the summer of 1992, Bhardwaj and Lin had worked full time on the transmutation work. With Champion gone to a Chicago lab, it was time to get back to the original projects. They had worked ½ time on Telander's work.

For this reason, we did not return to transmutation until December, 1992. Bhardwaj was the worker largely active here and he now found that he could not reproduce the results he had gotten with Lin in the summer. Over Christmas of 1992, Bhardwaj made eleven impact experiments with no positive results (though one of the runs showed the radioactivity earlier observed in all the transmutational runs). However, it must be said that it had become clear that Bhardwaj had taken a dislike of Mr. Champion and his backer. It transpired that he had reported results to an FBI contact and he seemed happy to tell me he could no longer obtain the results of the summer. Bhardwaj only looked for gold, using an analytical method available in the university (atomic absorption spectroscopy). The eleven experiments were accomplished in three weeks of the Christmas break and neither Lin nor I were present for much of the time. But Bhardwaj seemed not to have replicated all the conditions of the summer work. The overall time for a complete run and four analyses, then, had been c. 2-5 weeks and Bhardwaj's claim was a run every two days. The waiting time of several days again with Bhardwaj as in the summer.

Very soon, however, the situation was taken out of our hands because the SEC of California (under whose aegis the broker had operated in gathering investment funds, about 2% of which he had given to the university to test Champion's claims) stepped in and advised the university, no longer to use the funds because of a conflict as to the goal for which they could be used between the investors and the broker.²²

²¹ We also used the neutron activation service in the Texas A&M teaching reactor for some samples, and spectroscopic methods available in the university.

²² Roberto Monti, an Italian physicist, has continued the work. According to A. Michrowski (82), both an Italian and a French government agency have accepted Champion's impact method for testing in their labs. In the Cold Fusion meeting in Vancouver (1998), two Russian authors reported using an impact method to change the abundance ratio of the Cs isotopes.

Since 1992, many workers world wide have replicated the metal to metal transmutation we

For about 8 months, we all got on with other work (some of it transmutational but in different systems (and with different support) than those used in testing Champion's impact approach). Then, the storm broke. Although we had done no work which could be compared to the synthesis of noble metals used in the Champion work, stopped 8 months earlier, there appeared in the local newspaper a letter from a woman, a former assistant to the Dean of Science aforementioned. The content was shrill in tone and inveighed against the fact that medieval alchemy was being practiced in the Chemistry Department of Texas A&M, a major state university, stressing Science. Her letter drew the attention of a reporter from the *Dallas Morning News* who called to say he "knew all about Champion."²³ He asked for an interview and I was advised by my Boss' boss to give it. I chose a Saturday and described the project and the work for about 5 1/2 hours, including lunch. Present was the Dean, who had approved the acceptance of the award from Mr. Telander which financed about eleven months of research on nuclear reactions in the cold; and a man from the press relations section of the university. Everyone (four of us) had individual dictaphones to record the session.

I thought I had gotten on well with the reporter, whom I found to be an intelligent fellow. However, he had to write something "juicy" for the readers and although he concentrated more on the frailties of Champion rather than mine, his presentation made me seem to be a professor seduced by avarice and dragged thereby into unsavory territory. But he correctly reported that the results we found were of "tiny amounts of gold". Not being a scientist, - and a bit like the broker unsatisfied with only hundreds of ppm, - the reporter missed totally the scientific point that, if our results could be verified in other labs, we had broken through a great shibboleth in nuclear science and done something which all nuclear scientists would have said was utterly impossible.

But now the blows fell fast and furious. The accusatory letter from the former student to the Eagle newspaper had released much hate and turbulence in the Department of Chemistry. I was immediately *persona non grata*. I at first thought it to be all nonsensical (I did not yet regard it as an attack on me) but when I called one or two colleagues with whom I had had normal social relations, - reciprocal dinner visits, etc., I found to my surprise and then dismay that they would not speak with me!

Among the regrettable incidents (74) was one which occurred to one of my most able Ph.D. student, Minevski. He found himself one day late in 1993, going down a corridor in the Department of Chemistry when there appeared a professor. According to Minevski, this Professor told him that he should leave me, the Supervisor of his Ph.D. work at once, - in any case, it would make little difference when he left me for the Professor intended, Minevski reported, to "put your Boss in jail." Minevski came straight away and told me what had happened. I still took a fairly relaxed and incredulous attitude as I had about Taubes. I was wrong. It really does appear that, at that time, several of the chemistry faculty believed that I was acting fraudulently for personal gain! As with the tritium which

pioneered.. Among the more prominent is Prof. G. Miley of the University of Illinois (94). Evidence of nuclear reactions in biological materials has been produced in other Russian work.

²³ To our very great regret (and a burden the work carried from now onwards), we learned that Champion had served a term in jail earlier and now was again in jail for reasons too complex to describe here but entirely disconnected with his project with us.

all knew could not be produced from deuterium in the cold, and every chemist was entirely certain one could not transmute normal metals to nobles in the simple way which Bhardwaj and Lin had seemed to do. Being *sure* that what I said was impossible nonsense, there could only be darker reasons for my saying it.

This is again an example of the frozen nature of fundamental physics and chemists (75). Minds are no longer open to new facts and wonder. There is a bogus certainty all around and anyone who brings new facts which break the trance evidently receives not the probing questions which is the right response but only threats. There was also the unlikely thought that a professor with some 40 years of continuous university research experience would commit fraud.

The situation following the letter to the local newspaper and the article in the *Dallas Morning News* was added to by headlines in the local news which headlined the university investigation of gold making and etc. My wife discovered a letter addressed to the Provost which denounced me for "the cold fusion caper" (caper = "leap about in a frolicsome way") and then goes on to hint darkly that, my aims must have been commercial. My demotion distinguished professors, not one of whom asked to examine my already published work on cold nuclear reactions (83).

I was next to be hit by a heavy shell: a letter from the Vice President in charge of research which informed me that the Dean who had accepted Telander's grant had accused me formally of misconduct in research. The letter said an inquiry would be held and I was to appear before a group of my peers (four Distinguished Professors) at a named time and place. I understood that I was to be tried at an academic level and that, were it indeed Professorship but indeed my position with the university. I hired a lawyer. I also countered the letter of the Distinguished Professors by writing a detailed letter to the Acting Provost, explaining the scientific objectives of the work on transmutation, its relation to the proven (transmutational) production of tritium from deuterium (several published papers). I thought it unnecessary to explain that the production in three experiments of about $5 \cdot 10^{-4}$ grams of gold was not sufficient basis for a commercial level.

The lawyer and I prepared for the Inquiry. My wife, a lawyer's daughter, contributed significantly by finding the letter to the Provost, and then, in the archives of the university discovered rules of conduct for university employees, some of which were being broken. She contributed significantly to the lawyer's work in preparation for the trial.

The day of the trial arrived. I brought six collaborators (graduate students and post docs) who had performed the experiments on nuclear reactions under the new conditions and held them in a nearby room. They were never called.

The trial lasted about 1 1/2 hours. I had asked for 1/4 hour introduction in which I outlined the course of the research we had carried out on low temperature nuclear reaction. The committee chairman stated that the members of the Committee had studied more than 1000 documents and received cooperation in interviews with six persons (the ex-assistant to the Dean of Science she who had authored the original accusing note, refused an interview). The Committee had used voice enhancement technology to get the important material off the 5 1/2 hour talk with the *Dallas Morning News* reporter. Then, one thing popped out of the reports and discussions which, in my opinion, dominated all the rest. The Committee Chairman stated that they had been given a handwritten draft of a letter from me

to the fund giver of the transmutation work, warning him that he must not conclude that the results we had got justified a claim of the artificial production of gold. I vaguely remember writing something of this kind in a New York hotel where I was for a meeting with my publishers. How did the Committee come into possession of a hand written letter draft? My guess is that it was stolen from my room by someone. I had evidence that documents were being removed from my room and I think it is again reasonable to refer to the phrase "Hoist by their own petard."²⁴

The report of the Committee which had tried me came out only a week after the trial and the result was simple: Complete Exoneration from the charges. In the presentation of evidence (74) from which the Committee had reached its conclusions the points were made that there was ample evidence that I had told my Boss about the work we were doing, and that the letter draft showed that, - whatever the fund giver intended, - I had not encouraged him.

Two (out of 76) colleagues in Chemistry congratulated me on the results of the Inquiry but a group in the Inorganic division remained dissatisfied, - as we shall see.

My wife suffered in the years 1992-1995. She was on good terms with several faculty wives until the counter reactions to my novel work on nuclear reactions began. Thereafter, it was the cold shoulder in the supermarket - as I had found no one except the Department Head would speak with me on the telephone. Three years of isolation and rejection is a significant burden and I have many reasons for which to thank my wife (a refugee from Hitler). As a teenager, she had spent a year in Vienna under Nazi rule and it is significant that she felt the 3 years in isolation in College Station was a worse experience than the year in Vienna preparing for escape to England.

From February to June, 1994, was once more a period in which normality, - at least on the surface, - reigned in the laboratory and it was possible to concentrate on research and thinking rather than politics and fighting. In June, 1994, however, it all began again (75). I did not receive any warning from my Dean or Department Head but had to learn from the local newspaper that a new Committee had been convened to reconsider the so-called Philadelphia Project (the name we had given to the research on Champion's impact method).

This time, the gloves were off. The *Eagle* said outright that the Committee had been convened to consider ways of forcing my departure from Texas A&M University. The head of the Committee this time was Professor Kennedy, the Vice President in charge of Research. I called him at once to ask what in the name of fortune what was going on - had I not suffered trial and been found innocent? Kennedy was more comforting than the *Eagle* and stated that there was no cause for anxiety on my part (sic) and that the Committee (which consisted of a battle group from the highest reaches of the administration, the Provost, and several Deans) was merely interested in how financing of the type I had received was accepted - and several other related administrative things.

Time went on and the shunning of Lily and me was in operation again. My lawyer asked the university's top lawyer about the purpose of such a high powered Committee and was told that the university was not under obligation to tell him. I wrote to the Committee

²⁴ A "petard" is an explosive used, e.g., in breaking through a wall. If one gets too near to one's own charge, one might suffer correspondingly.

pointing out that I knew more about the things under investigation than anyone and that I would be glad to attend a meeting and answer any questions. (No answer.)

After some seven months of waiting to know what the Committee was intending to do to me, I sought an interview with the Chairman of the Committee. He said that he could tell me only that he did not know how the decision would go (so I knew the *Eagle's* description of the Committee's purpose was the right one). Then, he said he had a message for me that the Provost had asked him to give me. It was a chilling message indeed and it no idea what this strange message could mean.

It seemed clear enough: the Committee was going to recommend firing me, a Distinguished Professor, who had tenure. It would have been an unprecedented move, perhaps unique in the country.

I approached the same lawyer, he who had helped me at the trial. His view was that it was time to bring in the professor's union, i.e., the American Association of University Professors. We composed an eleven page statement of a case that the university had treated me capriciously and unfairly. We asked for an AAUP investigation.

I do not know what (if anything) occurred in telephone calls between the AAUP and administrators at Texas A&M. However, something gave rise to a very significant change of direction in the month succeeding my letter to AAUP headquarters. After being told that I would not be the only one, the Provost wrote me. It was not a warm letter of complete exoneration again, but it stated that the Committee had concluded that I had not contravened any of the rules governing research at the university and the decision had been made that "No personnel changes" were necessary.

Although I was no longer threatened with dismissal, the harassment continued for the last two years of my university life from which I retired in 1997 at the age of 74. The order had evidently gone out that I was to be isolated and shunned: not to be invited to any meetings.²⁵ Thus, a student in Engineering wanted to hold a meeting on New Sources of Energy with me as a speaker. He advertised the meeting with posters and directly these came out with my name as the lead speaker, he was told the meeting could no longer be held. And as to the research support which I had arranged from the Mexican Oil Company, Pemex, I contracted with this company for an extension which would go on for six months after my retirement (I sought to cover my post docs' employment). I memorized the Department Head of the Award and he scribbled a congratulatory message on the memo. However, some six weeks later, I received a note: the Department Head had sent the money back to Pemex and the post docs would have to leave! I called a meeting in the Dean's office. But it was a bit too late to put up a big fight. I had only a few weeks left, before retirement (84). The graduate school in Chemistry at Texas A&M University is highly ranked - number 10 out of 150 competing schools. But it is clearly not a place which welcomes radically new ideas.

²⁵ An extreme example of the wish being father of the thought occurred when an eminent Professor's secretary met mine and said (so, it is reported by my secretary) "what are you going to do now that Bockris has been thrown out?" My secretary demurred, remarking that she saw me every day at my desk in the Department of Chemistry.

4.17 THE FIRING OF PARAPSYCHOLOGY PROFESSOR RADIN AFTER PUBLICATION OF A CONVINCING BOOK ON PSYCHIC PHENOMENA

Dean Radin was, at the time of his termination by the University of Nevada, a well known parapsychologist. In a career which encompassed research and teaching appointments at several US universities, and at the UK's University of Edinborough, he had published articles on telepathy, clairvoyance, precognition and life after death (85-91).

In 1993, Radin accepted a nontenured appointment at the University of Las Vegas as the Director of Consciousness Research. In this position, he continued to publish in the above mentioned fields but in addition he wrote and published a book entitled "The Conscious Universe" (92). This is a book considered seminal by parapsychologists because it employed extensively the techniques of meta-analysis to put together the results of many investigations in telepathy, clairvoyance, psychokinesis and precognition. Such a technique takes into account the weight of the many investigations of the same quantities. Each investigation contains results with error bars on the numbers but if the same experiment has been repeated n times than the error bar on the net result is decreased in magnitude by \sqrt{n} . One arrives at a convincing statement of the quantitative measure of a psychic effect. These are often quite small but their degree of certainty is large. The main punch of Radin's monograph was to present all together in the one volume this quantitative evidence for psychic phenomena for the first time. It would be reasonable to say that Radin had presented scientific, statistically sound proof of the existence of ESP.

A few months after the publication of the book, - and much to his surprise, - Radin was presented with an ultimatum by his university. He was asked to sign a letter which would seem to record an amicable parting. If he signed the letter, his salary would be continued for two months. If he refused to sign, he would be terminated on the spot.

According to a report from the *Las Vegas Sun* (93), the reason given to Radin for the destruction of his career at the university was that he did not bring in enough money in the form of research grants ("the field is not viable"). However, it is difficult to take this reasoning seriously. The total amount of support Radin had brought in 4 years was c. \$500,000 and in my experience this is above what is considered normal for researchers in government supported science, such as chemistry, where there are government programs of support. Further, if a university comes to the conclusion that a change in direction implies that non-tenured faculty should be let go, such a rare dismissal is not carried out as with Radin, but takes place over the academic year, with leniency as to the exact date of termination to correspond to the finding of a new appointment for him who is being forced to leave (94).

It seems unavoidable to conclude that Radin was fired because the weight of the contents of his book had made some people feel uncomfortable and the university administration feared a backlash which might result in diminished funding to the university from big money givers, who might be put off by "all this spooky nonsense."

This case shows well the value of tenure. Radin had no tenure and therefore could be terminated at any time. In my own case at Texas A&M, I had tenure and although there was a strong movement to dismiss me for publishing work which was inconsistent with the present paradigm in nuclear physics, it was necessary, because I was tenured, to study the proposition for eleven months and then, after the case had been laid by me before the American Association of University Professors, to decide "that no personnel changes were necessary." (Cf., "Tell Bockris he will not be the only one.")

There was a nasty aftermath of the Radin firing which centered around a review of the book cited above in *Nature*. The author of the review, L. J. Good, is an eminent biostatistician. In the review he attacked Radin's treatment of the statistics of the "file draw problem". Thus, one may treat a number of investigations and find x positive in y results and then one can apply statistics to find the probability of a positive result. However, what is not known is how many unsuccessful results the investigator stowed away in his drawer. Radin presented some phenomena which had, without consideration of the file draw problem, a probability of 10^{2000} against the results happening by chance. He calculated that there would have had to be several thousand concealed experiments (an unlikely number) to undo the conclusion found. In discussing his result, Radin described the probability of the result occurring by chance as being billions of trillions to one. Of course, this is a literally as $10^9 \times 10^{12} = 10^{21}$ and on this basis came to the conclusion that a much lesser (and more acceptable) number of unsuccessful experiments stowed away would be enough to spoil Radin's conclusion.

Nigel Packham defied Gary Taubes' statement that he would have to go to Albania to find a job for he has been employed for c. 14 years after leaving Texas A&M, by landed on his feet after the explosive dismissal from his university. He is now Director of Research at the Boundary Institute in Palo Alto, CA. He is also one of four on the Board of Directors. A few of his publications are referred to in References 85-91.

4.18 MEDICALLY ASSOCIATED SUPPRESSION

The examples given above of the suppression of new truths by scientists all involved basically hubris, a fury among members of the establishment at having been shown to have been on the wrong path. But there are many examples particularly in the pharmacy world, where the dominating factor in the rejection - or suppression, - is financial (95).

The following brief accounts have been compiled largely on the basis of the work of Daniel Haley, formerly the Chairman of the Committee for Energy of New York State under Governor Rockefeller. His book (96) contains an enthusiastic foreword by Berkley Bedell, the President of the National Foundation for Alternative Medicine.

4.18.1 Glyoxylide: Birth of a Science, or Death of a Science (1914-1948)?

A therapeutic compound called Glyoxylide was discovered by Dr. William Frederick Koch of Detroit. He proposed a formula for the substance $O=C=C=O$. He found the compound had anti-cancer properties and used it extensively in the USA during and after WWI.

In 1919 Koch published a paper called "A New and Successful Treatment of Cancer" (96). Shortly after this, he received a visit from Dr. Henry Carstens, representing the Journal of the American Medical Association. Koch reported that Carstens offered to take over the drug, and make him famous. Koch said that he wouldn't accept the arrangement unless he could be sure that people who couldn't pay would still be able to use it. This disagreement marked the beginning of Koch's long war with the AMA.

Koch found that his refusal to collaborate with the AMA had the result that his publications were no longer accepted by the Journal of the American Medical Association. He asked for the drug to be tested, and found that the way the tests were carried out were not

in accordance with his instructions and therefore the fact that the AMA's test results were negative did not count against his use of the drug (97).

Koch used glyoxylide for more than 30 years. He repeatedly requested other tests of its efficacy to be made but until 1943 was refused.

A second trial was started in January, 1943, and continued until May, but in spite of the ongoing tests Koch was simultaneously attacked by the Federal Trade Commission. It asked a court to issue an injunction against him to prevent his advertising. However, the jury refused to convict but also refused to declare innocence.

Dr. Koch sold glyoxylide only to physicians. His work was praised in a publication from the Radium Institute of New York (98). The FDA then charged that the labels on his medicine were fraudulent because they had tested out the drug and found it to be inactive.

An astonishing aspect of the Koch therapy was its ability to cause the regrowth of tissues and organs damaged by cancer. In 1947, a book entitled *Least Common Denominator* was published by Dr. Albert Wahl in 1943 and contained a careful documentation of 150 cancer cures using the Koch therapy. In 1948 the British Columbia Ministry of Agriculture issued a favorable report of a five year study of the Koch catalyst in cattle diseases. The basic idea was broached that glyoxylide was indeed $O = C = C = O$ and provided extra oxygen which acted as a catalyst to accelerate normal oxidation.

This view was supported to some degree by the great Szent-Gyorgyi, the first person to determine the formula of Vitamin C. He stated that: "Carbonyls arrest cell division in the laboratory. If carbonyls ($C = O$) are missing, proliferation goes on (i.e., insufficient oxygen) and cancer results."

By 1946 Koch probably deserved a Nobel Prize, but his work was never recognized by the AMA and he finally retired to Rio de Janeiro to escape further harassment of his attempt to introduce a new therapy which was not controlled to the financial advantage of members of the medical establishment (98).

4.18.2 The Hoxsey Story (1840-1997)

A farmer called Hoxsey in 1840 had a horse which had developed a cancerous sore. The horse was put in a pasture to die. It was observed to eat grass and herbs from a particular part of the field, - and cured itself. A descendant of the original farmer, Harry Hoxsey, made extracts from the herbs the horse ate. They resulted in a tonic taken orally with a red salve and yellow powder applied externally (99).

Hoxsey was approached by representatives of doctors who offered to carry out professional trials but only if he told them the formulae and gave all details of his use of it to them. A further condition of the trials was that Hoxsey would close down his activities for 10 years and *after* that he would get 10% of profits being made by the use of his medicine. Hoxsey refused the offer.

In January, 1916, the AMA published an attack on Hoxsey although he had been curing people in Dallas for 20 years (100). Eventually, Hoxsey was forced by the Establishment to shut down his treatment center and move to Tijuana with his head nurse, Mildred Nelson. The clinic exists and is called The Centro Bio-Medico (101).

A project to test out Hoxsey was started in the MD Anderson Hospital in Houston in 1997, and is still ongoing (2004).

4.18.3 Krebiozen: A Drug Suppressed (1930-1973)

Durovac in Serbia in the 1930's found that horses grow cancers in the neck but some horses recover. He inoculated the horses with extracts from the cancers, and extracted a small quantity of a material which he took to be the vital factor. He found rapid clearing up of symptoms in horses which were injected with this material (102).

There was then a quarrel about the distribution of the rights to Krebiozen. Durovac was told that if distribution rights were not given to two specific business men, Krebiozen would be discredited. A negative report was put in the Journal of the American Medical Association. Then, a major report on Krebiozen was prepared by the former head of the AMA, Dr. Ivy, but it was refused publication, because it was positive. Finally, Durevac fled to Switzerland in fear of persecution by the IRS. By 1973, Krebiozen was outlawed in all states of the United States (102, 103).

4.18.4 DMSO: A Successful Drug Only Available Outside the USA (1960-Present)

Stanley Jacob, in the 1960's, found that DMSO had stimulating effects upon the mobility of paraplegics. In 1980 Morton Walker reported on the basis of tests on dogs that DMSO protects nerve cells. Burns become less painful if treated with DMSO. Rheumatoid arthritis sufferers, treated with DMSO, found they could move their limbs. Seventy-seven percent were cured of rheumatoid arthritis and 84% of osteo arthritis (104).

Cancer was treated successfully with DMSO by an orthopedic surgeon,

An international symposium on the successful therapeutic use of DMSO was held in Berlin in 1984. However, the FDA turned DMSO down because they said there was a danger to the eyes in its use. The FDA then put out negative stories about DMSO so that doctors were afraid to use it. It turned down requests for tests of its use in arthritis treatment. After the situation had been made on the TV program called "60 Minutes" in 1980, arthritis began to be treated with DMSO in Tijuana, Mexico. By 2002, about 6,000 people have been treated with intravenous DMSO in Brazil (105).

Why are Americans not allowed to have the use of this drug?

4.18.5 Colostrum: A General Path to Cure (1985-Present)

Colostrum is the milk of cows for two days after the birth of their calves (106, 107). Experiments with rat cancer have suggested colostrum is effective in curing this but the effect of colostrum as cancer in humans was not at first attempted.

Colostrum has been shown to be 72% effective against arthritis.

USDA carried out tests and (somewhat unexpectedly) found colostrum to be no good at all! The FDA would not give a permit to a certain Herb Struss to market the immune milk. A farmer who had been the originator of the idea of using colostrum (H. G. Sanders) was arrested in 1993 for practicing medicine without a license. A mistrial occurred: the jurors could not reach agreement (108).

However, in spite of this rocky (and typical) treatment, during the 1990's, research was funded on colostrum and it has been confirmed, - as Herb Saunders had suggested in 1985, - that it does have strong curative properties (109).

Experiments are now (2003) ongoing with the object of assessing the effects of colostrum on obesity, heart disease and cancer (c. Wright, 109; Rosenberg, 110; *Business Week*, 111)).

4.18.6 Gaston Naessens and a Battle Against the Present Paradigm in Cancer

Naessens built a particularly sensitive microscope with which he was to be able to see specific organisms in the blood of patients having cancer.²⁶ On the basis of this work, he developed a potion called 714X which strengthens the immune system. Persecuted in France, Naessens moved to Canada (112). The American Cancer Society immediately put 714X on its black list (113).

A trial of Naessens took place in Canada in November, 1989. The first day looked bad for him because an early witness stated that 714X had no effect on cancer in dogs. It turned out that this investigator had injected into the tumor and not into the lymph glands, as Naessens had instructed. However, a doctor from France flew to Quebec to offer support for Naessens. He explained that 714X acts to strengthen the immune system. Many positive witnesses followed this French doctor and the jury gave a not guilty verdict. By 1992, 200 doctors in Canada were using 714X. In 1996, 2,000 Canadian doctors were using it.

Naessens is a Galileo and his treatment probably represents a lead contender in present developing cures for cancer. It is not possible to purchase 714X in the USA, for the successes in Canada are not recognized here!

4.18.7 Hydrazine Sulphate and Straight Suppression (1968-1983)

Stopping angiogenesis is good. But, so is stopping gluconeogenesis (114). This term refers to the liver processing molecules to produce glucose. In 1968, a Dr. Gold published a paper which reasoned that if one could stop gluconeogenesis, then you could stop CACHEXIA, the wasting away process in cancer which kills 70% of cancer victims, could be stopped. Thus, cancers use up glucose intended to be the source of energy for the body, and therefore the body wastes away. Gold had learned from a biochemist, Paul Rex, that hydrazine would knock out enzymes in the liver needed for the processing of glucose. Gold was funded by the National Cancer Institute from 1973 to 1976, but when he reported that he had reached success in inhibiting Cachexia in humans, the National Cancer Institute canceled his grant.

It had been found that hydrazine is a powerful anticancer drug.

In 1973 Sloan Kettering and the Syracuse Cancer Center had a joint project to test out Gold's idea. But, Dr. Ochea who was in charge of the Sloan work used at first only one mg/day instead of the 60 mg/day recommended by Gold. It seemed that Ochea wanted to prove hydrazine ineffective and he published his results although he had been told by Gold that he was using an insufficient dose (115). On the basis of Ochea's results, and in spite of Gold's correction, Sloan Kettering put out a report indicating that the drug was a failure (115).

However, Russian research came in here and reported that hydrazine led to a cessation of cachexia. The National Cancer Institute (NCI) promptly published a paper contradicting the Russian work. By 1978, 5,000 patients had been treated with hydrazine with hundreds of physicians using it. But, when Gold applied to the National Cancer Institute for a grant to fight cachexia, the application was turned down.

In 1983, Dr. Chlebowski, from Russia, reported the use of hydrazine was successful in reducing cachexia (116). Again the NCI published a paper saying that hydrazine was

²⁶ An improved version of the original microscope was produced in 1999.

ineffective. The FDA then delisted hydrazine and therefore made its use by doctors more or less impossible. This situation needs congressional investigation (117, 118).

4.18.8 The Victory of Dr. Stanislaw Burzynski (1950-Present)

While still in Poland, Burzynski found peptides to interact with DNA and prevent cancer spreading (119). He called these peptides aminoplastons. Burzynski regarded their mechanism of causing a reprogramming of cells which had become programmed wrongly.

In 1977, after Burzynski had moved to the USA and reported success, the Twelve Oaks Hospital at which he was working refused permission to do any further tests! In 1978, the Harris County Medical Board investigated Burzynski on the grounds that he was making his own chemicals (sic).

After that, there was a general and sustained attack on Burzynski, orchestrated by the FDA (119). Several prosecutions were made on the basis that he was using drugs which were not approved by the FDA. This battle is still going on (2003) but there is now much evidence that aminoplastons do work in more than 60% of cancers. Furthermore, aminoplastons are not toxic.

At this time, Dr. Burzynski runs a clinic in Houston and is available to persons able to pay (or get paid) his considerable fees (120).

4.19 THE MECHANISM FOR SOME CANCERS

A mechanism of carcinogenesis has been derived by Haley and differs from the idea that cancer is caused by damage to the DNA. The mechanism which Hailey favors arises from work published up to 2001.

Thus, he sees a cancerous situation developing when a large highly absorbing molecule attaches itself to a membrane surface in the body. Carcinogens are primarily polycyclics and would cause an energized state of the membrane as a result of their adsorption. When these molecules attach themselves to a membrane, oxygen cannot enter the cell and reach the mitochondrion where the mechanism of the oxidation of glucose occurs. In the absence of oxygen, the glucose in the cell undergoes fermentation and forms lactic acid. The cell pH then drops to 6.5.

In the slightly acid medium the DNA loses its positive/negative radical sequence. As a consequence, amino acids entering the cell are changed. Haley suggests that this causes RNA to be altered and the cell loses its normal replication mechanism. Chromosomal changes ensue.

4.20 OBSTRUCTION TO NEW METHODS OF CURE

The FDA seems keener to protect Americans from certain nontoxic drugs as well as from the toxic ones. Haley reports that he has made a plot of the number of the National Cancer Institute employees and finds it correlates with the number of deaths due to cancer (121).

In the 19th century there was little heart disease and little cancer. Now, the USA is 16th in lifespan among countries! Infant mortality statistics have improved but are lower in Cuba than in the United States.

Healthy life expectancy has Japan as number 1. The USA is behind all the European nations, Canada and Australia. The US health system is #37, largely because of the financial barriers which it imposes on those who wish to use it.

Haley says that his study gives much evidence which indicates that censorship and suppression of health-giving measures occur as a result of actions of the FDA.

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CHAPTER 5

EXTRA SENSORY PERCEPTION (ESP)

5.1 DEFINITION AND EXTENT OF THE FIELD

Scientific investigations of paranormal phenomena ("Phenomena which appear to exist, independent of, but in parallel to, those observable through the five senses"), have been pursued by physicists and scientists from other fields for more than a century (1). ESP, or Extra Sensory Perception, is within the broader field of paranormal phenomena. The term was introduced by J. B. Rhine in the 1930's (2) and refers to:

Telepathy,
 Clairvoyance, and
 Precognition.

Telepathy is the most studied of the paranormal phenomena. Its occasional occurrence is also widely recognized among the general population. It concerns information exchanged between two or more minds without the use of the ordinary senses.

Clairvoyance and/or **Remote Viewing** refer to phenomena in which knowledge of happenings is received from a distance beyond the range of the ordinary senses. The scene viewed is sometimes time shifted. Remote Viewing is similar to clairvoyance, but is used to refer to experiments in which viewers position themselves at particular spots on the earth and attempt to transfer an image of what they are seeing to a distant receiver (generally a sensitive), but it is also used to "view" hidden pictures, so it is essentially the same as clairvoyance. Correspondingly, the receiver attempts to view far off scenes, sometimes of places defined only by coordinates on a map.

Precognition refers to information obtained about events which have not yet occurred.

These three paranormal phenomena have been subject to more scientific examination than other phenomena which cannot be understood in the normal way, e.g., Near Death Experiences. For this reason, they stand out and are grouped together under Rhine's term, ESP. The importance of the scientific studies of these phenomena lies in the fact that none of them (but particularly precognition) can be understood in terms of the present paradigm of science. They lend themselves much more to systematic scientific study than do other paranormal phenomena such as hauntings. Scientific proof of their reality make less incredible a number of other phenomena (for example, psychokinesis or distant healing), where the degree of scientific study is as yet varied in quality if not in quantity (2a).

Among paranormal phenomena outside the limitation of Rhine's ESP are:

Mind-Matter Interaction: Phenomena in which concentration of thought by an experimenter causes some change in the function of an inanimate object or system. Such phenomena are sometimes called psychokinesis. For example, some persons appear to be able to make a pendulum go slower or faster by willing it to do so. Very extensive data on the effect of the intention of an observer on the functioning of a random event generator have been published from the Princeton Engineering Anomalies Research Laboratory (3) and elsewhere.

Mind-living Organism Interactions: The concentration of rare experimenters upon a live organism may bring about a change in it. These phenomena embrace the large area of psychic healing, now officially practiced in the UK as an alternative method of medical treatment (4).

Field Consciousness Effects: This is a recently conceived field (Nelson, 1996) in which an ordering effect is noted in the behavior of an otherwise random event generator when it is in the presence of a large group of people the attention of which is manifestly concentrated on one subject (e.g., the verdict in the O. J. Simpson trial) or Y2K or the 9-11 tragedy.

Apparitions and Ghosts; Hauntings: The first two terms are often taken as synonymous (5). However, "ghosts" refer to the appearance of deceased persons whereas "apparitions" include the appearance of a living person at a place away from the physical body.

Hauntings refer to the appearance of ghosts and other anomalous events repeatedly in a certain location.

Possession is a phenomenon in which an individual's body appears to act as though it were being controlled at certain times by another personality (Spirit?).

Poltergeists ("noisy spirits"): Psychokinetic phenomena of a random kind, often involving violent movement of heavy objects, particularly furniture, by unseen operatives (5).

Poltergeistic events are paranormal in character and are not connected with the direct physical participation of a living being. However, they are usually associated with the presence in the building of a troubled adolescent.

Ouija-Board Information Transfer: Some persons experience a feeling that their writing hand is being taken over and "writes" in a sense independent of the volition of its owner (6). The content of such writing sometimes gives information apparently coming from a source outside the mind of the person whose hand is writing. In extraordinary cases whole novels describing life in different eras of the past have been written in this way (7).

Mediumship: A medium is a person who puts herself into a trance state during which it appears that a dead person takes over her vocal chords, sometimes, the expression on her face. The "possessing entity" can sometimes take part in intimate conversations with those present with whom it has had an emotional bond when alive. Information may be forthcoming, some of it unknown to living persons.

Channeling is a term used in more recent times for activity akin to that of mediums. The channeler purports to be receiving information usually from an alleged discarnate entity (8).

Although the evidence indicates that some mediumistic phenomena are genuine (G. M. N. Tyrell, loc. cit.), the area has been damaged by fraud and hence has low credibility. The "power" of a medium appears from time to time but many mediums cannot "switch on" at a given time. Asked to perform at a specific time, a medium may find herself bereft of her avowed abilities. There thus arises the temptation to cheat - or lose the fee she may be charging.

Out of the Body Experiences: Some people report that they have "left the body" and travelled to other locations, some far off, before "returning" to their bodies. This is an area in which a small number of scientific experiments have been carried out and some of these appear to support a literal acceptance of the claims (9).

Near Death Experiences: Since the mid '70's, it has become possible by novel medical procedures to resuscitate some persons who have come near to or undergone clinical death. Around 5% of such people give a detailed account of an apparent interlife. The accounts of children, atheists, christians and hindus (perhaps others) contain sufficiently

similar material to suggest that a common reality is being described (Ring (10), Lorlmer (11), Blackmore (12)).

Survival: This refers to the question of whether, after death, some part of the formerly living personality has an independent existence. Thus, this, the oldest (and perhaps the greatest) question, has been receiving sustained intellectual investigation (usually by scientists) since the early work of the London-based Society for Psychical Research in 1882 (1).

Reincarnation: The idea that, not only is there something remaining over after death but that this entity (with memories of a previous existence) is the essential substance of a new individual. This is one of the older ideas of mankind, but since about 1960, it has been subject to intense scientific investigation on a world-wide scale (cf. Stevenson's work at the University of Virginia, cf. Chapter 8).

Psychic Virtuosos: As briefly reviewed in Section (9.3), there are very rare human beings who possess powers similar to those alleged to have been in the possession of magicians who appear in legends. Several of these have been examined by psychiatrists and parapsychologists. Among these are Sai Baba, an Indian Holy Man who lives in Parapuri Allegre, 200 km west of Sao Paulo, Brazil. The reality of the astonishing (miraculous) phenomena associated with each of these men appears to have been established by modern observers (Haraldsson (14), Pulos (15)) using recordings and photography. At this time which nothing unusual is guaranteed.

Most of the phenomena named here (an incomplete list) have been known, and accepted as a part of Reality by most civilizations for millenia. In the West, the reality of paranormal occurrences has been largely suppressed during recent centuries, because it is inconsistent with the developing materialistic paradigm in Science. It was not only that this new paradigm explained so much (e.g., the planetary orbits, the nature of light) that had lacked understanding but its transforming influence on engineering (e.g., railways, telephones) implied that a clockwork, predictable, materialistic Universe was a reliable truth, which pushed out reports of happenings that could not be encompassed by it and which generally involved abnormal individuals and sporadic happenings. Thus, the Western world was being changed from the 17th century beyond measure and, in the 19th century view, - unambiguously for the better. The existence of those (e.g., "witches") who could move things without touching them, see the future, - is put forward in public discourses as part of an unenviable past. Although almost half the U.S. population believes in ESP, and precognitive dreams are recognized, one can easily look outwards to see the wonderful products of Science and think of the occasional seeming contradictions as mere dreams.

5.2 REPRODUCIBILITY UPON DEMAND AND REPEATABILITY

One of the demands by scientists in forming an opinion about the reality of a claimed phenomenon is reproducibility. Scientists ask that the effects be reproduced "under proper laboratory conditions", which (for paranormal phenomena) usually means persuading the psychically-active person to undergo tests using instruments strange to him and do so among experimenters who usually exude a hostile atmosphere, and suggest fraud if abnormal phenomena are observed.

Usually, people who sometimes manifest paranormal effects cannot do so reproducibly, i.e., paranormal phenomena are seldom reproducible at a certain time. Their

manifestation is said to be dependent on an acceptive atmosphere, whereas the skeptical scientist exudes an air of disbelief.

However, a number of natural phenomena exist in which reproducibility upon demand cannot be obtained although the phenomena (sporadically observed) are accepted by scientists. Examples are Ball Lightning and most meteorological happenings. Many phenomena in psychology, sociology and medicine cannot be switched on and switched off, as can experiments in, say, chemistry. An investigator has to wait until they occur, - under their own conditions, - and then observe them with as little interference as possible.

The difficulty of demanding that the psychic perform at a given time¹ is a greater one than that of performance in a given place. However, in evaluating the significance of this, one should ask one's self about the performances of other creative workers, - say, a poet. It would clearly be unproductive to tell a person who maintained she could produce good poetry that she must come at 10:00 a.m. the next day to be critically examined (electrodes attached to her head and visual and sound equipment in operation) while she is asked to begin to write poetry when told to at 10:15 in the presence of a number of staring, hostile people! The same would apply to creative workers in general, e.g., singers, artists, authors. They have to wait for the mood to come. It is less likely to come if they are surrounded by a group of examiners, expressing doubt as to their ability to perform while glaring at the subject and telling her to, e.g., "go on, compose."

Examination of the reality of reproducibility as a criterion of acceptability in scientific work shows that there is some hypocrisy about the demands scientists make for reproducibility-upon-demand in the examination of psychics. Thus, Bozarth and Roberts (17) surveyed 1,334 articles in conventional psychology journals and found less than 1% had carried out repetitions of their experiments! Correspondingly, H. Collins (18) studied the scientific literature in general and discovered that replication was rare.

Again, hypocrisy in demanding reproducibility is shown by particle physicists, in particular. Thus, in research on the omega minus particle, 200,000 attempts were made to find it and when three attempts out of this large number were found to be positive, its existence was considered proven (Barns, et al., 1964) (19).

There is another way of establishing the reality of phenomena which are not reproducible upon demand. This is to ascertain if they are repeatable, in independent laboratories using different workers in different counties. For example, in chemically assisted nuclear phenomena (Kozima (20), Mizuno (21); Beaudette (21a)), there is still a difficulty in replication on demand. When wires (instead of thin films) are used as electrodes, only one experiment in five may prove eventful. However, the same results, - albeit with the same poor reproducibility, - are reported the world over, i.e., the phenomena are repeatable.

A last point concerning repeatability and reproducibility: the question is, by whom? Clearly, the experiments must be carried out by people "skilled in the art." When one says that a certain experiment using a cyclotron in nuclear physics is reproducible, this means that a few hundred workers, with at least ten years training each, and taught by practical experience the necessary techniques and machinery, are able to reproduce results under well known and established conditions. When dealing with paranormal phenomena, the

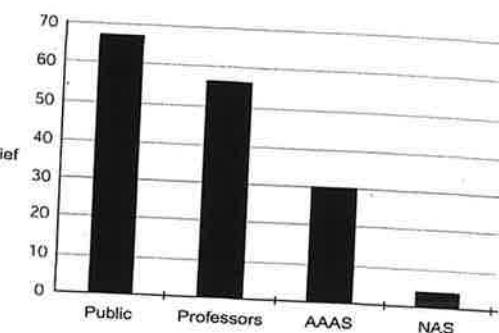
¹ The remarks made here apply in a general sense to the investigation of psychic phenomena. However, some psychics have submitted themselves to laboratory investigations (cf. D. I. Radin, *The Conscious Universe*, Harper Collins, 1997) (16).

conditions for success in research are less well known. However, the limitation that only a relatively few (highly trained) experimenters have success in carrying out experiments is found in all branches of Science.

5.3 WHY SCIENTISTS DO NOT READ THE LITERATURE CONTAINING THE SCIENTIFIC EVIDENCE FOR ESP

Although about two-thirds of the public accept the validity of ESP, and professors of all disciplines at universities give rise to a score of 56% in favor, there is a drop off to 30% when it comes to members of the American Association for the Advancement of Science (membership: only open to scientists with an outstanding publication records) (Fig. 5.1).

Fig. 5.1. Percent of belief in the reality of psychic phenomena for various groups in the community. AAAS = American Association for the Advancement of Science. NAS = National Academy of Science. Reprinted with permission from Dean Radin, *The Conscious Universe*, Harper Collins Publishers, 10 East 53rd Street, New York, NY 10022, published 1997. Reprinted by permission of Harper Collins, Inc.



For the elite scientist, i.e., members of the National Academy of Science, however, the number of those who accept the reality of ESP is reduced to c. 4% (See Fig. 14.1, Radin) (22). Within Science faculties at the University, admission of an interest in ESP marks one as "peculiar" ("credulous fellow, believes anything") and is a good way to reduce the possibility of tenure.

Why is the acceptance of psychic phenomena so low among leading scientists? The first reason is ignorance of the extent, quality and longevity of scientific work in the field. It is little realized among scientists that there are several professional journals, published in the UK and USA (23), in which the authors of the papers (all of which have been refereed, and survived a high rate of rejection) are exclusively scientists, in particular physicists, engineers and psychologists.

Although a small number of scientists may be aware of (and may be impressed by) the work going on at, e.g., the Princeton Engineering Anomalies Research Laboratory (PEAR), what is missing is the realization that highly scientific work on some areas (in particular, survival research) has been published since the foundation by several academics of the Society for Psychical Research in London in 1882. Systematic work in ESP, largely by university researchers, has been published in the US from 1884 onward.

Thus, the first reason for the rejection by most scientists of the validity of claims relating to ESP and the other paranormal phenomena is their ignorance of the available knowledge and the abnormally high scientific standards involved in the work. However, there is another reason behind the refusal to look. It is that the results of many of the ESP phenomena have implications inconsistent with the present paradigm in Science, so that their acceptance would be equivalent to pulling the house down. When the British explorer Cook arrived in Tahiti, the natives would not believe the existence of what to them were

unbelievably gigantic ships, until they touched them. The attitude of most scientists with respect to ESP at this time is that they are afraid to touch it. To read scientific publications on ESP which confirm the reality of, e.g., precognition, is too disturbing to the world view which at present exists among scientists. How to continue to *believe* in the present paradigm if one accepts the reality of such gross contradiction as verified claims of knowledge of the future?

It is encouraging to report that there are cracks in the wall surrounding the materialistic paradigm of science at 2004. They originate in studies of the meaning of the Quantum Theory some of which have led (Wigner (25)) to the hypothesis that the Consciousness of the observer affects the results of systems in the quantum region. Such a hypothesis may decrease the strength of the materialistic aspects of present Science. In fact, a few authors (26) have seen in the trends of post 1950 physics an approach to some of the concepts of Eastern Mysticism. An excellent example of a physicist who has come in from the cold is Stapp. Another is Nobel Laureate Josephson, at the Cavendish Laboratory at the University of Cambridge, UK.

On the other hand, just as quantum physics is tending to move away from the paradigm originating in the work of Bacon and Newton in the 17th Century, biologists and some psychologists are tending to move towards the reductionist position of present. It may be that a counter movement here will result, when studies of more easily observed paranormal phenomena such as Healing at a Distance (28), the Placebo Effect or Possession (29), are seen to show that these phenomena occur, and are not illusions of deranged personalities.

5.4 REAL DIFFICULTIES IN EXPERIMENTAL WORK ON ESP

Experimental research on ESP is difficult and often frustrating for those who attempt it. Some of the reasons follow:

(1) Any accredited research scientist entering the ESP field will experience intense criticism from colleagues and friends. It will be put to him that doing such work will make colleagues question his sanity, that it will harm his career. It will be suggested to him that he is not only doing something irrational, but that he may be involving himself in superstitious nonsense and even fraud.

Correspondingly, there is little money available for the employment of those who wish to do research in the field. The US government will give none publicly (though in Communist times, there were funds for the investigation of paranormal phenomena in the Soviet Union) and the hope is mainly in benefits from a few foundations. Writing in 1984, Professor R. Jahn (30), - Head of the Princeton Engineering Anomalies Research Laboratory, - thought that there might be as little as \$1 million in support for the field in the US. At 2004, it would be difficult to support an estimate of \$2M. Thus, a person, - well versed in the literature of ESP - finds it difficult to find a job available in that field. (There is now some NIH funding for distant healing research).

(2) Examining ESP needs a sifting through of the population to find "sensitives". Showing psychic ability (like the star quality among athletes) is a seldom encountered property. "Sensitives" may be found, but in tiny fractions of the population, depending on the ESP activity demanded.

(3) The Fading Out Effect. One of the more frustrating aspects of the psychic and some other phenomena is that an effect, - first noticed anecdotally, - will show up well on testing systematically, but, - as the tests go on, - the psychic's ability begins to fade. It

seems that there is also some kind of epoch-effect in that, - for half a century, say, - a certain kind of paranormal effect will be in evidence but, as the years go on, the phenomenon can be seen less and less. Although some of these changes may be ascribed to the imposition of tighter controls, there seems to be some cases in which the earlier work was well instrumented, - but, that, later, there is little to measure (though other fields of study may have opened up).

John Beloff (1) has vividly described this fading characteristic. He suggests that nature has its normal character, - the world familiar to scientists, - but, then, there comes a tear in the fabric of this reality and another reality can be glimpsed, - but it is as though the tear gradually mends and we are back in normal life, wondering what we have seen.

4. Dependence on Mood of the Subject. As with other creative activities, psychic ability among most sensitives is mood dependent. Even psychic virtuosos such as the Brazilian pharmacist Thomaz Greene Morton (15) may tell observers "The strength is not with me now."

People who can be sometimes psychically active are poorly affected by the presence of a critical atmosphere (1). Thus, instrumented laboratory testing is not a productive milieu in which to observe paranormal activities. The best way is to act casually as if there were nothing to observe or bother about; even to introduce an air of levity and inconsequence, - whereupon - perhaps, - one can see and (indirectly) measure what has been reported anecdotally.

Of course, such conditions are eschewed by the scientist critically examining a sensitive, and those few sensitives who agree to submit themselves to testing (EEG monitored, skin resistance followed, etc.) often fail to produce the anomalous effects which some will claim to have observed under informal conditions. Of course, this gives rise to the critic's response that "when properly tested, no abnormal effect is seen", - because there are less abnormal effects to be seen under the conditions and atmosphere of the laboratory. Experienced psi researchers know that a critical, doubting, atmosphere is not a good way to bring about the effects it is wished to examine.

(5) Psi Leakage. The suspicion that unconscious telepathy is widespread in the community makes it more difficult to draw unambiguous conclusions in some experiments on paranormal phenomena. A medium who says she is in touch with a dead person will frequently come up with knowledge which she, herself, could not have had, - and which involves, say, intimate details about the person when alive. But what if this intimate knowledge is obtained by telepathy from those who knew the subject when he was still living?

(6) It is an impression shared by some researchers in paranormal phenomena that a high intellectual status is less associated with a manifestation of spontaneous psi (31).

5.5 TELEPATHY

The experience of some kind of thought transfer from one brain to another is widespread and that is why the existence of telepathy, a term first coined by F. W. H. Myers in 1882 (31a), is the least controversial of the paranormal phenomena, at least in respect to its existence. Who has not thought of a friend, or, more likely, a relation, whereupon she is on the phone? ("What a coincidence"!).

The recognition among the public of the existence of occasional experiences of thought transfer of this kind does not prove the existence of the phenomenon in the eyes of

scientists and intellectuals. For the scientists, the attitude is that the phenomenon is not explicable² within the Science of the day and, - therefore, - that it cannot exist.³

The following brief account will be partly historical, for it remains true that, in spite of the confidence in the anecdotal occurrence of telepathy, experiments to prove it, - although dating back to the 1880's, - have not been considered compelling until those of the 1990's.

5.5.1 Early Work

An example of an early recorded examination of telepathy springs from the early 1880's and was made by Guthrie, a Liverpool magistrate (32). The experiments were rather innocent ones, though fitting their time. The experimental subject was Guthrie's teen-aged son. He was blindfolded and various objects were put down behind his back. He was successful in guessing the identity of more than half of these.

Guthrie next examined the telepathic abilities of two girls (a Ms. Ralph and a Ms. Edwards). The experiments were similar to those he had tried with his son. The blindfolded ladies were able to identify objects placed behind them. They were then asked to identify figures of a rather haphazard character drawn on paper in another room (32). About 150 trials were made and, for the first time, a frustrating characteristic of psychic phenomena is described: for the successful performance of these experimental subjects declined as the 150 trials proceeded.

The first "big splash" in the earlier literature of Telepathy research was made by Upton Sinclair in 1930. He published a book (34) describing a series of experiments carried out with his wife as receiver. He used figures of simple objects and transmitted what he saw to her, sitting in the next room. The degree of success these two had can be judged by the results shown in Table 5.1 (34).

The importance of the Upton Sinclair book sprang from the fact that Sinclair was a well known author and radio personality, a household name in the US and UK in the 1930's. People had confidence in him and therefore his book considerably increased acceptance of the reality of telepathic phenomena among US and UK citizens. The diagrams produced (see Table 5.1) were puzzlingly convincing, all the more so because the similarity between the original object transmitted and that reproduced by the receiver was far from perfect, - just what would have been expected if the phenomena were real.

A revolution in psychical research is associated with the name of J. B. Rhine (35), who carried out extensive work, much of it aided by his wife, Louise. The reason why the work of the Rhine's is so well known arises partly from the fact that they founded the first university laboratory (at Duke University) devoted to parapsychological⁴ research. Other reasons arise from the fact that this research was published over more than 25 years and that

² Particularly, after some of the characteristics of the phenomenon (particularly the independence of the signal upon distance) had been stated (33).

³ An extreme example is the statement of the eminent 19th century German physicist, Helmholtz, who is supposed to have said, in reference to psychic phenomena, "I would never believe it, even if it is true."

⁴ The term was introduced by Rhine. It referred to all the psychic phenomena (psi). He also introduced the term Extrasensory Perception (ESP) to cover the phenomena of telepathy, clairvoyance and precognition.

Table 5.1 Upton Sinclair's 1930 Experiments in Telepathy
Reprinted from *Mental Radio* by Upton Sinclair, Copyright 2001. Used by permission of Hampton Roads Publishing Company, Inc. All rights reserved.

OBJECT TRANSMITTED	OBJECT RECEIVED TELEPATHICALLY
/3	W

Rhine published several books (35) which were aimed at describing the work of his laboratory at a level understandable to the reading public (36); and - perhaps most importantly for scientists, - his work was more quantitative than that which had gone before it.

This last reason for the degree of acceptance of Rhine's work arose because of Rhine's application of work on statistics published by R. A. Fisher in the 1920's. The latter brought a quantitative character to the idea of randomness among results, and showed how

this could give rise to calculation of what would be expected in card guessing, for example, if only chance were at work. Fischer produced equations for the chance of expectation of a result enabling results of many individual ESP experiments to be judged.

Guessing cards as a method of examining telepathy research had been used by Gurney (1) in the nineteenth century. However, Rhine greatly improved the usefulness of the technique by using cards with design originated by Karl Zener (1937) (1). These consisted of a circle, a square, a star, a cross and wavy lines.

One of the original objectives of Rhine's work was to show that ESP existed throughout the population. He did not succeed in this endeavor, however, and his most successful work in card guessing was always done with rarely found sensitives (cf. the star athletes). One of these was Charles Stuart, who guessed cards with 26% probability (20% athletes). Rhine tried out the effects of being the score expected if only chance were at work). Rhine tried out the effects of depressants (e.g., sodium amytal) and stimulants (e.g., caffeine) and found a decrease and increase in ESP corresponding, respectively, to the known properties of the chemical ingested (35).

Among the card experiments was one in which Rhine would shuffle a pack of cards and then the subjects had to guess the identity of the cards as they were removed from the pack from top to bottom, the cards not having been seen by the so-called sender. Success here is an example not of telepathy (as the "sender" did not know which card had been picked up) but clairvoyance; such experiments gave rise to the realization by Rhine that distinction between telepathy and clairvoyance is sometimes difficult to make. Thus, the sender may look at a card and try to transmit what he sees telepathically to the receiver. However, the experiment described above raises the possibility that the receiver is not receiving thoughts from the sender's mind but "seeing" the card being sent by means of clairvoyance. For this reason, Rhine began to use the non-committal letters ESP for the activity present in card guessing experiments (36).

One of Rhine's most brilliant performers in card guessing was a certain Karl Linzmayer, who scored 9.9 hits on average over many trials, 5 being that expected by chance. The Linzmayer experiments again showed the decline effect and in two ways. Firstly, there was a gradual decline in Linzmayer's ESP ability over the several months in which he was subjected to card guessing. However, the Decline Effect also showed up in the individual experiments, - the subject scoring higher at the beginning of a test than towards the end.

A high score was achieved with Hunter Pierce, who scored 558 correct guesses in 1850 trials, 370 being the number expected by chance (37).

Given here then is a glimpse of the extensive quantitative work of Rhine. One of the disappointments of this work was that it had to be admitted that only "sensitives" scored well above chance. As time went on, too, such sensitives became more difficult to find (1), - but by now "ordinary" people on average have been found also to perform above chance - it just took much more data to establish this.

Rhine's use of the Zener cards was thought by some to be boring to the experimenters - perhaps this was the cause of the Decline Effect. One of those who changed the method was Douglas Dean at the Newark College of Engineering (38). Dean used changes in blood volume to provide an indication of thought transfer. As before, the sender looks at cards but they now have on them a mix of the names of people emotionally important to the receiver mixed up with names from the telephone book. With some

receivers, both types of random names were registered by the change in blood volume, but those names charged with emotion in the mind of the receiver scored more strongly.

Another technique to test telepathy was employed in work with a Czech sensitive, Milan Ryzl (39). He was able to receive using a complicated redundant coding scheme, fifteen digit numbers transmitted to him from an adjacent room. Thus, of 19,350 calls over 50 hours of work, he was able to guess 10350 times correctly, - 62%, - a very remarkable performance.

To be compared with this work in Czechoslovakia is a rich vein of work in the USSR which has gone on since 1930 (40). Vasiliev made behavior modification caused by a distant sender the center of his work. He tried to put people to sleep and was able to wake them up upon mental commands sent from a distance (41). Government attitudes in the USSR varied with time. At first there was rejection and lack of funding. Later, and particularly after news of American work on ESP became known in Russia, the work was government funded, usually in the Biology Departments of universities.

There only remains, in reporting headlines from work continuous with that of Rhine, two modern theoretical contributions. Thus, Frank Dilley (42), in 1990, focused on the question of whether telepathy existed. He favored the view that all apparent cases of telepathy were alternatively explicable in terms of clairvoyance. In juxtaposition to this is a paper by R. O. Becker (well known for his experiments on the growth of limbs as a consequence of the passage of electrochemical currents) who re-proposed in 1992 that electromagnetic radiation as the mechanism of thought transfer. This view was popular at an earlier time in the USSR. The big difficulty is the experimental fact of the independence with distance, but Becker maintained correctly that this difficulty would be diminished for radiation in the Extremely Low Frequency range (43).

5.5.2 Meta-analysis

Conclusions from research work in psychology, biology and medicine is often made difficult by irreproducibility and great variation in results among different investigations. The results of individual papers taken alone may mean little under these circumstances and a great many results have to be obtained before the trend in an effect is finally established. Of course, work on ESP - indeed in all parapsychology, - is affected by the same problem.

In meta-analysis, the need for a great number of results is met not by finding resources to fund a worldwide research program but by taking the results of many individual investigations and putting them together. It is easy to show that the magnitude of the error bars in the determination of a certain quantity is proportional to $1/n^{1/2}$ where n is the number of results.

Thus, in meta-analysis the units are not the detailed results within a given investigation, but the net result of several (often, many) individual studies (16).

One of the surprising, - and encouraging, - results of meta-analysis is the conclusion (44) that certain well known areas among the hard sciences, e.g., the study of life time in particle physics, - are no more precise than results in the soft sciences. Hedges found, on giving detailed attention to particle physics papers, that net results with small error bars were only obtained by artificial selection of results, leaving out results which the investigators did not like!

In making a meta-analysis, another foible of the experimenter has to be taken into account. Has he filed away his poor results and published only the good ones? Although

it is impractical to find this out directly, the problem can be met by a calculation of how many filed-away results averaging a null result there would have to be to change significantly the results obtained by assuming that all the results have been made available. If it can be found that this is an unreasonable number, e.g., 100 or even 1000 results would have to have been hidden for every one published, to change a result claimed, the file draw effect can be viewed as an implausible explanation.

5.5.3 Forced Choice and Free Choice Transfer

The type of experiment which Rhine carried out for so long (guessing the identity of Zener cards) is called "forced choice" and with it is associated the Decline Effect, perhaps due to boredom with the repetitive nature of the work.

Another type of experiment, two examples of which are described below, is called Free Response, which tries to avoid this difficulty.

5.5.4 Thought Transfer to a Dreaming Person

This type of experiment was firstly carried out at the Maimonides Medical Center in Brooklyn, NY, between 1966 and 1972 (45).

The sender was separated from the receiver by various distances. The receiver is allowed to go to sleep and during her sleep the sender tries to send pictures from what he is seeing. She is observed during sleep to show rapid eye movement, which is known to be characteristic of the dreaming state.

After each dream, the sleeper is woken and asked to describe the dream. Judges independent of the sender and receiver are shown what the dreamer described as seen in her dream with the target picture which the sender has been intent on transmitting to her. The judges are asked to grade everything as 0 or 1 (non-hit and hit). The chance probability is therefore 0.25.

Between 1966 and 1972, 950 dream telepathy experiments were made and the results are shown in Fig. 5.2 (16).

In the figure there is a single point on the extreme right of the diagram is the net result of all the studies taken together. Of course, the error bars (95% confidence limits) are now very small because of the great number of results analyzed.

The net result is 63% (cf Radin, (16)) compared with a chance result of 50%. Nineteen out of 25 investigations gave positive results and the possibility that this result is due to chance is one in 710^7 . The improvement of the results of meta-analysis over those of individual (often contradictory) experiments is clear and definite.⁵

5.5.5 Ganzfeld Telepathy

In this type of experiment the objective is to minimize sensory stimuli which impinge on us all, on the basis that, in their absence, it might be more possible to register the signals which may be arriving in the receiver's mind by means of telepathy.

⁵ Radin (16) observes that the results given do not prove telepathy because of the file draw problem, although in many investigations the number of neglected results needed to interfere with the result obtained by neglecting them, is too large to gain credence.

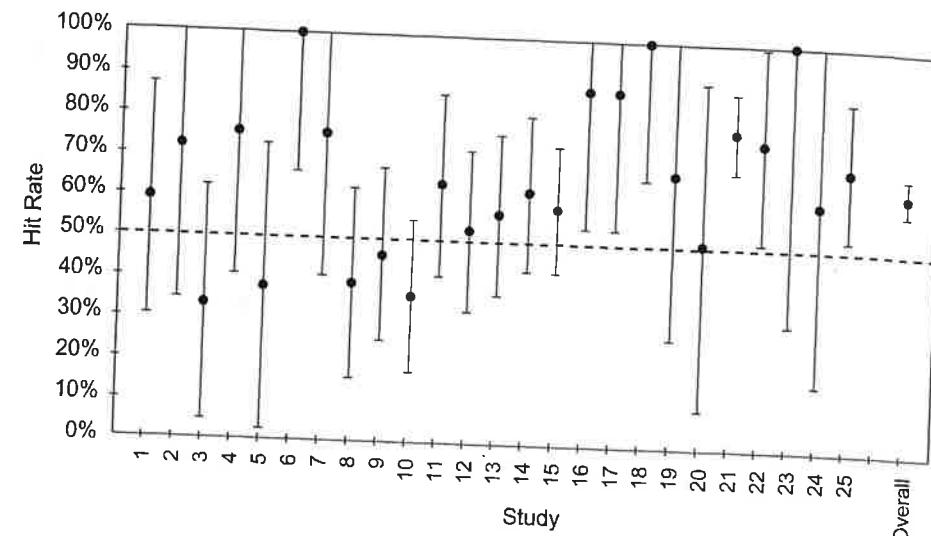


Fig. 5.2. Meta-analysis of transfer to sleeping person of thought-pictures by waking sender. Reprinted with permission from Dean Radin, *The Conscious Universe*, Harper Collins Publishers, 10 East 53rd Street, New York, NY 10022, published 1997. Reprinted by permission of Harper Collins, Inc.

This technique was pioneered by Braude and Braude (1973) (46), at the University of Houston. Charles Honorton and S. Harper (1974) (47), at the Maimonides Center in New York and Adrian Parker (1975) (48) at the University of Edinburgh, UK, have developed it in subsequent studies.

The receiver is confined to a sound proofed compartment, two half ping-pong balls covering her eyes. Her electroencephalographic characteristics are followed (sometime, but not necessarily) and she receives gentle white noise through ear phones.

Outside the receiver's compartment is the sender who has one of a group of four cards - or video chips in modern tests - selected for him by computer (i.e., the chance hit rate is 0.25). The sender tries to transmit the selected card to the receiver. An individual experiment lasts for 30 minutes. A direct hit ("1") is scored if the receiver is considered by independent judges to have picked the target card sent to her. Other choices are scored zero (See Fig. 5.3) (Radin, (16)).

Between 1974 and 1997, 2,549 sessions were obtained. It can be seen from the figure that the meta-analysis result is about 35% compared with a chance expectation of 25%.

Analyzed in this way, the Honorton results can be said to be repeatable and, together, with those from the Dream Experiments, appear to prove at a scientific level, the existence of telepathy. Thus, the work done before the meta-analysis results were begun in 1974 were strongly suggestive but the post 1974 work with meta-analysis has raised the evidence for telepathy to a higher level. The evidence very strongly indicates the existence of the phenomenon - in unselected volunteers - i.e., not special subjects.

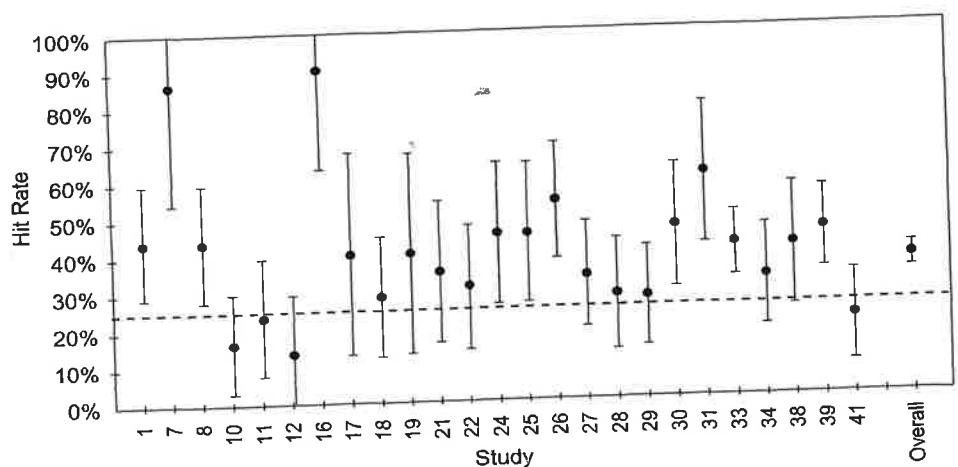


Fig. 5.3. Gangfeld's experiment in telepathy. Meta-analysis of the results of Honorton, 1989. Reprinted with permission from Dean Radin, *The Conscious Universe*, Harper Collins Publishers, 10 East 53rd Street, New York, NY 10022, published 1997. Reprinted by permission of Harper Collins, Inc.

5.5.6 Psychic Phenomena among Animals

A telephone survey carried out by Rupert Sheldrake (49) found that 48% of dog owners and 33% of cat owners thought that their pets responded to their thoughts.

The most frequently observed phenomenon is action by a dog to show that she anticipates the arrival home of her owner. The animal waits at the door or window about 10 minutes before the homecoming. Experiments carried out by Sheldrake establish that the phenomenon is independent of the time of homecoming, i.e., it is not caused by recognition of a routine.

Sheldrake reports other observations which suggest animal precognition, e.g., behavior by a dog when the owner thinks of taking him for a walk.

These observations should be considered along with the facts of bird migration. In the case of pigeons, they come home to the original loft, although their sense of smell has been removed and they have been taken to a strange spot in a cage in a closed van.

5.5.7 Clairvoyance

In telepathy, there is a sender who exchanges a message to another (or other) mind. In clairvoyance, the recipient receives information from a place or scene or hidden target under circumstances which preclude normal explanations. There is no *intentional* sender (49a).

Spontaneous cases of clairvoyance often involve crises or occur in dreams. Remote Viewing is a modern term, meaning non-spontaneous clairvoyance under contrived conditions, usually of a far-off scene.

However, clairvoyance is an old phenomenon. In the Bible and particularly in Greek history, one sees that persons of high rank were confident that they could obtain knowledge of distant events so long as they could consult an oracle, - and there were many who claimed to be able to see events, e.g., in other lands.

For example, it has been recorded that King Croesus (d. 546 BC) decided he would find out which Oracle could *really* know what was happening in another country (important knowledge for military planning). He sent messengers to oracles in six different countries. Each was asked, at a certain day and time, to tell what the king was doing.

Among others, the famous oracle at Delphi, in Greece, was consulted. She sat on a chair raised within a rocky cave and at a lower level, a cauldron boiled, some of the fumes being inhaled by the oracle. Petitioners gave their questions to an assistant, who transmitted them to the oracle, who gave an immediate answer. However, she mumbled and the assistant finally interpreted her answer to the petitioner.

King Croesus' messenger arrived and asked the oracle what the King was doing now. The Oracle at Delphi began her answer while the messenger still explained it to the assistant. This is what she was heard (directly) to say:

I can count the sands and I can measure the ocean;
I have ears for the silent and know what the dumb man meaneth;
Lo, on my sense there striketh the smell of a shell-covered tortoise,
Boiling now upon a fire, with the flesh of a lamb in the cauldron.
Brass is the vessel below and brass the cover above.

This reply was taken back to Croesus who immediately chose the oracle at Delphi. He had chosen for the day of the test the most improbable act he could think of. He had taken a lamb and a tortoise, cut them to pieces, and set them to boil in a vast cauldron.

This account is part of the reason that the reputation of the Delphi Oracle has remained with us through several thousand years of history (cf. *Psychic Power*, Time-Life, New York, 1984).

Early scientific experimental work on clairvoyance was carried on in France by Richet (50). He found (in 1889) good results with a hypnotized person who guessed correctly the contents of documents concealed in envelopes.

Between 1912 and 1926, Tischner (51), a Munich physician, tested out many subjects and found some who could find concealed objects. He concluded clairvoyance to be a genuine phenomenon.

Then, in 1925, another German investigator, Gustav Pagenstecher (52), found a sensitive, Maria de Zierold, who could read in detail the contents of an old letter concealed in an envelope. Of the 38 statements which she made about the contents of the letter, 33 proved to be correct.

The last of the early results whose record is with us (1) is a Polish sensitive called Stefan Ossowiecki who was widely tested. To make the task more difficult, the experimenters concealed letters containing scribbled writing put inside wrappers and sealed going on to describe the writer!

One of the results of card guessing experiments was that cards could be guessed although they were selected later (16).

Radin (16) has published a meta-analysis of knowledge of what is inside envelopes (Fig. 5.4) from Rhine's work.

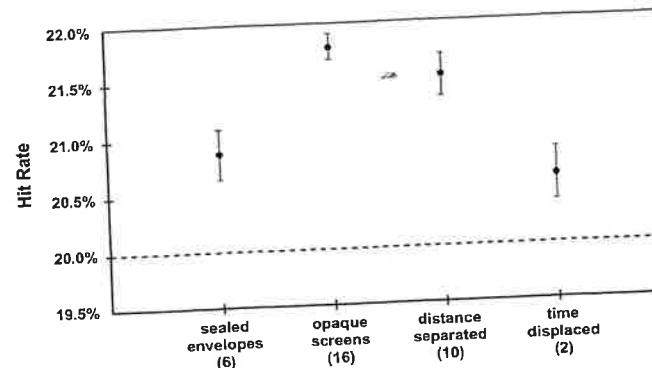


Fig. 5.4. ESP card tests. The number of repeated experiments is in parentheses. Chance would be a hit rate of 20%, as there were 5 different cards. Reprinted with permission from Dean Radin, *The Conscious Universe*, Harper Collins Publishers, 10 East 53rd Street, New York, NY 10022, published 1997. Reprinted by permission of Harper Collins, Inc.

5.5.8 U.S. Government Supported Work

The CIA gave support to Remote-Viewing experiments from 1972. The work continued, - under the sponsorship of various U.S. government bodies - until 1995. It was classified but a small fraction of it has been declassified and is described in some detail in a paper by Hal Puthoff (53), who was the first director of the work. His co-principal investigator became, later, R. Targ.

Puthoff and Targ were laser-physicists, but Puthoff's interest was drawn to paranormal phenomena by Ingo Swann, a well known psychic. Swann showed Puthoff that he could "see" the interior mechanism of a magnetometer. A most remarkable result was later manifested by Swann who showed that he could remote-view the planet Jupiter. He found the planet to be surrounded by rings, as is well known to be the case for Saturn. At first, this result was treated coolly by astronomers, because at the time there was no evidence of such rings, but when a fly by of Jupiter was made by the Voyager spacecraft, transmitted photographs showed the rings (33).

The CIA-funded work soon evolved away from the classical clairvoyance work of seeing the contents inside sealed envelopes, if opened out into targets in the San Francisco bay area (54). A comparison was made between a photograph of the actual scene and what the sensitive, stationed at the Stanford Research Institute (SRI), received (and drew). A hit was scored when independent judges, blind to the actual targets, saw sufficient similarity between the drawing and the photograph to consider them related.

The most remarkable sensitive tested by Puthoff and Targ (and government agents) was Pat Price, a former police commissioner, who claimed he had used his powers in Remote Viewing of criminals (whereupon squad cars were sent to the location seen clairvoyantly to apprehend them). Price presented himself for testing in the sound-proofed and screened room used in the SRI experiments. After some preliminary success, Price offered to find targets in the Soviet Union (this was deep in the Cold War). He was asked if he could identify hidden intelligence posts and he was able to find one in the Urals. US intelligence officers confirmed that the post Price had found did indeed exist in the location indicated.

Still more remarkable were the results of Price's Remote Viewing analysis of a secret Russian facility at Semipalatinsk. Satellite pictures had identified a series of buildings, but in particular a gigantic gantry the purpose of which was unclear. Price drew a remarkably accurate picture of the gantry. But (as reported by Puthoff (53)) he was even able to penetrate the offices of the facility, observe a cipher machine and titles on folders in the office.

Price was clearly the known star of those examined at SRI⁶, but unfortunately he died at the age of 57 in 1976. The work with Price established that certain rare human beings have the capacity to observe remote events in great detail. The estimate of rarity is about 1 in 10,000 which is not that rare. Added to results with Swann, it established that Remote Viewing could occur over great distances.

A surprising matter was the CIA's statement (at least publicly) concerning the \$20 million, 24-year investigation. The agency let it be known that, although results in the laboratory had confirmed clairvoyance, in no case had it aided intelligence work! E. C. May (56) has published a detailed rebuttal to this conclusion. The CIA's public statement appears to have been politically motivated. The senior collaborator at the CIA had a skeptical and even a negative attitude toward the work which his Agency had funded.

Further confirmation of the SRI work on clairvoyance was given from a very extensive investigation carried out by Jahn and Dunne (58). These by and large confirmed the SRI work.

5.5.9 Uri Geller

Extensive tests of this remarkable Israeli sensitive were carried out at SRI by Targ and Puthoff (33). Among the experiments, a hidden message was successfully viewed by the sensitive. However, the suspicion was that the sensitive might be receiving telepathically information from the person who prepared the hidden targets. To reduce the probability of this, an individual not associated with the work was used to prepare the experiment. He arranged ten cans, but put a target to be discovered in one only. The cans were then randomized in position and numbered.

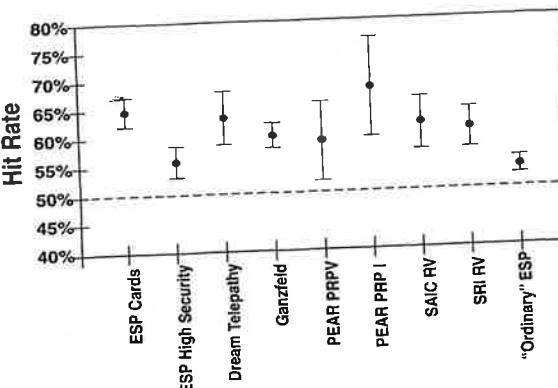
Geller was then brought into the room and asked to identify the can containing the target. He sometimes called out correctly the number of the can containing the target directly upon entering the room. On other occasions, he passed his hand over the cans. In 14 experiments he was correct 12 times. In the other two cases he could give no answer. The experiments were recorded and played frame by frame in front of professional magicians, none of whom, however, was able to explain how Geller got his results.

5.5.10 Ordinary and Non-ordinary States

Two psychologists, Stanford and Stein (1994) attempted to determine whether a Remote Viewing ability was greater among those put into a hypnotic than a normal state. A meta-analysis of results published between 1975 and 1982 is shown in Fig. 5.5; it shows that Richet's original result is confirmed.

⁶ But there were others not as well known but as effective in ability as Price.

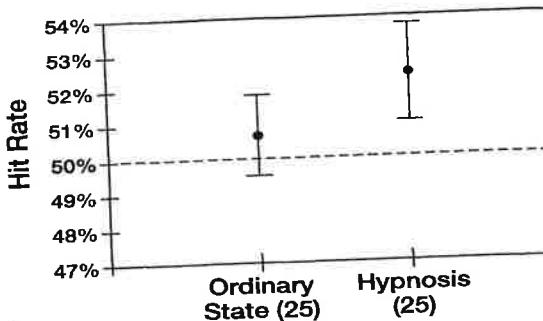
Fig. 5.5. Results of ordinary-state experiments versus hypnosis experiments in terms of 50% equivalent hit rates and 95% confidence intervals, with the number of experiments in parentheses. Does hypnosis increase Remote Viewing ability? The result is clearly: yes. Reprinted with permission from Dean Radin, *The Conscious Universe*, Harper Collins Publishers, 10 East 53rd Street, New York, NY 10022, published 1997. Reprinted by permission of Harper Collins, Inc.



5.5.11 Radin's Meta-analysis of Clairvoyance

In 1997, Radin published the results of a metaanalysis of all obtainable clairvoyance results (Fig. 5.6). The hit rate of the various types of clairvoyance experiments is 11% above chance, - when the results are cast into 50% equivalent scores.

Fig. 5.6. Clairvoyance tests. Explanatory material from Radin is printed under the figure. Reprinted with permission from Dean Radin, *The Conscious Universe*, Harper Collins Publishers, 10 East 53rd Street, New York, NY 10022, published 1997. Reprinted by permission of Harper Collins, Inc.



These results seem to indicate a significant clairvoyant effect. However, critics point to the file drawer problem although this is countered by Radin (59) who has calculated that in order to reduce the results to chance, it would be necessary to have more than 3000 results, averaging a null effect, hidden in a drawer, for each experiment recorded.

5.5.12 Remote Viewing of Atomic Structure

Two well known early investigators of psychic phenomena, Annie Besant and C. W. Leadbeater (60), who spent much time in India, wrote a book (1909) entitled *Occult Chemistry*. Part of the book concerns detailed Remote Viewing of atomic structure for which the authors claimed they had employed a yogic technique.

Recently a British physicist, S. M. Phillips (61), has published a book analyzing the early findings of Besant and Leadbeater in terms of modern knowledge of the nuclear and electronic nature of atoms.

At the time Besant and Leadbeater published their work, the structure of atoms was poorly known - and the structure of the nucleus not at all. Phillips points out that the structures of the elements derived at a date which makes telepathic transfer from a knowledgeable source impossible, - is similar to that of the present quark model of atomic

nuclei. The conclusions of Besant and Leadbeater are also consistent with modern-day string theory, according to Phillips.

5.5.13 Does Clairvoyant Ability Run in Families?

A study of a particular kind of clairvoyance called Second Sight has been made by Shari Cohn (62). The phenomenon has been anecdotally reported for centuries. It consists of the sudden vision during waking hours of a scene which may be time-displaced and at a distance. It occurs particularly in isolated communities.

Cohn found women more apt to show the ability than men. Her analysis was based on the return of forms distributed among Scottish communities. One hundred and thirty family histories were compiled partly by means of interviews (70 families). The phenomenon can be found frequently (in fact, in 20-30% of Scottish families).

Analysis of the family histories shows that Second Sight may be an inherited phenomenon. The smaller the family, the greater the tendency towards inheritance of the trait.

Neppe (63) has found evidence that psychic ability is associated with temporal lobe dysfunction and Cohn (62) has developed this view in terms of a detailed genetic analysis of several individuals and their offspring. No other model was examined.

5.6 PRECOGNITION

5.6.1 Introduction to Precognition

At present, we do not know how telepathy and Remote Viewing work. But it is only just over a century since it was realized that electromagnetic radiation occurs from an oscillating circuit and hardly more than a half century since we realized that cosmic rays (let alone neutrinos) are traversing our bodies. Thus, it is conceivable that some new form of electromagnetic communication could be found to explain telepathy and Remote Viewing. If this occurred, the explanation of the phenomena might be said to be beyond the pale, but not beyond the paradigm (62a).

Precognition, however, is a phenomenon which defies an explanation within the present paradigm of Science.⁷ Thus, one of the basic assumptions of the present scientific world view is that there is no teleology, - no direction from above. The future will work itself out in terms of the laws of nature (including the effects of a fundamental uncertainty at the quantum level) operating in terms of electrical interactions during chance encounters between the basic elements of matter (64).

Yet, precognition shows that the near future *is* and can be known now.

⁷ My eminent referee has pointed out that present paradigm electrodynamics and classical quantum mechanics are fully time-symmetric and that advanced and retarded waves are commonly known in electromagnetic theory. This being admitted, it hardly serves to interpret phenomena such as the records of those (cf. SSE Meeting of 1999) who record vivid scenes in dreams, sketch them in a diary - and then take matching photos of the happening days later. The much rarer scenes (and accompanying sounds) of past scenes are strangely complex in composition, difficult to explain as retarded waves. Rather, it is as though everything is, and we pass through it, generating our sense of time. Such a model makes more plausible the occasional hiccup of a future scene slipping back to our oncoming selves.

5.6.2 Anecdotal

There are, of course, countless tales of people who claim to be able to see the future. A typical one concerns the content of a dream related by President Lincoln. In it, the President goes into the White House and finds a coffin raised off the ground, guarded by soldiers. He asks what this is all about and learns that he is seeing the coffin containing the body of the assassinated president (65). On the following day, the president was indeed assassinated in his box at Ford's theater.

5.6.3 Laboratory Work

Much of the laboratory work here is concerned with examination of the ability of persons to predict which target (lights of various colors, ESP cards) would appear at a future time.

Outstanding in these experiments, both due to the originality of his experimental design, usually involving the use of electronic instrumentation, has been the work of Helmut Schmidt (66), a German physicist who had served as a senior scientist with the Boeing research laboratory from 1965-1969, before becoming (after work with Rhine) the director of the Mind Science Foundation in San Antonio, Texas.

In 1975, Schmidt was using β emissions from strontium 90 as a way to generate a random signal. Detection of the β particles stopped a fast clock counter 1-4, and that picked the target lamp. The experiment consisted of getting subjects (chosen at random) to guess ahead of the machine which lamp would light up next. A number of persons (about 16% of those randomly chosen) were able (statistically) to know the order in which the lamps would light before this had been selected (cf. Braude (67)).

The very remarkable psychic, police commissioner Price, who was examined by physicists Russell Targ and Hal Puthoff in 1975, was able to predict the future as well as excel in Remote Viewing. Thus, experimenters would set out from the Stanford Research Institute, drive around town, before deciding where their trip would end up. Price was able to foresee their final destination about 8 minutes before it was chosen (R. Targ and Jane Katra (68)).

Krippner et al (69) used a British psychic, Malcolm Besant, in experiments on precognition. Besant was asked to dream of experiences he would have during the following day. He was awakened when observed to be dreaming and asked for a description of the dream. In a typical case, he dreamed of being in a cold white room where he could see some blue objects. He felt chilled. The next day, Besant did have an experience in which ice cubes were dropped down the front of his shirt. Two blue forms were in the background.

Extensive experimental work on precognition was carried out at the Princeton Engineering Anomalies Research Laboratory (e.g., R. Jahn, B. Dunne, and R. Nelson) (70). One kind of experiment involved the experimenters hiding at some selected time and the viewer identifying the place before it had been decided where it would be. The time between the prediction and the happening was varied from 5 minutes to one year without any change in the accuracy of the prediction. The odds of the predictions being correct by chance is 1 in 10^{21} .

A substantial meta-analysis of precognition was made by Honorton and Ferrari (71). They examined work on precognition carried out between 1935 and 1987. The basic experiment was that in which viewers were asked to determine the order in which colored lamps or ESP cards would be chosen. The choice was made at a time of seconds to one year before the happening to be predicted occurred. The success of the results of the meta-

analysis can be expressed by the figure 10²⁵:1 against a chance cause for the predictions. The file drawer problem was examined and it was found that 14,265 results would have had to have been ignored for each one counted if the result was to have been reduced to chance. In this investigation, it was found that 37% of the participants showed some degree of ability to make correct predictions of future events.

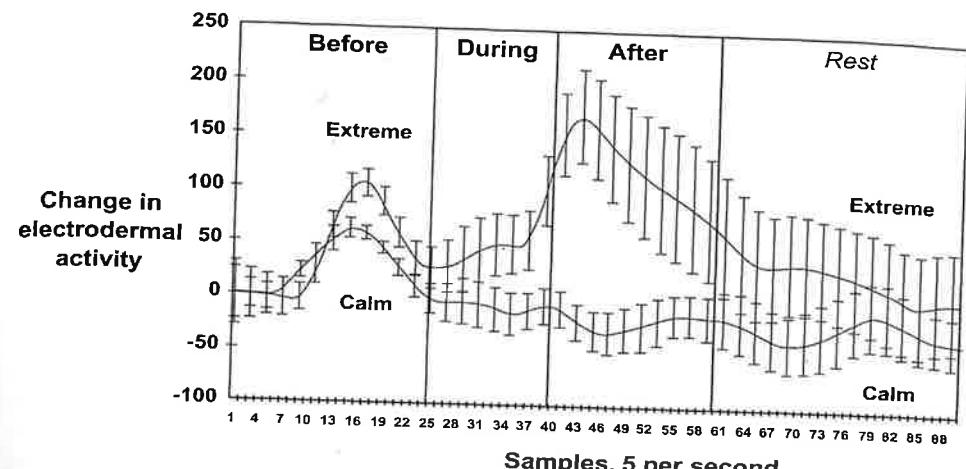


Fig. 5.7. The subject was shown a series of calming photos (Meadows, domestic scenes, children playing); or shocking pictures (sex scenes, dead people, a shootout). The subject's electrodermal reaction was understandably greater for the emotional pictures. But the point is that this greater reaction occurred *before* she knew what kind of a picture she was to see. Moreover, the future picture stimuli was not yet determined, i.e., no one knew the identity of the up-coming picture. Reprinted with permission from Dean Radin, *The Conscious Universe*, Harper Collins Publishers, 10 East 53rd Street, New York, NY 10022, published 1997. Reprinted by permission of Harper Collins, Inc.

5.6.4 Measurement of Electrodermal Activity

A technique for assessing precognitive ability in individuals was introduced by Radin (16). He set up apparatus to monitor the electrodermal properties (skin resistance) and another to measure blood volume at the finger tips. The subjects thus instrumented were shown two types of pictures. One type was of calm scenes, e.g., a farm. The other type contained emotionally disturbing material, either scenes of violence or of sexual activity. A most significant result was found. The "calm" pictures showed a change in the electrodermal property only after the pictures had been seen. However (See Fig. 5.7), the emotionally exciting pictures were sensed up to 5 seconds on average before being shown to the subjects. The subjects, however, reported that they had not felt anything before seeing the disturbing pictures, i.e., the precognition is unconscious.

5.6.5 Can Precognition Enable One to Change the Future?

Instances are known which may suggest one can. For example, a man dreams that he is in an airplane which crashes. The dream is vivid and memorable and, - knowing a little of these things, - he decides to take another flight. The plane indeed crashes but the dreamer is safe (Russell Targ and Jane Katra) (68).

The unreasonable conclusion that one may actually affect the future by reacting to a dream about it, is avoided (somewhat unconvincingly) by Targ and Katra who say that the precognition dream was about the reality of the plane crash. The dreamer put himself aboard the plane and this distorted the dream - not the future.

These works, particularly the meta-analysis of Honorton and Ferrari (71), and the electrodermal work of Radin (72), appear to prove that some human beings can predict the nearby future and that (in accordance with common experience) most human beings have unconscious presentiments of disturbing events a short time before they occur.

5.7 SCIENTISTS' INTERPRETATION OF ESP

The attitude taken in this book is to present experimental results, - the facts, - independent of any background hypothesis, of any paradigm. However, this does not seem to be the attitude taken by the majority, - of mainstream scientists. The evaluation of the facts of psi is often made firmly within the present materialistic paradigm of present science. Thus, in those whose minds are closed to the possibility that it is the scientific paradigm of our time which errs, that there could be any reality to psi, is seen as impossible. Their view is that explanations of the reported effects (which they term anomalies) must be found in a "pathology" of the experimenter.

Prior to a brief statement of this view, it may be said that there is still suspicion raised that some psi results may be due to fraud; or to the incomplete reporting of results (Alcock, (74); Hansen, (75)). Further, some studies, which attempt to reproduce studies showing psi effects, fail to find any (cf Wiseman and Smith, 1994, (76)), although there are modern studies by investigators of high repute (e.g., Targ and Puthoff (77); and Utts (78) 1995) which confirm the reality of some of the effects. As pointed out by Radin (79), meta-analysis has led to a narrowing of the error bars on results (cf Krippner et al. ((80) 1993). For example, Bem (81) emphasized effect size of psi results, obtained through meta-analysis.

The first of the explanation of psi in terms of pathology rests on the assumption that the effects arise because the experimenter is trying to enhance his Ego, in particular to overcome unconsciously perceived ideas that his scientific work is insufficient (82).

A similar hypothesis (the experimenter is trying to boost his self esteem by presenting wondrous results) was put forward earlier by Bainbridge (83).

A second line of argument is that the experimenter must be suffering from "cognitive deficit", i.e., he recognizes "hits" but does not recognize misses (Alcock, 1981 (74)).

By referring to psi as a whole, and by omitting a detailed criticism of the actual methodology in investigations of telepathy, clairvoyance and precognition, these alternative explanations tend to be too general to have much bite. None of them meet head on the central question: Do the reported effects have veridicality, - are they true? Here, again, one comes across the immense inertia of the present paradigm, and its effect upon authors, particularly senior authors firmly inside the pale, and fearful that, if they favor the view that psi results are real, true, it is not far from poking a hole in the immense body of modern science and declaring that some of the basic concepts of the present world view are not consistent with observed facts.

The suggestion that pathology in the investigator is the origin of why much data seems to undermine central scientific concepts must be given a hearing. But by now (Schlitz, Targ and Irwin, 2001)(73), it is time to move on, realizing that some published results in studies of paranormal phenomena (to say nothing of all other scientific disciplines!) may indeed be faulty; but understanding that there is a solid data base for

veridical effects in thought transfer person to person; perceptions of far off scenes by unknown means and cognition of events still to come (74a).

This conclusion acts as a firm basis for the material (less subject to statistical analysis) presented in the following chapters of this book.

5.8 SOME CONCLUSIONS

In this chapter, evidence is given to support the following contentions:

- (1) Mind to mind transfer of information can occur by an unknown mechanism which is consistent with the fact that the strength of the thought transfer is independent of distance.
- (2) There are occasionally found individuals who can access information which has no sender, over large distances and in great detail. Sometimes such information is time-displaced (i.e., the events seen today do not occur until tomorrow).
- (3) It is possible for some sensitives to know the future. The strongest evidence concerns the nearby future, but a very few laboratory experiments concern precognition of events a year in advance. Anecdotes report precognition of events several years into the future.

It has not been found possible to fit these facts into the model of physics at 2000. An explanation of precognition would need a radical change in our present view of reality.

The refusal of most scientists to study these results arises principally because they believe that if the phenomenon cannot be explained by means of present theories of science, it does not exist. Such an attitude prevents scientists from studying refereed publications on ESP phenomena (even if the authors are physicists or other physical scientists) and realizing the enhanced strength brought to conclusions by the use of meta-analysis.

The objection that many of the phenomena are repeatable but not reproducible on demand would apply to research on many subjects in, e.g., biology and meteorology. It seems that, in particle physics, the accepted conclusions of some experiments actually have a less firm basis, in terms of reproducibility upon demand, than results in ESP (17, 18, 19).

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CHAPTER 6

APPARITIONS, HAUNTINGS AND POSSESSION

6.1 INTRODUCTION

There is no doubt that of all the paranormal phenomena, those concerning apparitions and ghosts are likely to receive the greatest degree of ridicule among the general populace when their existence is seriously proposed. The non-scientist who mentions the topic will be met with an aggressive sneer. "You don't believe in ghosts, do you?" As to the scientist who refers to the subjects of this chapter as a phenomenon worthy of study, his remarks would be met by other scientists with an embarrassed silence. Out of earshot, there will be worries expressed about their colleague's mental state. In a corporate laboratory, the explorer is likely to fall in the next downsizing ("talks irrationally").

This origin of such rejection is curious.¹ Reports of apparitions have appeared during all of recorded history, in the Bible and in Shakespeare's plays (e.g., Hamlet).² But all this is swept away when it comes to attempting a serious dialogue on the topic, considered by many to consist of fantasies by the scientifically uneducated. In movies involving ghosts, the story is usually a comedy in which a ghost seems to be there by some trick but does not really exist at all.

This attitude turns out to be a well protected false front. Thus, Ian Currie (2) reports that Robert Kastenbaum, a psychologist at Wayne State University, asked 140 people concerning their contacts with the dead. Forty-five percent reported positively! Robert Morris (3) reports on his investigation of 300 widows on the same subject: 47% said they had had contact with their dead husbands. Other reports from spouses came in at near to 50%; and for a group of Australian University students (asked if they have had contact with the dead) at 40% (H. J. Irwin (4)). Many who reported to have had such experiences said they held back in admitting to them for fear of ridicule. Some of the widows thought they might be going mad.

Thus, contact with the dead is a widespread (concealed) phenomenon. Only, it is thought not acceptable to mention experience of it outside the psychiatrist's office.³

Possession is a much less well known phenomenon and generally discussed, - if at all, - in a religious context, along with its converse phenomenon of exorcism. Two films related to demonic possession: *Rosemary's Baby*, and *The Exorcist*, have been popular as horror movies, but have done little to provoke serious public discussion ("It's only a movie.").

¹ It seems that the degree of violent and emotional rejection of phenomena for which there is systematic evidence, with repeated observation of the same thing over many decades, is connected to the degree of strangeness of contradiction to the present paradigm, on belief in which so much depends.

² As mentioned by Becker (1993), Ludwig Lavater published a treatise in 1573 entitled "Of Ghosts and Sprites Walking by Night." It was written in Latin but translated by J. Dover Wilson (1).

³ What is mentionable in society varies with the period in history. In Victorian times and stretching past WWI, references to sexual matters were blanked out or referred to indirectly with lowered voices. At 2000, with science as the Religion of the West (cf. Chapter 1), it is Death and the After Life which is not mentionable. It is the new pornography. 237

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6.2 DIVISION OF THE MATERIAL

There are four parts of this chapter. The first three hang together and the fourth is somewhat apart.

6.2.1 Apparitions of the Living

Here, the apparition of a living person appears, usually, to someone with whom the appearer has emotional ties. The appearance is often willed by the person whose apparition is seen, the distance between the living person and his apparition varies greatly and can be to the next house, but also as far away as it is possible to get on the planet. Particularly during illnesses, apparitions of the living occur spontaneously in the absence of any intention by the appearer and without his knowledge.

Apparitions of the living are related to the phenomenon of bi-location (5). Although the psychic research literature contains many accounts of bi-location (6), - the appearance of a person at two separate places at the same time, - descriptions of such phenomena are to be found particularly in accounts of the lives of Christian saints, and of Indian Yogis, where the ability to bi-locate is called akasha (5). Modern examples of bi-location, can be found them in accounts of the lives of Sai Baba in India (7) and those of Thomaz Green Morton (8) in Brazil.

6.2.2 Apparitions of the Dead (Ghosts)

There are several types of such apparitions which will be described below. The frequency of appearance of dead people decreases as a function of time after death and apparitions more than 50 years post mortem are rare. They thereby differ from haunting ghosts which can appear for hundreds of years post mortem.

Apparitions appearing up to 12 hours either side of death ("Death Bed Visions") are the most frequently seen (8a).

6.2.3 Hauntings

In apparitions of the living and the dead, the location of the event is not essential to the phenomenon. It is often a matter of an emotional connection between appearer and recipient. In hauntings, the apparition seems tied to a certain place, which had been of emotional consequence to her during the most recent lifetime (8b).

6.2.4 Possession

These phenomena concern bodies which act as though invaded by a discarnate entity, sometimes benign and even seemingly playful, but sometimes of a terrifying, demonic character. The person thus possessed may still have some control over herself. They may visit, frightened, an appropriate investigator (the exorcist) who attempts to persuade the invader to leave by argument, alternatively cajoling and threatening (9).

The phenomena accompanying a demonic exorcism lead to exceedingly dramatic actions in which a possessing entity appears to fight the exorcist often at a physical level. Exorcism may not succeed. It is extremely stressful to the exorcist, who may have to work for more than 24 hours non-stop.

Exorcism of a demonic entity is usually carried out by a priest who has trained for the operation.

Exorcism is a fully modern phenomenon. Accounts of it (10, 11)) stretch over the millenia and many are described in the New Testament. Christ (and later his Disciples) "cast out devils". Today, some parishes appoint a priest who is trained as an exorcist; one of these reported in the 1990's that he had requests for help to an extent that he was constantly employed. An exorcist will never accept a case unless psychiatric examination shows that the phenomena are beyond psychiatric explanation.

6.3 APPARITIONS OF THE LIVING AND THE DEAD

6.3.1 The Entities Reported As Apparitions Are "Real"

In view of the most obvious attack upon the idea that this is a field worthy of study (and not a product of a distorted imagination), it is important to give evidence which shows that certain types of apparitions are real and not the product of hallucination. In earlier times, particularly in the theories put forward by the originators of the Society for Psychical Research in London (12), apparitions were thought to be due to projections from the sender which telepathically communicated with the receiver's mind. The latter then projected the image he had received outwards. The following characteristics of some apparitions are not consistent with this view (13).

- (1) Observations of apparitions by a third party obey the laws of perspective.
- (2) Apparitions are 3D entities and one can sometimes walk around them.
- (3) More than 200 cases have been described in which the entity is observed simultaneously by more than one person (collective cases). Animals also react to the same experience as that of the several observers (G. R. Prince, 1955) (13).⁴
- (4) Physical objects are moved by some apparitions and in poltergeist phenomena this may be heavy pieces of furniture.
- (5) There is a systematic difference between the density of apparitions. The ones appearing spontaneously vary in density from vaporous writh-like shapes, through transparent bodies, to solid-looking entities (with clothes), which, however, usually show no resistance to an instrument pressed against their bodies. On the other hand, apparitions of the seance room, associated with a medium, may be solid to the touch and can make finger marks in molten wax before they disappear (15, 16).

To balance these evidential facts supporting the reality of apparitions in a group of people observing an apparition, some may observe it, but others not. This is an example of the so-called "sheep-goat" effect. Sheep people have a positive attitude to observations in the field. Goat people are skeptics and tend not to observe the phenomena seen by those with a more receptive attitude. Do individuals possess a psychic receptivity coefficient which determines how much they see (G. R. Prince (17))?

⁴ Thus, a dog, cat and snake have all been reported to react defensively to the presence of an implied discarnate entity, by positioning themselves as though a danger came from space near, say to a certain chair. Correspondingly, in circumstances where a new haunting has been reported, a dog will stare fixedly at a given point in a garden, while barking, although a human can see nothing unusual there (14).

6.3.2 Hallucinations

Having given the evidence that the properties of some apparitions and ghosts indicate a reality outside the observer, let it be reported that in some cases, a telepathic theory is more consistent with what is "seen." Thus (15), one may see an apparition of a horse and rider. It turns out that, at the time of observation, the rider had just died but the horse was alive. Here, one must respect the original telepathic model of Gurney et al. (12). It seems (Johnson, 18) that there may be a spectrum of observations which ranges from telepathic pseudo-illusions to objective apparitions occupying space outside the receiver.

However, the model supported by Gurney et al., does not always apply to cases which do seem illusional. Thus, I am recovering from anesthetic and find that the nurse sitting by my bedside is indeed my beloved; or I am standing on the foredeck of a ship caught in a storm in the North Atlantic. The wind tears at me as I hold on, when suddenly standing beside me is the same loved woman who in reality lives thousands of miles away. In these cases, the receiver appears able to create a consciousness of her who, in Gurney's view, would be the sender.

In a similar class come sudden visions which seem entirely real and are remembered for decades. I am sitting in an aircraft about to leave a country airport. Looking out of the window, I see my very distinctive big black leather suitcase being wheeled away from the plane on a luggage cart. I ask the hostess: "Are the doors still open, - all my travel-belongings are in that case." She says, "Sorry, the doors are closed, send back inquiries from the next airport." But when I arrive there, the distinctive big black leather suitcase is among the delivered baggage..... Yet I would have made a sworn deposition that I had seen it being wheeled away.

Related to such illusions are dreams, some of which are reported in the literature to have prophetic power (R. Targ and J. Katra, (19)). They are described as particularly striking and memorable, often indicating some disaster which can then be avoided. I had a dream seemingly of this type, so clear and distinctive it remains vividly with me after 45 years. I am to fly the next day from Johannesburg, South Africa, to Cape Town. In the dream, I see my plane caught in a terrible storm, lightning illuminating the bucking aircraft as it is tossed about between storm driven clouds. But it is all too much for the wing structure which breaks off. At this time I was uneducated in psychic matters, and did not know enough to heed the dream. As it transpired, I traveled in a perfectly smooth and normal flight.

Thus, the condemnations of scientists, - all paranormal sightings such as apparitions, etc., are hallucinations, - must be heeded first, when investigating a putative paranormal event, just as experimental error and fraud must be the first reactions to a paradigm breaking experimental result such as low temperature nuclear reactions (Bockris (20); Mallove (21)). After these possibilities have been tried out and found wanting, only then it is time to examine the reported observation for possible paranormal character (22).

6.3.3 Apparition of a Living Person⁵

Mrs. L: We were building our summer cottage. Olle, one of the neighbor's boys, went away on holiday just

⁵ From I. Currie (2).

when the foundation was laid, and the house went up during his absence. One evening at dusk ... it was still light, [and] I saw [a] man ... striding obliquely over the rise up toward the house, dressed in light blue pajamas and [looking] just like Olle. The figure walked right through the spruce trees and up to the house, where he stopped, and with his hands on hips, studied the house-- and then disappeared into nothingness.

After a few weeks, Olle strolled up just the way the figure in pajamas had, but now he avoided the spruces. He looked up at the house completely terrified and burst out, "But I've seen this before!"

Olle: The L. family had just started leveling and grading for the foundation when I went away, so I had no way of knowing how the house was going to look when it was finished. One night I dreamed I was walking along the path that led up ... to the L.'s [cottage site]. In the dream, when I reached the cottage I saw it absolutely clearly ... I ... saw Mrs. L. standing on the steps as if welcoming me.

Later, when I came back from the trip, I walked over to the L.'s to chat. I was terrified when I caught sight of the cottage; it looked exactly as I'd seen it in the dream, and Mrs. L. sat on the steps. She asked me if I'd worn a pair of light blue pajamas the night I had the dream, and in fact I did. The time corresponded, too.

6.3.4 Apparitions of a Dead Person (a Ghost)⁶

One November afternoon I arrived home from school, and I noticed my grandfather in his sitting room talking to my grandmother (who had been ill). She was sitting on the couch brushing and combing her hair. She was in her nightgown and robe. I entered the room and said hello to them, and told my grandmother it was nice to see her feeling up to being out of bed. After a minute or two of polite conversation, I said I had better go do my homework. My grandmother then said, "Barbara, it would be best if you don't tell anyone I was up and that you spoke with me."

I went on upstairs and as I entered my own room it suddenly came over me that my grandmother

⁶ After I. Currie (2).

AN INVENTORY OF APPARITIONS AND HAUNTINGS

Based on multiple reports, particularly in Time Life Books, New York, 1992.

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion ?	Gender of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Old car door springs open when passes cemetaries	Day	Mechanical event	Cool F	F	Even if door roped, flew open.	General	Fair	Seems force can spring from graves?
Group students, hear motor bike comrade. When consult Ouija board, tells them go grave. Go. Find dead comrade there.	Night	Heard bike. Saw ghost.	Fear F	Ouija board.	General	Fair	Could Ouija board have been faked, and man grave human? Dead return, doing the thing for which they were known in original clothes.	
Man appears, same clothes and appearance as when he died. 40 years back. Continues to appear.. Woman finds unswept dust and sweeps up. Ghost never appears again.	1:00 a.m. (Time he used to return from work)	Seen by 4-5 independent people. Did not speak.	Cool F	Raking ashes (his?) Sent him away.	General	Good	They usually appear in former clothes.	
Girls discover old papers. Rocking chair begins rock. Then, girls see mirror which shows woman in chair with child.	Day. Ex-Exploring decrepit house	Watched rocking chair. Saw woman with child. Disappear.	Terror F	Reflection in mirror.	General	Good	Seemed as though raking through old papers woke people up.	

was dead! She had died a month earlier. My school books dropped out of my hands

Are these totally improbable experiences? So it might seem. But research shows that experiences like them have happened to an astonishingly large number of people (21a). Here are two further examples.⁷

Apparitions often seem to want to announce their deaths to loved ones, particularly in wartime. A well-corroborated case (2) is that of Capt. Eldred Bowyer-Boyer, who was shot down over France early on 19 March 1917. At that same time, his sister-in-law (who did not know that he was in combat) saw his apparition approach her in her room at the Grand Hotel in Calcutta, India. At first he appeared so real that she thought he had come to visit. Then, when he suddenly disappeared, she felt something must have happened to him, and a terrible fear came over her. At the time he was shot down, his sister was still in bed at home in England. Her daughter (his niece) came upstairs and announced that Uncle Eldred was downstairs! His sister was so struck by the occurrence that she wrote to her mother about it, and she confirmed the time and date of his fatal flight.

Another case (2) demonstrates intention some years after the death of the agent. John Harford was a Wesleyan lay preacher; on his deathbed, he asked his good friend C. Happerfield to care for his wife. Happerfield readily agreed, and saw to it that Harford's widow was cared for, first by friends, and then by her grandson. After that, he lost touch with both of them for some time. But then, he said,

...one night as I lay in bed wakeful, towards morning . . . I suddenly became conscious that someone was in the room. Then the curtain of my bed was drawn, and there stood my departed friend, gazing upon me with a sorrowful and troubled look. I felt no fear, but surprise and astonishment kept me silent. He spoke to me distinctly and audibly in his own familiar voice, and said, "Friend Happerfield, I have come to you because you have not kept your promise to see my wife. She is in trouble and in want."

Happerfield promised to look into the matter, the apparition vanished, and he roused his wife. They learned that the grandson had lost his job and the grandmother (widow Harford) was about to be sent away.

6.3.5 An Inventory of Apparitions and Hauntings

Table 6.1 arises after an analysis of the accounts of "Ghosts" published by USA Weekend in 1992. The great variety among the observed is striking.

⁷ From: C. Becker (28).

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion ?	Gender of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Yearly visit by ghost of little girl. She reaches for doll, falls down stairs, dissolves into air when about to hit floor. After some years, did it when young man there. He caught her. She thanks him, never seen again.	Day	Peace	F & M	Astounding story of catching falling girl.	General		Weak	If girl weighed normal, difficult to catch. If not, not noted. This one a bit too much.
Cool air blasts. A presence. Door bell but no one. Saw man in smoking jacket, smoking cigarette. Man had slashed throat.	Awake from sleep.	Visual	Fear. Screamed	F				
Small child had been drowned. Inexplicable noises from son's bedroom, child seen, laughing.	Day	Audial	Cool	F				
Man seen in mirror. Spoke. Brother also sees him but legs stopped below knees. Figure illuminated from within. 30 years before man had choked to death.	11:00 p.m.	Visual. Ghost spoke.	Fear	F	Finished at legs.	Lost Souls.	Medium	Child ghosts return and do their thing - play with ball, etc.
						Lost Souls.	Good	Cool air blast often associated with apparition. Injured people, throat cut, turn up.

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion ?	Gender of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Couple in bed. Top half their mom appears with instantanic camera. Also seen by children.	Night. Bed.	Visual	Peace (mom cared)	F	Instantanic camera.	General	Children gave separate account.	Mon appears with instant camera.
Saw head of man, illuminated red from behind; then, older woman bending over her in bed.	Awoke from sleep.	Visual	Fear	F	"Illuminated red from behind."	General	Good	Couple seen had lived in house before.
Woman appeared in doorway, wearing specific blue dress.	Boy observer, awoke from sleep.	Visual	Fear	M	A real dress had disappeared from wardrobe.	General	Good (tho told boy daughter)	Illuminated figure.
Woman looked down well. But did not see her own reflection; saw that of old woman. Later, woman appeared foot of bed. In viewer's inner self, heard woman say "Be careful near 'well!'"	Observed during day and also on awaking.	Visual, inner auditory	Cool	F	Smell of apples (woman from orchard)	General	Good.	Seems, often, material things are brought into apparitional experiences.

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion ?	Gender of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Footsteps. Man had killed himself earlier. Husband and wife heard.	Night	Auditory	Cool F		Lost soul		Good. Very detailed.	
Child, headless in bedroom. Body moved.	Night	Visual	Terror M		Lost soul		Fair - poor. Vague.	
House in which gypsies had lived> murder had occurred. Cold Whirlwind near base of tree. 2 nd whirlwind settled over woman house - buyer in garden.	Getting dark	Visual	Surprise and fear F		Lost soul		Good	
A boy fell down stairs, died. Then, house haunted. People followed poltergeists. Music on.	Day	Auditory and visual	Exasperation F		Lost soul		Good	A very peculiar story. Can ghosts empower cool blasts, etc.?
Translucent small girl playing with doll house. Potters off through wall.	Full day; Happiness	Visual	Cool F		Lost soul		Good	Poltergeists are mischievous and don't seem to have much sense.
								Ghost goes through wall again.

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion? of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Antique shop. Man and woman covered in soot. Ask owner see furniture from old house. However, fire had occurred nearby. Two killed - just like those in rumpled clothes and covered in soot who had called.	Day	Substantial ghosts, covered in soot. Dead.	Fear F	Soot after fire.	Lost souls	Fair. No definite connection to scary visitors and those who died.	
Strange woman, sitting in window. Sobbing. Man had killed wife there.	Day	Visual	Cool M		Lost soul	Good.	
Tall man. Luminous cape. Next time he is not standing, sitting. Face like corpse. Disappeared. Third time, tried strangle sister. Earlier man had committed suicide there.	Night	Visual	Fear F	Luminosity.	Lost soul	Medium.	Violent ghost. Very unusual.
White wisp as tall as child, wisked around Music. Little girl had earlier burned to death (accidental).	Day	Visual	Cool F		Lost souls	Good. Very detailed.	
Restaurant. Chairs moved, no one there. Saw tentacles in window. Man had been lynched.	Day	Visual	Cool F		Lost soul	Fair - poor. Vague.	

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion ?	Gender of Author	Curious Aspect (e.g., Haunted House)	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Saw lone soldier, seemed pretty shagged. Later found whole Vietnamese unit wiped out. Man had been dead.	Night	Visual and auditory. Dead man in soldier's uniform, talked.	Shock M	Ghost wanted cigarette.	From Beyond	Good	Just after death a common time to see a ghost.	
Her husband had died. But her plot of cemetery was ready and waiting. Dead husband in white shroud woke sleeping woman and beckoned. Got to her future grave, - by his; - but they had buried another woman there.	Night	Visual Cool F	Ghost in shroud.	From Beyond	OK	Do dead keep watch over us (cf Japanese idea).	Seems guardian angel turns up from time to time.	

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion ?	Gender of Author	Curious Aspect (e.g., Haunted House)	Type of Encounter (e.g., Haunted House)	Credibility	Comment
White figure softly floating. Woman. Former house owner returned to do dishes.	Day and night	Visual Cool F	Wispiness of observed entity. Gradually formed into recognizable shape.	Help from Beyond	Good	Sudden guardian angel. Intervention may occur.	Weak	
Woman at crossing. About to run into car. PULLED BACK by unknown man who then pattered off.	Day	Visual and auditory Excitement and gratitude F	Help from Beyond	Normal	Help from Beyond	Medium	Remarkable example of appearance and disappearance of a whole bit of past.	
Bells rang. Phone. People ring at door, etc. New occupants of house chased out.	Day and night	Visual Cool F	Whole restaurant	Help from Beyond				
Restaurant. Everything like 10 years before. Next day gone.	Night	Visual and auditory Cool M						

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion? ?	Gender of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Old lady in house. Mended dress for wife. Came back once, gone like a puff of smoke.	Day	Visual	Happy F				Good	
House haunted. Noises. Things appear disappear. Sometimes, a dark woman is seen.	Day and night	Visual and auditory	Fear	F	Haunted house	Yes		Houses get haunted alright. Usually, it is a specific person who haunts.
Man in cow! appears behind woman, touches hair. House had been built on monastery grounds.	?	Visual	Fear	F				
Tap gets turned on in flat; child heard crying, asking for water.	1:00 a.m.	Auditory and visual	Anxiety	M		Haunted house	Yes	Even monks get trapped and "stay behind."
Mrs. Shoter had died of heart attack in the 50's. Presence felt. Perfumes. Things disappear, turn up later.	2:00 a.m.	Visual	Cool F		Haunted house	Yes		

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion? ?	Gender of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Woman murdered. Returns, 20 years later. Wraith. Leads to hidden gun. Murderer apprehended.	Night and day	Visual	Cool F	20 years to return. Wraith like.	From Beyond	Good	Dead return to do finished business. But time elapse unusual.	
Man with young family, terrible storm. On road. Car fails and stops across road in wrong lane. Chap turns up and mends engine.	Night	Visual	Happiness M	Guardian angel type	Help from Beyond	Good	Guardian Angel intervenes at right moment.	
Child drowned. Seemed dead. Funny little old chap turned up. Asked for food. Gave. Child cured. Man disappears. He looks like St. Clement Patron Saint of Drowning.	Day	Visual	Happiness F		Help from Beyond	Medium	Patton Saint arrives at correct moment.	

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion ?	Gender of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Father, dead 22 years, turns up. Says he will return. Cake cut. On photo, a white light.	Awoke	Visual	Cool F	22 years after death			Yes	22 year old ghost. Unusual length time.
Grandma turns up in her BURIAL CLOTHES. Walks towards husband and disappears in him. But screws on piano mysteriously get put in.	Early evening	Visual	Surprise & fear M				Yes	Trivial action and consequence.
Dead soldier turned up on anniversary of death. Marched. Played clarinet. Disappeared into a VAPOR at last note of plaintive song.	Stormy night	Visual and auditory	Fear M	Disappears into vapor	Return of dead sister	Return of dead	Yes	Typical. Anniversary, repeats something typical of life.
Dead brother, Hank, appeared in usual clothing. Once, fully, in room. Then, fleetingly, behind, in car.	Day	Visual	Cool F	Ghost wearing clothes	Dead relative pops in	Yes		

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion of Author	Gender of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Man in blue windbreaker, bare bald head.. Trivial talk. Seen by several	Day	Visual	Fear M					
Pillar of smoke moved about. Reminiscent of recently dead father.	Awoke in night	Visual	Love F					
Woman (Lydie) killed in fire. Moved things. Knives moved. Lights on and off. Crockery broken.	Day and night	Visual	Cool F					
3 kids died. But there were 6. After 3rd child went, dead husband returned. Said OK. Now I have got 3 and you have 3! Never seen again.	Awoke in night	Audio and visual	Cool F					
Woman mending slacks. Blood drips from legs. Earlier house occupant had died from emphysema, spat blood.	Day	Visual	Horror F	Blood dripping				

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion ?	Gender of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Dead husband returns, wakes wife. Makes speech praising her. In morning, two cups of tea made in kitchen.	Awakes	Visual and audio	Joy F		Husband's love	Medium	Unusually happy ghostly experience.	
Big brother died. Plays tune on violin with which he was associated.	Night	Audio	Fear	F				
Grandpa was buried in his best brown shoes. Later, he returned, always walking about the house at night. But the point is that the brown shoes buried in are now back in cupboard.	Day	Visual	Joy	F	Return of dead person repeats accustomed thing	Yes	They want to tell you they still exist.	
Grandpa was buried in his best brown shoes. Later, he returned, always walking about the house at night. But the point is that the brown shoes buried in are now back in cupboard.	Night	Audio	Fear	F	Running	Haunting	Wanted to get rid of material encumbrance.	
					That ghose did not <u>want</u> his shoes, signs of corporeal existence	Haunting	Yes	

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion of Author	Gender of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Felt presence in bedroom. Saw woman, floating. Came to look at grandsons. Observed by three boys, separate occasions.	Awoke	Visual	F		Dead relation. Back on visit			
If a family member swore, a 3 legged table raised itself off ground. Grandma had brought from Italy. She was strict on swearing.	All times	Visual	Cool	M	Haunted house	They sometimes float. Come back to check on kids. Multiple observers.		
Dead brother, Jock, always appearing in doorway. Things "got broken". Strange sound of wind in kitchen. Door handles turned. Chair found drawn back from table was dead Dad's.	Evenings	Visual	Comic	M	Psychokinetic action of ghost.	OK	Some evidence that ghosts watch us.	
	Night	Visual and auditory	Fear	M	Return of dead relative.	OK	That cold wind again.	
					Dead relative makes presence felt.	Yes	Wind once more.	

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion ?	Gender of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Nasty ghost pulled down bed clothes and jiggled bed up and down. 3 toed footprints of visitor. When woman leans against cupboard, is scratched by something. 3 TOED FOOTPRINTS SEEN, WHICH FADE. Thing came from ceiling and goes back there.	Night	Visual	Terror ?	?	3 toed footprint	Haunted house	Yes	Most unusual.
Footsteps from room of former owner. House caught fire - no cause. When house rebuilt, woman pushed down stairs.	Day	Audio	Fear	F	Blood from ceiling?	Haunted house	Medium	Fire caused by ghost?
Red globs drop from ceiling. Clock stops. But when it restarts, time matches sad event.. Trap door opens.	Day	Audio	Horror	F	Haunted house	Yes		

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion ?	Gender of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Man's son killed suddenly in accident. Groaning in house. Shadowy figure at bottom of bed. Pet's throat slit.	Awoke	Visual	?	?	Groaning. Animal's throat cut.	Haunted house		SUDDEN death is often reason for appearance.
Doors torn from hinges. Ghost on stairs. Many ghostly shapes. Pulsing, pounding.	Day and night	Visual and audol	Hysteria	F		Haunted house Poltergeist?		
Ghose whispered woman's name. Bedroom doors opened. Presence shook bed. Scratches on husband's arm.	Day	Audio and visual	Fear	F	Scratches unusual	Haunted house	Yes	Ghostly vaporous shapes.
Cat died. Returned and scratched man's tie.	Day	Visual	M					
Hooded figure. Had glow where face should be. Old lady, dressing gown, looks from end of bed.	Day	2:00 a.m.	Terror	F	No face, just glow	Haunted House	Yes	Ghosts of cat, too Haunted house account. Typical

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion ?	Gender of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Man died. Mother was 103. No one told her. Man was buried in blue suit, no shoes. When mom fell ill, son turned up in blue suit and no shoes (mom didn't know her son dead). "Why no shoes, son," she said. Son went white and said: "You see, Mum, I'm dead."	Night	Audial and Visual	Surprise	M	Triviality of essence of happening		Yes	Really super ghost story. The mother did not know son dead and certainly not that he wore blue suit, no shoes in grave!
Woman (A) was suffering from asthma. Nearly died. Grandma (deceased) turned up and initiated call ambulance for (A).	Night	Audial and Visual	Fear	F	Love shown of ghost for offspring		Yes	It seems that the dead watch over us.

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion ?	Gender of Author	Curious Aspect	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Man's father died. Left clothes in trunk. Son found clothes. Took out hat. This upset dead father who returned. Door opened. Black shape appeared. Did it again when friend there. Put hat back. No more trouble.	Night	Visual	Fear	F	Haunted house		Yes	So human! Man disturbed hat. Ghosts appeared and caused trouble until hat put back!
Grandpa died. Called up and said he's fine.	Evening	Audio	F	Phones?	Day		Yes	Phone calls from dead well reported
Lover, John, died at 1:20 a.m. At 1:20 a.m. his lady awoke and was sure John had come to say goodbye.	Awoke	Audio	Love, sadness	F	Unusual love in ghost account	Dead lover, turned up on way out.	Yes	Went through wall. Reported ghostly actions.

Event	Time and Site	Type of Encounter (visual, auditory)	Emotion ?	Gender of Author	Curious Aspect (e.g., Haunted House)	Type of Encounter (e.g., Haunted House)	Credibility	Comment
Grandpa dies. Appears to run away from grandson. Has his typical sailor's cap and doffs it in characteristic gesture.	Day	Visual	Fun	M			Yes	Here is a ghost, long dead, turning up to do his thing.
Man dies. Appears to daughter. Then grandpa comes by, stands at bottom of daughter's bed.	Night	Visual	Fear	F	Return of dead.	?		
Dead sister appears. Glowing. Says she's happy with Lord. Earring with which she was buried, remains on floor.	Dream	Visual and audial	F	F	Material thing involved. Glowing	Return, report heavenly experience.	Yes	Leaves behind real thing. Earring in which she had been buried.

6.3.6 Characteristics of Apparitions and Ghosts⁸

1. Some ghosts seem to act with specific intention, e.g., to set right something from their previous lives.
 2. Although apparitions often appear to be transparent and immaterial, some appear to have solid bodies sometimes with modern artifacts, e.g., an Instamatic Camera.
 3. Although some ghosts seem to be solid, they appear to be able to walk through walls.
 4. Occasionally, a ghost seems to be seeking a body.
 5. Cold air often heralds an ghostly manifestation.
 6. There is some evidence for guardians, who manifest in an emergency.
 7. Some ghosts exhibit normal human thoughts. With 3 children out of 6 dead, a dead father tells his living wife, "Now I've got 3 and you've got 3."
 8. Houses can become the sites of hauntings. Anniversaries of the death are frequently haunting times. Lights go on and off. Rattles and clicks. Broken glass. Doors slam. Footsteps. Sometimes, the ghost is seen. Occasionally, the action is gruesome and mysterious. For example, footprints begin in the middle of the room and are 3-toed.

6.3.7 Photographic Evidence

It is difficult to obtain photographs of ghosts. For one thing, except for hauntings, - where there may be some repeatability, - apparitions occur unexpectedly, - and normally at night. Further, the percipients are nearly always frightened and not in a relaxed objective mood which would enable one to find a camera and take a photograph.

Nevertheless, many alleged photographs of ghosts exist. There are many photographs of what seems to be a vague white cloudy entity, not indicating someone identifiable.

The following have been culled from the Mary Evans Technical Library (UK), which holds the collection from the Society for Psychical Research and from Apparitions, Inc (See Figs. 1 and 2). Even these must be regarded with skepticism because they would have been easy to fabricate (23).

6.3.8 "Death Bed" Visions

The pioneer in the study of Death Bed visions was Professor James Hyslop who published a paper called *Visions of the Dying* in 1918 (24). An Irish surgeon, Sir William Barret, was also a pioneer in the study of paranormal phenomena associated with the time of death and he published several reports on the subject (25). Both authors pointed out independently that the evidence was strongly indicative of survival of the personality of after death, because of recognition by the dying persons of relatives whose death was unknown to them.

Thus, two small girls about eight years of age lived in the same town. The two girls fell ill and soon both died of diphtheria. Jennie died first and Edith was not told of her death.

Partly based on deductions made from *Ghost Sightings* (4).



Figure 6.1 Legless Lady in background (by pram). Photo taken in Covent Garden, London, by Maurice Crosse, Feb. 1, 2001



Figure 6.2 Mother and Father (both deceased) of the male singer behind him. Taken by Maurice Crosse, London, Feb. 1, 2001

Unfortunately, she too could not recover, and as she was dying she began to talk about other friends who were dead. She appeared to be seeing them. This could have been due to a hallucination and to this point, nothing unusual had occurred. But suddenly she spoke to her father and remarked that she was going to take to the other world her friend Jennie. She then, in surprise, asked her father why he had not told her that Jennie had died. After these words, the dying girl welcomed her unseen friend and seemed to be talking to her (Bayless (15)).

These pioneering studies were confirmed by Osis (26). Osis polled 5000 nurses and 5000 physicians. Where they replied positively, he conducted telephone interviews and correspondence. Osis concluded that while the dying person is still in possession of his faculties, *he frequently sees apparitions of dead relatives and friends.*

In 1955, I had been in the USA for two years. My mother remained in the UK. My wife received a telegram one evening, indicating that my mother was in the hospital and dying. We said nothing to our children and went to bed with the thought that the end was probably near for mother. In the morning, my seven year old daughter entered our bedroom before my wife and I had risen. "I saw Grandma during the night," she said. "She came like a red flash." Shortly afterwards, we received a second telegram advising of my mother's passing.

While the dying person may receive paranormal sight of those already dead, others sometimes see him on what seems to be his death bed, although before he even knows he will soon be found there.

I had felt well and entered my office in College Station, Texas, very early on a Sunday morning in 1999. I received an unexpected phone call from Australia.

The caller was a woman with whom I had had some emotional ties, some 25 years earlier. She was distraught and gave a detailed description of me in a hospital gown lying ill in bed. I assured her that I was in normal health. However, one day later, I became subject to angina pains, underwent an angiogram and was operated on for a triple bypass surgery two days after the warning phone call from Australia.

After the heart bypass operation, one becomes conscious with a probe in the mouth which passes through the larynx and ends up in the lungs. A machine "breathes" the patient. The presence of what seems, to the patient becoming conscious after anesthesia, to be an obstruction to his breathing is frightening. I recall that I was gasping. I struggled to remove the instrument and attempted unsuccessfully to call a nurse. Finally, I began to give up and *had the impression that I was choking to death.* A clear thought occurred to me: "Give up. You've done enough. Give up. Die now." At this moment, I was swept by a strong emotional counter feeling for a family in Adelaide, Australia, where my stepson - blind and unable to earn a living, - and his family depend for their survival on my sharing a substantial fraction of my pension income with them. "No," I thought, "I've got to make it."

Entirely unknown to my conscious self, lying in a hospital in Houston, Texas, at about the time of my recovery from the anesthetic, my stepson's wife observed me standing in her home in Adelaide, Australia. I did not speak but she felt I had come to say goodbye. "Go back. Go back," she said. I vanished.

6.3.9 Poltergeists

Poltergeist is a German word which can be translated as "disturbing spirit". The occasional presence of poltergeists in family dwellings has been reported the world over.

The first characteristic of a poltergeist is that the disturbances caused are all destructive. Poltergeists start with unexplained noises, knockings and thumps (27). The phenomena increase to include kitchenware, which inexplicably falls to the ground, mysterious bells ringing, and the tossing about of familiar objects. Occasionally, small fires spring to life in the house or garden. More serious and remarkable is the slow passage through the air of stones. The stones do not have a normal trajectory but seem to be carried. Occasionally, a stone seems to be about to drop on the head of an observer, but its fall is arrested in time to avoid contact. Further, poltergeists cause objects to pass through doors and walls and arrive suddenly "from nowhere" (The phenomenon of "aports"). Another phenomenon characteristic of poltergeists is their ability to shift heavy furniture. Most unnervingly, a heavy armchair will gradually creep across a room.

Sometimes there are sudden movements of a heavy item of furniture, as though it has been given a powerful "shove." Objects weighing 50 kg and more are seen to behave, in a fashion which would be difficult for a live human being to replicate.

Now comes a key characteristic of the poltergeist phenomenon. It is always associated with the presence in the house (but not in the affected room) of a young person, usually female, of pubertal age. It is not that the young girl causes (in a direct way) the happenings listed above. The strength and dexterity needed to cause some of the phenomena would be beyond that of an adolescent. But the fact remains that removal of the young person from the house stops the phenomena.

Poltergeists rarely appear but represent one of the most clearly attested of psychic phenomena. However, they, - and their connection with the young adult, - remain facts without acceptable interpretation (Becker (28); Gould and Cornall (29); Cook and Delaney (30); and Grof (31)).

6.3.10 An Inference from Observations on Apparitions of the Living and the Dead

Thus, apparitions of the living correspond often to conscious processes in the minds of those whose apparitions are received. Apparitions of dead people show no apparent difference to those of the living. It therefore seems reasonable to suppose that these apparitions, too, come via some mechanism from the consciousness of those perceived. This similarity is seen by some (Becker (28)) as indicating survival after death.

6.4 MATERIALIZATION

6.4.1 Introduction

As stated, the phantoms reported by many people in the last hundred years have various densities of form. They vary from wraith-like transparent forms, which often do not bear much resemblance to a specific entity, up to entirely solid figures, like the ghosts in the LH 1011 aircraft described in Section (6.7.9), looking like the person when alive, but able to appear and disappear, pass through walls, etc.. These appearances can occur at various speeds, sometimes slowly from the feet upwards or sometimes in a flash, especially in respect to the disappearance.

Now, there is a whole class of phenomena which require a separate section and can best be called materialization. Unfortunately, these phenomena are more exemplified by records of the 19th and early 20th century when reports of materializations were more common than those of recent times (though cf. The Scole Phenomena, Section (8.12)).

This should not bother us too much. It probably is largely a matter of what is acceptable to observers. As noticed in section (3.4.2), the least good way to encourage the manifestation of psychic phenomena is to examine them under controlled, formal conditions. This remark may cause levity among scientists who might well say, of course, that there is nothing to be seen if the phenomena are examined "properly." In a sense this is true, - for, like the ability of creative artists, if they are examined scientifically, - psychic abilities often disappear. This is a great difficulty for testing the reality of these subjects, but nevertheless, a sober description of some of the reported phenomena will allow the reader to make up his own mind.

Although these materialization phenomena are now less seen in the USA and Europe, they are more commonly observed in Brazil, and other countries where the pressure of a materialistic philosophy is less intense than in the West (but cf. The Sorrat phenomena, Section (8.4.13)).

6.4.2 Materialized Apparitions As Reported by E. A. Brackett (32)

Bracket was a sculptor who devoted many years of his life to the study of mediums in the Boston area and came out with a rich description of materialization phenomena.

These phenomena involved a medium, usually a woman, who went into a trance, in which she appeared to be unconscious, often the head lowered forward. The trance lasted on the order of an hour, after which the recovered medium is unconscious of what has happened during her trance.

The medium is associated with "a control," another personality which seems to operate within or just outside the medium. The control is usually invisible, though in some of the reports of Bracket, she materialized.

In Bracket's descriptions, there was a cabinet in the séance room. It was large, about six feet square and could be placed in various positions in the room, the most satisfactory being in the middle of the room so that the audience could see most of it.

It was from the cabinet that the materialized beings emerged. The obvious rejoinder that a confederate inside the cabinet creates the materialized beings is not admissible, because members of the audience were invited to go inside the cabinet and see the materialization taking place.

The materialized beings, who resemble, in final form, a deceased relative of a person present in the room, usually began as a small luminous glow, and transformed themselves within minutes into a solid looking person who talked and spoke with sense.

Occasionally, the materialized being walked around the room, sat with others and talked with them, then went back towards the cabinet, often dematerializing before reaching it!

This kind of manifestation happened repeatedly at different séances. On changing the medium, there was sometimes at first a change in the appearance of the subjects materialized, but after some practice, they got back into their proper forms and were, according to witnesses, indistinguishable from the persons while in life.

These manifestations, of dead people show signs of physical growth between the time of death and that of appearance. For example, a little girl, aged 4, dies but then materializes 12 years later as a 16 year old girl of appropriate height and dimensions.

Surely, these are the most incredible of all psychic phenomena. It is only by studying in detail, the wealth of information contained, e.g., in the records left by Bracket (32) and that of Greber (16) (see below), that some credibility can be given to the content. Furthermore, of course, there are the studies of Sai Baba, by psychiatric, Haraldsson (8), and of Thomaz Green Morton by psychiatrist Pulos (7). These are modern studies carried out in the 1980's and 1990's, containing photographs and movies recording the happenings, which include materializations, more of objects but also of people. The dematerialization of Capt Loft in the first class cabin of a jet liner similar to the one which he had crashed in 1972 is also a striking modern example.

A few details from Dr. Bracket's observations in Boston are relevant. He described many séances, particularly with a medium, Mrs. H. B. Fey, but also with various other female mediums.

The first shock to the originally skeptical Bracket came when he attended a séance by a Mrs. Fey and was told that his dead wife was there. At first he reported seeing a person who was smaller than his deceased wife, having a tired and careworn expression and with features which resembled the medium's! Bracket held her at arm's length and said "you are not tall enough to be my wife." "Wait," she said. She stepped behind the curtain, returned a few moments later a head taller. The height and general build was of his wife but the face was still a medley between that of his wife and that of a medium. Later, the materialization of the wife improved to a true resemblance.

At this first meeting with Bracket, his wife told him things which seemed impossible for anyone but his wife to know. They concerned in great detail personal facts of his domestic life.

After some time, the apparition seemed to grow weaker, bade goodbye to the living husband and "went down directly in front of him within a foot of where he stood, the head, arms and shoulders, being the last part visible."

This first manifestation which Bracket observed was an archetype of those further to be reported. Mrs. Fey's control was called "Auntie" and after Bracket had been to several séances, the control invited him into the cabinet. Thus, in the cabinet there were at first three entities, the medium, Bracket and the control. Later, a materialized individual formed.

The first meeting with his wife was repeated through many materializations. At one session Bracket reported 40 to 60 people of all ages from that of a little child to an old individual appeared. The wife came to him again and again and improved her appearance over time so that she had no resemblance to the medium whatsoever.

One of the beings whom Bracket thought that he was meeting was his niece, Bertha. Among the phenomena to which Bracket's report drew attention were the materializations of her clothes. Thus, he reports having seen her in a luminous gown, and he asked her if she would come again in that way.

When she reappeared at a later session, she was wearing a dark dress and said, "I am in mourning because I have lost my friend." However, while Bracket was looking at her, the dark dress disappeared and she stood before him in the beautiful gown which he had wanted to see.

The materialized Bertha character was that of a 16 year old girl. She had a playful disposition and made amusing remarks. She had long silken hair which flowed down to her white lace. Bertha was able to materialize several yards of a substance which looked like over his head and materialized a wig!

One of the more remarkable phenomena reported concerns a Mr. Whitlock who produced a pair of scissors and applied them to the clothing of a materialized Emma, who came out of the cabinet dressed in rich white satin. Whitlock cut a piece out of the dress, but the damage repaired itself rapidly.

Dematerialization phenomena are richly reported in Bracket's book. For example, a lady who seemed to be a relative of a Colonel Bailey, one of the visitors at the séances, called him to her, and then in full view of the audience dematerialized.

Materialization sessions, many of which were reported in the 19th century séance rooms in England, were also studied by Von Schrenk-Nötzing in Germany (33). He published a book called "Materializations" describing his experiments.

In spite of the decrease in the number of materialization phenomena reported in seances in the 20th century, there is the remarkable case of Don Loft, the Captain of the LH aircraft which crashed into the Everglades, Florida, in 1972 (Section 6.7.9)(35).

6.4.3 Work of the Rev. Johannes Greber (16)

A remarkable work comes from the pen of a German Catholic priest who had long resisted the pull of some colleagues who asked him to take part in séances. He finally agreed, and his book of 432 pages describes his experiences. Two of the most interesting phenomena which he describes took place in the late 1920's and the first is about the Polish medium Kluske (34). This medium worked entirely naked in the absence of ladies, but wore a strategically placed small handkerchief suspended from an elastic waist band in their presence. He easily went into a trance. The séances were held in red light.

While in trance this medium produced many types of phenomena, but his specialty was the production of apparitions. Usually these occurred only of the head, which formed behind the medium. There firstly appeared a series of lights the size of a hazelnut and upon closer inspection, it could be seen that they had the appearance of human eyes. Soon a human head appeared in association with the eyes. The faces had friendly smiling expressions.

With Kluske many full apparitions were also seen in red light strong enough to see the texture of the cloth of the phantom's clothes. Animals were also seen, in particular squirrels, dogs and cats.⁹ One of the more interesting features of the Kluske phenomena were the folds made in melted paraffin wax by the phantoms who could mold complicated figures out of the paraffin (34). When the phantoms dipped their hands in the molten wax, "gloves" could be extracted in which an observer could see the details of the hand, including the curved recesses between the fingers.

⁹ On one occasion a materialized lion was seen and the audience became frightened and awoke the entranced medium and thus ending the séance (and the lion).

Kluske also produced apports and the most remarkable of these was Kluske himself who upon one occasion disappeared from the séance chamber (which was locked and sealed) and was found in another room of the apartment, sound asleep (34).

A frequently reported characteristic of these phenomena was a drop in temperature in the séance room, between 6 and 8°C, before the materializations occurred. Such an occurrence is widely reported to accompany the appearance of ghosts and the repeatability of this feature supports the veridicality of these phenomena (34a).

Observers of the Kluske phenomena always stressed the human behavior of the apparitions who were described as acting like guests at a party.

The normal size of the apparitions depended upon the strength of the medium. When the medium became exhausted, the apparitions diminished in size by a half, or a third, before disappearing (cf. Bracket's reports).

The medium appeared exhausted at the end of the session and only held sessions once every two weeks because of the energy which his activity took from him.

6.4.4 Phenomena Associated with the Brazilian Medium Carlos Mirabelli (36)

The phenomena associated with this medium were carried out in daylight or in bright artificial light, and were witnessed by a large number of persons, particularly scientists and leading citizens of Brazil,¹⁰ and also members of religious organizations. Many were of extraordinary complexity.

Mirabelli could speak in many languages when he was in trance, although out of trance he knew only his native Portuguese. He stated that his utterances were nothing to do with him, but that he was being operated "by spiritual guides."

Thus, Mirabelli could write in up to 28 languages while in a trance and at a speed above that possessed by normal persons. A typical example would be a composition in German entitled "Greater Germany, Its Downfall and Restoration," only 40 minutes being taken for 25 pages. The writing was done under the supervision of scholars who had searched the medium beforehand, and who surrounded him while he wrote.

Mirabelli's face was often contorted as in ecstasy while in a trance. He sang a hymn as a preliminary to his trance-like writings. After it was all over, he fell in character from ecstasy to apathy.

Mirabelli manifested many remarkable phenomena. During one session, he was seated on a chair while being closely observed in daylight, by several scientists. The chair holding him moved out of place without apparent cause and rose, the medium still sitting on it, and floated across the room about two meters from the floor. The duration of this movement was about two minutes. The chair descended slowly to the floor and landed 2.3 meters from its original position. All the while, the medium was in a trance.

As to materialization phenomena, they were witnessed by a number of scientists (16). As an example, Mirabelli materialized a child who had been the daughter of a certain Colonel sitting in the audience, and whom he had buried. The Colonel asked the child questions which she rationally answered. When this occurred, the medium imitated the motion of the child's arms with his forearms. The child disappeared after 36 minutes in

¹⁰ Mirabelli was observed by about 200 persons, including 72 physicians, 12 engineers, 5 chemists, 25 military men, etc.

which she was seen in daylight by a group of educated men, ten of whom hold a degree of Doctor of Science and who signed documents testifying to what they had seen.

Many other phenomena were associated with the materializations of Mirabelli and one was that of Bishop Jose de Camargo Barros, who was formed out of a fine mist which grew gradually into the apparition, carrying a baretta and in the full regalia of a bishop. Dr. De Sousa, a physicist present, took several steps toward the apparition who smiled at the oncoming investigator. De Sousa examined the apparition minutely, tapping its body which was solid, and rubbing his fingers over the teeth to determine the presence of saliva.

The Bishop conversed with those present in Portuguese and said finally "Now, watch me closely as I disappear." The Bishop's body contracted sporadically and then began to grow dim and shrink in size. The apparition dwindled to a height of some 30 cm and then disappeared completely. There were 60 signatures attesting to the observations (16).

Although materializations on this scale have not been reported for 50 years, modern materialization mediums are not unknown (37).

6.5 APPARITIONS OF MARY

In Christian theology, "Mary" denotes the mother of Jesus Christ. She is called a virgin on the ground of the biblical account of Christ's birth, which is described as resulting from a visit from an archangel who told the peasant girl that she would give birth to a child of great importance.

Throughout the centuries there have been references to Mary's appearances but systematic accounts began to appear only in 1830. Since that time, there have been records of appearances by Mary, roughly every decade or two. She more often appears in obscure places, country villages, throughout the world. However, recently she has appeared in a suburb of New York.

Two types of visitations can be distinguished. In the one, the more frequent, Mary speaks through "seers." These are generally young girls, 9-12 years of age. After their attention is drawn to a strange appearance of a young woman who in later conversation indicates that she is Mary ("the blessed virgin Mary"), the young girls fall into a trance and are told come back to the same place at a certain time. They do so, and again fall into a trance and in this state they allegedly see and hear the lady. She gives them certain messages and these have content and indicate that a certain action should be taken (e.g., at a certain place a grotto or a church should be built). However, Mary's messages often also contain a particular prediction, - later verified, - and then there is frequently rebuke which is aimed at the citizens of the world as a whole, but sometimes centers upon groups, for example, prelates in the Catholic Church whom she accuses of being involved in politics. The apparition is extremely critical of priests and nuns who go to bed together (no mention of pedophilic priests) and priests who leave the church.

The other type of appearance of Mary is when she can be seen fully by a crowd of onlookers as a normal looking young woman and in these appearances she sometimes speaks and has been photographed and recorded.

The content of many of Mary's messages, as stated, is often stern admonishment and predicts dire happenings as a consequence of continued forbidden behavior. She will

tell how sinful actions of citizens of the world will bring upon them a great calamity. Sometimes these calamities are described in horrifying detail.

As to belief in what the seers say after their trances, of course at the beginning there was no belief whatsoever in statements of uneducated young peasant girls, but gradually as the decades went by and the phenomena repeated themselves, it became clear that some of the messages which they bore had a veridical content, - predictions which were made and which came true.

These supernormal experiences have been described in an objective way by Ingo Swann (38), a noted psychic in a book called "The Great Apparitions of Mary." From this work, I have made abbreviated summaries of some appearances.

Let us begin with an expanded table made from descriptions in Swann's book showing the place and brief details of the appearances from 1531.

SOME APPARITIONS OF MARY

Date or Beginning Date	Place	Seers/Witnesses
1531, December	Guadalupe, Mexico	1 seer. One witness, two miracles. A flower blooms out of season and the uncle of the witness is cured instantly of a fatal disease over a considerable distance. Interest in this visitation has lasted for 500 years.
1830, July	Paris, France	1 seer. No witnesses. A medal cast in connection with the visitation has given rise to miracle cures to those who possessed it. When the body of the seer was exhumed in 1933, i.e., 103 years after death, it had not decayed.
1846, September	La Salette, France	2 seers, many witnesses. Predictions made which were verified later. This was the first visitation in the series under consideration in which Mary talks about terrible punishments. Water and fire will damage the earth's atmosphere. Convulsions and earthquakes will swallow up cities.
1858, February	Lourdes, France	1 seer, many witnesses. This has been the most famous site of miracles, a number of which have been attested by a committee made up of doctors and scientists. The body of Bernadette, the principal seer, was exhumed in 1909. It was found to be incorrupt. It was again exhumed in 1919 and found to be still incorrupt.

1871, January Pontmain, France

4-6 seers. It seemed that the village in which the apparition had appeared was protected from the German advance in the 1870 war.

1879, August Knock, Ireland

There were a dozen witnesses. Many miracles for the next 50 years.

1896, March Tilly-sur-Seulles, France

400+ witnesses and experiences. The Virgin and child. She smiled at the onlookers and moved her hands.

1917, May Fatima, Portugal

Three seers, 90,000+ witnesses. This was the most sensational visit. It occurred after a promise to some seers that a sign would be given. On the appointed day the sun appeared to fall towards the earth in a zig zag fashion. The people who had been waiting for the miracle in a downpour of rain suddenly found themselves dry. The body of one of the seers, Jacinta, was found to be incorrupt in 1950. A message which Mary had given to Jacinta and she to the Pope, because it was "secret", was revealed by the Pope in 1980. It predicted widespread flooding of the European continent in which millions would lose their lives.

1932, November Beauraing, Belgium

Three seers. The apparition spoke to the children and also to a person called Tilman Come who was suffering from a deadly disease and who was cured instantly. Many other cures. Chapel requested and built. Tilman Come became a seer himself later on and a number of messages were given to him which were supposed to be kept secret until a certain time.

1933, January Banneux, Belgium

1 seer, witnesses. A spring. Many cures. Chapel built.

1938, September Kerizinen, France

1 seer, hundreds of witnesses. 15 appearances. Strange phenomena of rose petals which appeared to fall independently of the wind. Chapel constructed.

1948, September Lipa, Philippines

1 seer, thousands of witnesses.

1949, November Necedah, Wisconsin

1 seer. Many appearances. Messages largely about Communism. Mary's statements particularly critical of the clergy being interested too much in material reward.

1954, July Jerusalem, Israel

200+ witnesses. Two appearances. In the first appearance the apparition is transparent and in the second solid. The Lady wore a blue dress. She floated among the students and then walked among them. A white glow surrounded her.

1961, June Garabandal, Spain

4 seers, 1,000+ witnesses. Many appearances. Angels appeared, too. As a girl was taking communion, witnesses saw the host glow on the girl's tongue.

1964, October San Damiano, Italy

1 seer, 10,000+ witnesses. Many photographs. She appeared every Friday for 13 years. Many miraculous signs including some apparent movement of the sun which was similar to that seen at Fatima. A pear tree bloomed six months after season. The lady warns of disaster if there is no reform.

1966, February Montichiari, Italy

1 seer, thousands of witnesses. ¹⁹⁴⁷ and 1966. A woman called Pierina often visited by the Lady who told

1968, April Zeitoun, Egypt

her to dig a spring. Man miraculously cured by the waters. bishop forbade Pierina further meetings with Mary but she continued them. Lady was particularly critical of priest-nuns sexual activities, threatened that God would send floods, etc. Some apparent movement of the sun was seen and a red disk appeared to descend towards the earth. 30 appearances. The 13th of each month was to be called Rosa mystica Mary's day.

1970, June Bayside, New York

500,000+ witnesses, many unchallenged photos. Appearance lasted for two years. The Lady stood on the balcony and also on the roof of a church. Her arrival was preceded by strange lights. She did not speak. Birds glided by but there was no flapping of their wings. Many miraculous cures. Among those confirmed by doctors were the cure of bladder cancer, blindness, deafness, paralysis of limbs, etc. The visitations ended in 1970.

1981, June Medjugorje, Yugoslavia

1 seer, 1,000+ witnesses. During a visitation Lady predicted that earthquakes would occur in New York City. This was regarded as most unlikely but indeed on October 19 and 21, 1985, quakes did rock New York City and the epicenter was 15 miles north of midtown Manhattan.

6 seers, hundreds of witnesses. Here the Lady was not seen except to the seers, five girls and a boy. They fell into trance and claimed communication with the Lady each evening and carried back her

messages. An itinerant physicist measured strong electric field during the times of the claimed visitations. The phenomena began when the seers sensed a luminous silhouette of a woman hovering three feet above the ground, dressed in grey garments, wearing a white veil. Her face was shining brightly. Essence of the apparition's statement was that the earth was now in a period of darkness. Many miraculous cures. About 10,000 people per day visited the church in which the seers received their visitations. Seers have all been examined by psychologists. A state of ecstasy which came upon them all simultaneously and ended simultaneously cannot be explained by normal means.

1981, November Kibeho, Rwanda

7-9 seers, numerous witnesses. Many warnings by the Lady of apocalyptic events for Rwanda, just what happened a few years later. Many cures. Appearance of the sun similar to that at Fatima.

In general, the nature of the statements of the Lady were what you would expect from an ideal Catholic, who has paranormal knowledge of any part of the world and any person, with precognitive and psychokinetic ability (40)(MacKenzie, 1982).

It is interesting to contrast the type of statements which the Lady made with the statements which are reputed to have been channeled from Jesus Christ in the book "A Course in Miracles" (39). The attitude in this book is that Christ's death atoned for the sins of the world. God's love is all embracing. There is no punishment but stress upon the love of God and the need people have to overcome what is called "the Ego", the wayward personality which is built up by each of us on top of an inner spirit which is the divine essence itself (similar ideas are present in Hinduism).

6.6 MODERN APPARITIONAL EXPERIENCES

Because some of the accounts of the appearance of apparitions and ghosts were made in earlier times does not mean they do not now occur. For example, in 1979, a survey in the United States gave a figure of 17% for people who had an experience of a ghost or apparition (Stevenson, (41)). The following modern example is taken from the paper by Ian Stevenson (41), who is the narrator.

R. N., the percipient in this case, is a resident of Cardiff, Wales, and was born in 1945. She has had a number of apparently paranormal experiences, including at least two apparitional ones.

The experience of this report occurred in 1989. I learned about it in 1992 from Mr. Jeffrey Iverson, also a resident of Wales, who put me in touch with R. N. (Mr. Iverson, a television producer, had recently made a documentary film in which my research had figured, and he was aware of my interest in apparitions.) She wrote out for me an account of the experience dated June 3, 1993. Subsequently, on June 7-8, 1993, I met her in Cardiff and discussed details of the experience with her. R. N. took me to the office where she had had her experience. I examined the area and sketched the office, locating the place where R. N. had stood when she saw the apparition and where the apparition had seemed to be. I obtained some additional information later through correspondence.

The person figuring in R. N.'s experience was T. I., who had formerly been employed by the company for which R. N. worked. He had quarreled with his associates (not with R. N.) and left the company abruptly. R. N. had known T. I. well when they were employed together, but did not keep in touch with him after he left their company. At the time of her experience she had not seen him for what she described as "yanks," meaning a time of indefinite length, not precisely remembered. R. N.'s husband (in a later conversation with me), however, estimated only a month had elapsed between T. I.'s leaving the company (where he also worked and had known T. I.) and R. N.'s apparitional experience.

The experience occurred on the afternoon of July 20, 1989 at around 3:00 p.m. R. N. remembered that she had had that afternoon an appointment with a fellow-employee whom she was advising. (She showed me the entry in her appointment book for this meeting.) R. N. and her visitor were seated in her office, but several telephone calls interrupted their conversation. When these occurred, R. N. had to get up from her chair and walk over to her desk in order to answer the telephone. The outer wall of the office behind her desk was a full sheet of glass (from floor to ceiling), and this gave a clear view of a flat walkway

between two stairs that led from a parking lot to an entrance for the building. As R. N. answered the telephone on one occasion, she noticed T. I. walking past. He was wearing a navy blue shirt, a navy blue sailing sweater, and navy trousers. She remembered his "sailor's gait." (T. I. had sailed a great deal and had developed this kind of gait.) R. N. thought that T. I. seemed to be in a hurry. T. I. ordinarily had a ruddy complexion, but on this occasion--to quote now from R. N.'s account--"he was very red and he looked very troubled. He appeared perfectly solid, and I did not attract his attention through the window. I thought no more about this, it was nothing unusual." The distance between R. N. and the appearing figure of T. I. was about 10-12 feet.

On the following day, July 21, a secretary of the company told R. N. that T. I. had died. R. N. commented that his death must have been sudden, perhaps from a traffic accident, because she had seen him just the day before. The secretary replied that this could not be so, because T. I. had died in the hospital. I was able to obtain a copy of T. I.'s death certificate, which confirmed that he had died in the hospital on July 20, 1989. Mr. Iverson further learned from T. I.'s widow that T. I. had been unconscious for almost the entire day before he died and that he had died late in the evening, perhaps around 11:00 p.m.

I obtained a copy of the "clinical notes" of T. I.'s admission to the hospital. They were lamentably sketchy. The notes for July 20 stated that he was unconscious the day before he died, on the last day. They did not record the time of death.

Comment by Stevenson. According to the ascertained facts, R. N. saw T. I. in clothes that seemed natural for him at a time when he was not dead, but dying and unconscious in a hospital 4 miles away. There he would have been dressed in hospital clothing. For investigators of paranormal phenomena there is nothing especially unusual about a person appearing as an apparitional figure while still alive. In their classic study of apparitions, Gurney, Myers, and Podmore (1886) considered an experience to be coincident with death if it occurred within twelve hours before or after the death. It is also common in such experiences for the percipient to see the appearing figure in clothes

familiar to the percipient, but different from those in which the appearing person was then dressed.

Some readers may suppose that a stranger unknown to R. N. passed the window of her office as she was at her telephone and that she misidentified this person with T. I. The short distance between R. N. and the appearing figure make this unlikely. Even if R. N. had misidentified a stranger as T. I., however, this would leave unanswered the question of why she mistook the stranger for T. I. instead of for someone else. Because T. I. had left the company, R. N. had no reason to expect that she would see him back at the company where he had worked.

Could R. N. have overhead the secretary talking earlier about T. I.'s illness without registering this consciously and yet having this information influence a misidentification of someone else for T. I.? I cannot exclude this possibility, but it seems unlikely. The apparent sight of T. I. would surely have brought into R. N.'s consciousness an awareness that T. I. was ill and unlikely to be walking around. On the other hand, the hypothesis of misidentification receives some support from R. N.'s noting that the appearing figure looked even redder than T. I. usually did.

It occurred to me that perhaps as T. I. was dying he had thought about the company with which he had worked and from which he had parted disagreeably not long before he became ill. He might have--I speculated--even considered meeting his former colleagues and making peace with them. If so, he might have mentally projected himself, as it were, back to the company's building, and this might have stimulated R. N.'s perception of him. I was unable to obtain any confirmation of this conjecture. Mr. Iverson learned from T. I.'s widow that T. I. had not discussed the company with her before he lapsed into unconsciousness.

Stevenson points out that there is sometimes 15-20 years between the experiencing of ghostly presences and these being made into accounts. Does this mean that the memory of such things may be badly distorted with much added from imagination? In the above account, only a month had elapsed. Stevenson points out that striking things (seeing a gun fight) remain in one's mind clearly for many years. A ghost is certainly a striking

There is also evidence that people who do see these ghosts tend to have paranormal experiences (Palmer, 1979) (42). It is also clear from the surveys that most (not all) experiences of ghosts occur near the death of a loved one (Broad (43)).

6.7 HAUNTINGS

6.7.1 Introduction

The characteristic of a haunting is that the discarnate entity appears only at or near a certain place to which it had emotional connections while alive.

6.7.2 An Example of a Haunting

The following account (abbreviated) is of a haunting described by I. Currie (2). Mr. Alfred Axtell, of 17 Woodstock Road, Oxford, England, has played host to Mr. Walklett, the deceased former owner of his house, for almost thirty years. A couple of weeks after moving in, Mr. Axtell came face to face with the dead man:

On the staircase ... I saw distinctly an apparition in the form of Mr. Walklett. I might say that I was well acquainted with him. I ascribed this happening as being probably due to some form of imagination I dismissed the matter from my mind ... and did not mention it to anyone.

A few weeks later, an elderly woman who lived with the Axtells was frightened by the sudden appearance of a man on the same staircase. Mr. Walklett's appearance was quite distinctive, and Mr. Axtell had no trouble identifying him from the woman's description. He asked her to say nothing of her experience, and to try to forget it. Several months later, the same apparition was seen by the Axtell's six-year-old son and by Mrs. Axtell. All of these sightings took place within eighteen months of Mr. Walklett's death, after which he apparently reduced his visibility, but continued to inhabit the premises. Twenty-eight years later he was seen again by Mr. Axtell's stepson, who had never been told about the apparition.

6.7.3 How Common Are Hauntings?

I was not able to find an estimate of this because, clearly, no house owner wishes to publicize the fact that his house is haunted.

6.7.4 The Nature of Haunting Ghosts

Some such entities appear not to realize that they are dead. They think the time is always that of their death although by the time an appearance is noted it may be many decades later. The noises to which they give rise seem to be attempts to draw attention to themselves for they seek a solution to their being prevented from making spiritual progress. Some realize that they are dead but don't know what to do about it.

Thus, (2)

I was living with my mother in a ground-floor flat in Sussex Gardens.... this flat was shaped like a ... letter L and there was a step in the long part of the corridor just

before reaching the main bedroom.... I often saw an old lady with a stick pausing before she negotiated this step, presumably on her way back to the bedroom from the loo round the corner.... I did not tell my mother about her, because I did not want to upset her.... One night, I can't think why, I spent the night in this room and had a terrible time, scared stiff of something that appeared to resent my presence. I was too frightened to sleep. I can't think now why I was not in my own room round the corner--perhaps we had guests--but next day I told my mother that I wouldn't sleep there again. She said, "I wonder if it was the old lady." She had kept quiet about her for fear of worrying me.

6.7.5 Hauntings Along the Potomac River

Some areas of a country seem to be particularly subject to hauntings. They may be, for example, places where battles have taken place in the past. It is as though some who died suddenly there are unable to leave the area of their dramatic termination. The following is an abbreviated account from Susan Crites (45).

I live in Gaithersburg, Maryland and own a small cabin at the Woods Resort in Hedgesville, West Virginia. My wife and I frequently visit our cabin to relax and to escape the pressure of our careers. We drive through gorgeous country. We always make it a point to make the drive during daylight in order to admire the relaxing scenery.

On only one occasion have we made the trip at night. Given our experience on that trip, I can assure you we'll never attempt it again after dark.

It was late October. We'd intended to start our journey to West Virginia at midday. Both of us had arranged to take leave from our jobs for the afternoon, but there had been a major traffic accident on Route 270 just before noon. Radio reports indicated that traffic was not moving northbound and was backed up for miles. I called my wife, and we agreed that it was wise to wait until the traffic was unsnarled before starting our journey. For these reasons, we weren't able to leave Gaithersburg until well after 8:00 P.M.

We turned onto West Virginia Route 901 about 9:30. While the Interstate had been easy driving with good visibility, 901 was so foggy in patches that I was forced

to stop the car and inch through the fog at no more than five miles an hour. When I came to a break in the fog, I could resume a more normal speed. We must have stopped and started four or five times when I hit the turn by the crumbling Spring Mill Plantation.

Suddenly, it was so frigid I turned on the heater full blast. All the windows in the car fogged over. As I rubbed a hole in the mist on the windshield, I saw heavy fog swirling around the car. I couldn't see my headlights, the fog seemed to develop a ghastly, greenish shimmer, and my wife--who is normally the Rock of Ages--said, "I'm frightened!" Just then, the engine died.

We sat for an instant in the lonely silence. Not two feet from the front of our car a figure emerged from the fog. He was a short man, about five feet, four inches. He had longish, amber hair and a full beard. He wore a grey uniform with a sword sheathed at his side. He was clutching his back with both hands. The hands were bloody. He seemed to notice us. He leaned forward, placing his bloody hands on the hood of our car. He looked at me as if he were pleading for help and crumbled to the ground.

I jumped from the car, leaving my stunned wife staring at the bloody hood of the car. I dashed around the car door to the front of the vehicle. I saw him lying on the ground. I reached out to touch him, to help. As my hand neared him, he disappeared. A moment later, the engine restarted, the headlights came on, and as I walked back to the driver's seat, I noticed the fog had vanished.

Susan Crites (45) writes: The Spring Mill Plantation was used by forces of the North and South during the Civil War. It served as a headquarters facility and, undoubtedly, as a safe resting place for the wounded.

6.7.6 Borley Rectory

The most well investigated case of haunting is that of Borley Rectory in the UK. During the course of this famous haunting, many abnormal manifestations (mostly disorderly) were reported. Voices and whisperings were heard; footsteps of every description occurred; raps and knocking took place; objects were displaced; writings were frequently found on the walls; luminous effects were witnessed; odd odors were evident;

fires were set; and apparitions of several different individuals were seen, including that of a well-known nun.

Those who wish to know more about this famous case should read Price's *The Most Haunted House in England* and *The End of Borley Rectory* as well his paper in *Proceedings: S.P.R.*, March, 1969 (46).

It must be remembered that Price (a famous investigator of hauntings) was a practicing member of the Church of England and thus a religious man. This fact may come as a surprise to many, considering his noted skepticism and "toughness" as a psychical researcher.

6.7.7 Haunting by a Person Freshly Dead

Fred Newman (name changed) had been an Engineering Professor at an Ivy League university. He was unhappily married to my present wife, Lily. After their divorce, I married Lily in 1971 and Fred died in Philadelphia, PA, in 1972.

Meanwhile, Lily, her son, Thomas, and I, had moved to Adelaide, Australia where I took up a professorship in Chemistry at the Flinders University there. We bought a remarkable property up in hills 3000 ft above the city, lying in a clearing in wooded ground, the main house (of three) being at the end of a driveway about 150 yards back from the road.

One night, about 9:00 p.m., Lily, Tom and I were in the kitchen, doing the dishes. It was a dark, stormy night and the swaying of the many trees on the property was making a great deal of wind noise. Suddenly, our chimes sounded, indicating someone at the front door. We froze. One hundred fifty yards from the road, 9:00 p.m., a stormy, dark night, who could it be? It was Lily who opened the door. No one was there but our dog appeared to be cowering outside the door, looking up and away from it. The sound of girlish laughter seemed just audible on considerable wind.

The next day, we learned that Lily's former husband, Fred, had died in Philadelphia, the day before the ringing of the door bell.

The next evening, about 6:00 p.m., and in brilliant sunlight, we were sitting together, having dinner. To our astonishment, a large red fire truck appeared, traveling slowly across the garden. We rapidly went out to inquire as to the firemen's mission and they said, they had had a call to the effect that there was a fire on our property (people in the Adelaide Hills react promptly to rumors of fires because the area is heavily wooded). The firemen stayed for about 1½ hours during which time they extinguished five further small fires which seemed spontaneously to break out on the property.

After that, a number of unusual incidents occurred.

1. An unknown man was observed by my stepson, Thomas, to be visible through the windows of the third building on the property, essentially a large shed in which I had my study. He was seen to be bending over my desk, appearing to seek something. When my stepson went into the shed to ask the man his purpose no one could be found there.
2. On several occasions, the lights in the house would be gradually lowered and then raised again.
3. A few nights later, the garden in front of the house was brightly lit by a full moon. I was asleep in a room seeing out onto the extensive front garden, I had a dog, sleeping in the room with me and was awakened by

- the dog clawing my arm. Directly he had awoken me, the dog sprang to the window and put his paws against the sill and stared out at the garden. However, I could see nothing unusual there at all.
4. Strange phenomena continued and we sat discussing them in a restaurant. Suddenly, my wife (an unemotional woman who never cried) put her head in her hands and lowered it towards the table while emitting a most unusual groan. Later, a woman friend, a psychic, told me that Lily thought she was being haunted by the dead Fred, although, in her relation to me, my wife maintained a fully atheistic position.
 5. The phenomena in Adelaide, Australia continued for about a month, after the death of Lily's former husband, Fred, in Philadelphia.

6.7.8 A Haunted Property?

The 5 acre, three building property - the main house 150 yards from the road - in which we lived (1972-1978) was the site of other events, some of which may have indicated the presence there of a haunting spirit other than that of Fred, though some of them also lend themselves to a materialistic interpretation.

1. On one occasion we left the house in good order to have dinner in the town. On return in late evening, a half eaten ham sandwich lay on a plate in the bathroom. No ham was ever purchased for use in the house.
2. We generally parked our cars outside the main house. Opening up the house windows, one morning, there lay upon the hood of my car was a piece of marble. It was c. 6 x 3 cm in size and around 1 cm thick. We knew of no marble on the property.
3. Early one Sunday morning, on opening the front door, we found a part of the adjacent brick wall wet by what seemed to have been a copious supply of urine. It seemed to have been delivered just before our observation, as some of it was still flowing off the concrete onto a gravel surround. It was peculiar enough that the wall looked as though some creature had urinated against it at around 6:00 a.m. on a Sunday morning, 150 yards from the road, - but the amount of the urine was so large that it seemed to have come from a horse rather than a man. Yet the stream had been directed against the wall.
4. The second house on the property had been furnished as a guest house, so was usually not occupied at night. In 1976, I became suspicious that an unknown person was sometimes present at night in the cottage. One night, I rose at 12:50 a.m. and, armed with a flashlight, approached the cottage (30 yards from the main house) and entered by the back door. I encountered a strong smell of sulphur. In the sitting room (1:00 a.m.) I found one seat of the settee to be wet.
5. In 1977, we received a visit from friends, one of whom (Anne) was a Yoga teacher and occasionally mentioned that she had "psychic insights." Anne and her husband spent a night in the cottage. She told us that during that night, she had awakened to find what she felt was a malign

presence in the bedroom. She woke up her husband, but he could detect nothing unusual.

On New Year's Eve, 1977, I was sitting in the main house with my wife, stepson Thomas and a post doctoral colleague, Shahed Khan. It was extremely warm (Australian summer; no air conditioning). Khan was the first to proclaim that a drop of water had struck his head, apparently from the wooden ceiling. Shortly afterwards, I felt the same. Minutes later, I was sitting in my shorts, elbows on knees, looking at the floor. I then observed (with total clarity) two tiny jets of water emanating from mid-calf of my right leg, striking my left leg. The phenomenon lasted about two seconds. I chose not to comment. A minute or two later, Thomas rose, walked to the adjacent kitchen, and called out in surprise. On return he showed us a wet patch on the side of his shirt and said that, as he passed into the kitchen, he felt a jet of water striking him.

Khan and I tried for an explanation. The air was moist but in the second two occasions water did not drop down from condensation on the ceiling but was jetted horizontally.

There may have been more than one cause for those odd events. The strong smell of sulphur in the cottage and the water jets seem extremely difficult to rationalize.

There were more strange events on the property in the Adelaide Hills. What, for example, of the enormous black dog, - the size of a small pony, - observed running behind the cottage but never seen again? A dozen ball bearings present on the bedroom floor of the cottage? A colored child's ball near the incinerator (nearest house ~ 100 yards and no child seen on this property). Tracks near the house seemingly of a baby carriage? A very large single footprint in soft wet grass near the house? A man's shirt hanging ~ 12 ft high up on a tree??¹¹

I have lived in houses in the UK and US: none (except that in the Adelaide Hills which my stepson, Tom, was an adolescent but spend most of his time at Boarding School) have shown abnormal events. Thus, it was not I or my wife, who attracted these happenings. It seemed to be the property with which they were associated.

6.7.9 The Hauntings of the LH 1011 Aircraft

6.7.9.1 The Accident

The following account is based upon the book on the subject by J. G. Fuller (35).¹² In December, 1972, an LH-1011 aircraft was en route from New York to Miami. During the approach to Miami airport, the pilot, Captain Loft, found that the light on his

¹¹Other strange events included one experience by my 18 year old stepson, Thomas, who while living temporarily on the property alone, returned late one night to find lights on in the main house. On using his key to open the door, he found it flung open. Two men, formally dressed, pushed past him and rushed away. This event joins other which could be interpreted by the hypothesis that ASIO, the Australian CIA, was interested in gaining a clandestine knowledge of my research which at this time involved the solar-electrochemical production of hydrogen from water. If economically successful, one could see a threat from such a process to the use of oil as a fuel.

¹²I found air hostess in the 1970's who took the events described as cause for anxiety.

instrument panel which should have indicated that the nose wheel was down, was not lit up. This meant either that the light was faulty or that the nose wheel was not down.

Not being able to land until the problem had been solved, the Captain decided to fly out to sea but return over the Everglades, the extensive Florida swamp.

He flew around in this manner at 2,000 feet while the engineer, the co-pilot, and he, himself, attempted to observe the state of the nose wheel. All three rose separately from their seats in the flight deck, to go downstairs into the nose of the aircraft where they thought they could see the nose wheel (if it was down).

For about half an hour, the airplane flew while the crew struggled with the problem.

During the several times the pilots got up from their seats and moved about, one of them appears to have unconsciously dislodged the setting of the automatic pilot control. The plane had begun a slow descent, although neither the Captain nor the co-pilot were aware of this.

According to the voice box recorder, the Captain realized the situation when the plane was a few feet above the trees. He cried out, and tried to gain height. However, the plane struck into the Everglades swamp, and broke up, though it did not catch fire. About half the passengers were killed by the impact.

Captain Loft was still alive when rescuers arrived. He said, "I am going to die," and, although he did not seem to be badly injured, he did die within an hour. The engineer, Don Repco, had died in the crash. The co-pilot died later.

6.7.9.2 Phenomena Observed

In the two years following the accident, several Eastern Airlines hostesses, an engineer, and a pilot, say that they saw Captain Loft and Don Repco.

The planes in which the ghosts appeared were always aircraft on which parts from the crashed LH-1011 had been placed as spares. Realizing this, the company replaced the spare parts which belonged to the original aircraft, and the ghosts no longer appeared.

6.7.9.3 First Phenomenon

This was observed by a hostess in a lower galley of another LH-1011. She observed a small vapor cloud to form in one part of the galley. As she watched it, it took shape. Terrified, she retreated from it and turned her back upon it, but noticed in a mirror in the galley that it had formed the shape of the Captain's face.

6.7.9.4 Continued Phenomena

Many other phenomena of the same type were observed, most often in the lower galley. Usually, a face would be seen only. On one occasion, a hostess opened a cupboard and was confronted with the face of Don Repco.

After the faces, and sometimes the full forms with clothing, were seen, they would suddenly disappear.

On one occasion when Captain Loft appeared, he was sitting in the first class compartment in his uniform seated by an elderly lady. An air hostess thought the Captain looked odd, - always staring ahead and not answering queries, - so she called the co-pilot. When he arrived, he said: "My God, it's Don Loft." At this, the Captain vanished. The lady went into hysterics and was taken to a hospital.

6.7.9.5 Information Given by Ghosts

Occasionally, ghosts speak. Thus, the ghost of Don Repco, existing in face only, told a flight engineer "there will be a fire on this one." Later, this same aircraft was indeed involved in a fire, though, partly because of the warning, it was being flown by the crew only, and the fire was easily controlled.

6.7.9.6 Remarkable Telekinetic Phenomenon

On one occasion on an LH-1011 aircraft, a passenger called the flight stewardess to indicate a luminous shape on one side of the wing. Then, the plane began slowly to be gently rocked to and fro.

6.7.9.7 Information from Ouija Boards

A. G. Fuller tried Ouija board contact with the ghosts, and was able to communicate ("Dolly's got her hair done nice, I see"). He even joked, with minor puns, entirely in character with his personality when alive.

6.8 POSSESSION

6.8.1 Definitions

Possession is a state in which the normal personality appears to be replaced partly or completely by another, sometimes by several personalities.

Great caution and thorough psychiatric evaluation is needed before a case is accepted as being one of Possession (7)(10)(11). Thus, the phenomenon of "Multiple Personalities" is known psychiatry. Among signs favoring possession are inner voices; rapid swings in character and impulsive behavior (Fiore, 1987)(47). There are changes in favored language from the first, and has different skills.

6.8.2 Demonic Possession (9)

All cases of possession involve some suffering and if not effectively treated, - may lead to deterioration and even destruction of the personality invaded (10). A rare kind of possession involves signs of the presence of a malevolent entity in the possessed person. Such cases resemble those described in the New Testament (e.g., Luke 8:27, 29, 36).

Exorcism of this type is briefly described in Section (6.2.4). The material can be dramatic and disturbing (10).

6.8.3 Examples of "Normal" Possession

A rich source of examples of possession came from the work of Carl Wickland, a psychiatrist who practiced in Chicago and Los Angeles (49). He worked in collaboration with his wife, a trance medium. Wickland encouraged the departure of the possessing entity by passing an electric current down the patient's spine, whereupon the entity sometimes transferred temporarily to the nearby Mrs. Wickland. This fact underlies some of the following interchange which also illustrates the possessing entities' delusion in respect to time.

Wickland usually took the precaution of holding his entranced wife's hands during the "interview," a situation which caused misunderstandings (49). In the following examples, the possessing entity, Carrie, is apparently unaware that she is temporarily occupying Mrs. Wickland's body:

The conversation is reported by Ian Currie (2).

Doctor: Tell us who you are.

Voice: I do not wish you to hold my hand.

Doctor: You must sit still.

Voice: Why do you treat me like this?

Doctor: Who are you?

Voice: Why do you want to know?

Doctor: You have come here as a stranger, and we would like to know who you are.

Voice: What are you so interested for?

Doctor: We should like to know with whom we are associating. If a stranger came to your home, would you not like to know his name?

Voice: I do not want to be here and I do not know any of you ... when I ... sat down on the chair you grabbed my hand It has been a terrible time for me for quite a while. I have been tormented to death. I have been driven here, there and everywhere. I am getting so provoked about it that I feel like giving everything a good shaking.

Doctor: What have they done to you?

Voice: It seems so terrible ... I do not know what it is ... it seems as if my senses were being knocked out of me. Something comes on me like thunder and lightning. (Electricity passed down the spine in the treatment of the patient.) It makes such a noise ... it is awful! I cannot stand it ... and I will not ...! I have had so much hardship.

Doctor: How long have you been dead?

Voice: Why do you speak that way? I am not dead.

Doctor: Can't you realize what has been the matter with you? Understand your condition ... that you have no physical body. You died....

Voice: Could you talk to a ghost?

Doctor: Such things certainly do happen.

Voice: I am not a ghost, because ghosts cannot talk. When you are dead, you lie there.

Doctor: When the body dies, it lies there. But the spirit does not.... When you leave here you will understand that you have been talking through another person's body. That person is my wife.

Voice: What nonsense! I thought you looked wiser than to talk such nonsense.

Doctor: Do you want to go to the spirit world?

Voice: What foolish questions you put to me.

Doctor: You have lost your body.

Voice: I have not lost my body....

Doctor: Listen to what is told you ... you are ignorant of your condition. You lost your body, evidently without knowing it.

Voice: How do you know?

Doctor: You are now controlling my wife's body.

Voice: I never saw you before, so how in the wide world can you think I should be called your wife? No, never!

Doctor: I do not want you to be.

Voice: I don't want you either!

Doctor: Now, Carrie, be sensible.

Voice: I am sensible, and don't you tell me differently.

Doctor: Now Carrie!

Voice: I am Mrs. Carrie Huntington!

Mrs. Wickland: You listen to what the doctor has to say to you.

Voice: I will not listen to anyone....

Doctor: Do you know you are talking through my wife's body?

Voice: Such nonsense. I think that's the craziest thing I ever heard in my life.

6.8.4 Possessed People

In 1965, Allan Vaughn (cf Martin Ebon (50)) worked as a Science Editor in New York City. He decided to experiment with an Ouija board and on the third experiment concluded that he had been contacted by a discarnate entity, "Z", who appeared to be benign in character.

Experimenting further, he found himself contacted by a female discarnate called "Nada". So fascinated was Allan Vaughn with this contact that he decided to try to get a friend over to his apartment to share the excitement of his discovery. On calling the friend, however, he found no answer and at this point, took a step with serious consequences. He asked the entity Nada to help him find his friend's apartment.

Directly, he had, - as it were, - invited the entity to join him, - he felt a strange sensation in his head. He found himself walking in the street apparently to find the friend. However, he was mercilessly twirled around, - and staggered in this direction and that. "Nada" clearly did not know the location of the friend's apartment and was controlling Allan Vaughn to carry out random wanderings at her will.

On returning to his own apartment, Vaughn decided to use the Ouija board again and now was contacted by the benign entity, Z. The latter informed him of his condition: he had become "possessed" by the after life entity Nada. Z explained the danger of his condition.

Z's statement brought anxiety to Allan Vaughn and, - luckily for him, - it also caused him a violent protective reaction. He felt a great uprising within his body. It was as though something in him had risen up to force the invader out. He found this as a goal to the exclusion of everything else: he had forced himself free of Nada and her influence.

Thus, Allan Vaughn's case had a successful ending. Such an ending is not common.

Another example is that of Fred Thompson, a goldsmith, who was casually acquainted with Rob Gifford, a professional artist. Unbeknown to Thompson, Gifford died. Soon afterwards, Thompson experienced a strong urge to paint. The urge was so strong that he had no time for his professional work as a goldsmith.

Worried that he was losing the means to earn his living, - and fearing that he was becoming insane, - Thompson consulted Prof. James Hyslop, Professor of Philosophy at Columbia University in New York. He explained to Hyslop that when he painted he somehow felt he was Gifford.

Hyslop took Thompson to a medium who told of what she saw in the first session. It was a man standing behind Thompson. A description of that man showed that he resembled the artist Gifford. Thompson remained possessed by Gifford and had to give up his profession of Goldsmith and earn his living by selling paintings in the Gifford style (51).

6.8.5 Who Are the Possessors?

It seems that some entities, after the death of the body, tend to remain earth bound and do not make normal progress. Such "stuck" entities have had, while on Earth, an abnormally strong desire for Earth bound pleasures, e.g., abnormally strong love or hate; abnormally strong desire for food or sex; a wish for revenge, etc. On the whole, people who get left behind on Earth are those who are considered "bad" by the communities on Earth. An abnormal intensity of desire may keeps some discarnates Earth bound and causes them to develop a wish to possess a living person and thus regain the use of a body.

6.8.6 Demonic Possession (cf. M. Martin, 1992 (10))

There are some conditions of the psyche which are outside the realm of psychiatry. The principal difference between a disturbed personality, neurotic or psychotic, and a candidate for exorcism is the exhibition by the latter of a number of specific psychical phenomena. Thus, objects fly about the room; furniture cracks and breaks; there are strange noises, - hissing and rumblings, with no apparent source.

The consciousness of the patient takes on certain characteristics, e.g., reflexes sometimes disappear for a time; breathing stops for times of more than one minute; the face becomes strangely distorted.

Even though these symptoms are abnormal within the field of the behavior of psychotics, they are not enough to prove possession. Thus, a characteristic of the demonically possessed is the shouting of profanities and obscenities, cursing, snorts and facial distortions. However, there is a condition called Tourette's syndrome which causes some of the symptoms quoted (10). It is due to chemical abnormalities in the brain and responds to drug treatment. Certification by at least two psychiatrists that the phenomena cannot be explained on the basis of psychiatry is required before a priest will accept the challenge of attempting an exorcism.

Among the more telling symptoms which pushes diagnosis towards possession are:

- i. The exhibition of occult knowledge by the patient concerning the character and past lives in the would-be exorcist and his assistants. This may involve embarrassing revelations concerning the personal lives of those in the room: patient, doctor, priest, assistants.
- ii. A violent revulsion at the sight of religious symbols, e.g., the crucifix.

Such reactions are often violent and the exorcist may be struck. It is desirable¹⁰ to strip the exorcism room of damageable items, e.g., carpets, pictures, chandeliers, etc.

According to Martin (10), there are six recognized stages in the exorcism of a person showing demonic characteristics. They are called Presence, Pretense, Breakpoint, Voice, Clash, and Expulsion.

Presence is felt even during the preparation of the patient. It is a baleful atmosphere of hate, an atmosphere of destruction for destruction's sake.

In the early stages of an exorcism, the abnormal entity within the patient may try to unite himself with the possessed in character, - to hide, - the voice used being that of the patient.

The priest must break up the Pretense for the exorcism to make progress. In so far as he approaches success, the patient writhes and struggles in a more violent way.

When the Breakpoint comes, the embodied entity begins to speak in its own voice. The voice is usually slow and gutteral. However, just when understanding of it begins, there may be other voices added, screaming, laughing, sneering, groaning.

There then occurs the Clash. The exorcist now has a being to struggle with, the personality now showing itself. Can he, by his will power, and calling upon his spiritual strengths, silence the hideous voice emanating from the patient? It is now that the exorcist needs his greatest strength and determination.

A sample interchange between exorcist and the embodied identity is given by Brittle (9). It refers to a case being worked on by a lay exorcist, Edward Warren.

Voice:	I do not choose to be here!
Ed Warren:	Why did you come then?
V:	I am under the Power!
EW:	Whose power?
EW:	Describe yourself to me.
V:	No. (The crucifix is then set in place, followed by agonized screaming by the possessing spirit.)
EW:	Describe yourself to me!
V:	I must in truth tell you what I look like. I am wicked--and ugly looking. I am inhuman. I am vindictive. I have a horrible face. I have much gross hair on my body. My eyes are deepsunk. I am black all over. My nailes are long, my toes are clawed. I have a tail. I use a spear. What else do you want to know?
EW:	What do you call yourself?
V:	(Proclaiming) I am Resisilobus! I am Resisilobus!

The clash which occurs sometimes results in success, i.e., the expelling of the entity. How is it known that the possession has ended? Suddenly, all is quiet. The patient no longer wreathes and struggles. She wakes as if from a nightmare. Sometimes, she remembers nothing of the exorcism battle which may last for more than 24 hours.

The synoptic account given above is too short to convey the terrifying atmosphere generated during the exorcism of a demonic entity. Occult and entirely strange happenings

separate it from other types of abnormal experience. Demonic possession is surely one of the most stressful in human experience.

6.8.7 The Work of Arthur Guirdhan: Obsession

Arthur Guirdhan is a UK psychiatrist whose work (much of it with children) has led him to the conclusion that there is a relation between obsession and possessing spirits. Thus, an obsessional person is one who is compelled to carry out certain actions in spite of himself. A simple example is the phenomenon of facial ticks. A more developed one is that of indecent exposure, where the individual acts compulsively, but is often chaste and of low sexual potency. Shouting obscenities against the will of the patient provides a more extreme illustration. An ultimate one is the woman afraid to be alone with her children because she feels impulses to kill them.

Guirdhan (52) has found in his psychiatric work that patients beset by obsessions are also generally attacked by evil thoughts. He has concluded that some obsessions originate in reactions in childhood to the terror of being left alone at night. He makes the hypothesis that evil discarnates are then more likely to be active and that the child does not merely imagine when it is so afraid of darkness. The obsession is originally generated when the child attempts to protect herself by means of ritualistic reactions, e.g., jumping in and out of bed, saying a prayer in between, and repeating these reactions many times.

Guirdhan applies his hypothesis to the modern Western population. He sees it indulging in an obsessional worship of money. He regards this as set in motion by forces for which he believes his work gives evidence. He is pessimistic as to the chances for goodness in the present society, in which actions unconcerned with the pursuit of more money (giving to the poor, creative art, religious experience) are increasingly regarded with suspicion as antisocial!

6.8.8 Work of Edith Fiore: Possession As the Origin of Some Mental Problems (47)

Edith Fiore (47) is an American psychiatrist who works in Saratoga, FL. As a result of experimenting with various creative pathways towards mental healing, she has concluded that around 70% of her patients react well to a hypnotherapeutic approach.¹³ The aim of this approach is to find, and expell, possessing entities. The latter are largely Earth bound and find solace in settling within a living person, - much, however, to the disturbance of the possessed.

Fiore's findings on the degree of possession is that it ranges from complete, the original personality being entirely overcome by that of an invading entity, to a minor influence, which may nevertheless lead to psychological discomfort.

As to the age at which possession begins, Fiore echoes Guirdhan in finding that many possessions originate in childhood. Growing up while associated with a foreign Earth-bound spirit acts to cause confusion in the psyche of the possessed who asks spontaneously, "Who am I?"

¹³ For some patients, Fiore finds conventional psychoanalysis and the recovery of repressed childhood trauma to be effective. Some others, she finds, benefit by regression to past lives.

When possession occurs after childhood, there is greater consciousness that there are two people in one's body. "Until the accident, I was happy, but afterwards, I began to withdraw and try to avoid people."

Possession by spirits of the opposite sex is disastrous for it may lead to the rejection of the spouse and to active homosexual behavior.

6.8.9 Work of Shakuntala Modi (48)

A still more radical attitude in her work is taken by the Indian woman psychiatrist, Shakuntala Modi, an M.D. certified in the US, who works here (Modi, 1997) (48). Modi uses hypnotism and due to experiences found while using this technique, she has come to accept past life regression as a therapeutic tool.

Her practice has led her to a spiritistic interpretation of many kinds of psychological illnesses. She begins with inducing a hypnotic trance in the patient and while in this condition she often finds she can relate the malady to some kind of possessing entity. Her skill as a therapist then rests upon persuading the possessing entity to deport the patient (cf. the work of Carl Wickland (Section 6.8.3)). When this occurs, the patient resumes a healthy life.

Modi distinguishes between unconscious possession by Earth-bound spirits, humans, whose spirit, on death, did not make the normal transition, and demonic spirits, who arise from a non-human source and who are malevolent, causing soul fragmentation and disintegration of the person.

As with the so-called Healers, Modi regards herself as a channel for divine power.

A close examination of Modi's cases would have to be made to see if they could be fitted into the present range of psycho-therapies, without spirit hypotheses (although possession as a phenomenon is well recognized by parapsychologists). It is of interest to note that Dr. Modi's 1997 work brings psychotherapy round the full circle. Thus, in societies which have not embraced a scientific, materialist paradigm, the same spiritist interpretation of psychological illness is given (cf. Christ's "casting out of devils", recounted plentifully in the New Testament).

Modi reports on a range of physical symptoms among her patients which have been cured by depossession. Chronic tiredness, profuse sweating, sciatica, profound depression, intense abdominal pain, are all maladies which disappeared from the patient after Modi had used hypnosis to obtain information on and contact with the possessing entity.¹⁴

In mental problems, a lack of concentration is an example of a symptom which technique used by Fiore and Modi has cured.

6.8.10 Work of Stanislaus Grof

Stanislaus Grof (cf. Currie (2)) is the world leader in knowledge gained by psychiatric treatment of patients under the influence of LSD. He has written a number of books (53) on the development of ideas on the Nature of man, based on his work.

The particular event in Grof's work, which Currie relates, refers to an incident in his practice at the Maryland Psychiatric Center in Centerville, in 1976. A young woman

¹⁴ There should be no confusion between the processes at work here and exorcism of demonical entities. Fiore discarnate entities often seem submissive and react to reasoned argument.

patient presented Grof with a remarkable phenomenon during her first psychedelic session. Her facial characteristics underwent a transformation to those of an evil-looking male and her voice became deeply masculine and angry. The possessing entity shouted that the young woman belonged to him. The angry spirit, showing its paranormal power, - and embarrassingly shouted out descriptions of indiscretions in the private lives of people in the room. The possessing entity said that he would reveal their poor behavior to the media unless they desisted in their work on the young woman. Grof tried meditating on white light. He projected an image of himself and his team immersed in "white light."¹⁵ The phenomena ceased. The girl began to respond to treatment.

6.9 CREDIBILITY OF THE MATERIAL IN CHAPTER SIX (47a)

The material in this chapter is the most difficult among the chapters as far as credibility is concerned. An initial violent rejection of the material is to be expected from scientists ("utter rubbish"); but also, at present, by many among the lay public.

Thus, looked at from a modern scientific world view, most of the material in this chapter is unbelievable, and, indeed, absurd. Most people, and particularly intellectuals, will not take it seriously ("You must be crazy to believe that stuff."). Spirits? Hauntings? It's medieval."

Even the younger religious are perturbed by the continued insistence by the Christian church upon a literal interpretation of the meaning of the spiritual nature of man. As for the miracles described in the Bible (e.g., casting out devils), some modern theologians are in retreat from accepting a literal, rather than a symbolic, meaning to such events, which scientists have shown to be clearly impossible. When challenged on such matters, well educated (younger) priests tend to be embarrassed.¹⁶

On the other hand, there are some other points to be considered before the chapter is closed.

1. The work described has been carried out or phenomena reported on by academics, some of them eminent, many of them physicists, psychiatrists, or priests.
2. In contradiction to the idea that this is "all old medieval nonsense", the work quoted is seldom more than 50, - and some of it less than 10, - years old.
3. Fraud as an interpretation of the material seems extremely unlikely - because of the world wide recognition of the phenomena, although fraud is always difficult totally to eliminate in a specific case. The possibility that some of the reports are due to illusions must be taken very seriously. Methods are known whereby the reality of phenomena can be distinguished. Thus, apparitions of the dead have been shown to be observed collectively and by animals; and real phantoms occupy 3D

¹⁵ There is an occult tradition that evil spirits are turned off by intense white light.

¹⁶ It is of interest to note that Catholic priests seem unenthusiastic to enter discussion about evidence for the post mortem state, although this applies less to those in Brazil where followers of a nineteenth century French priest, Allan Kardec, tend to embrace a literal interpretation of spiritual life.

space. Hauntings occur repeatedly and occasionally have given rise to photographs. Possession is a phenomenon to be distinguished from multiple personality disorder. If the case is one of possession, the symptoms of illness disappear after a successful depulsion (48). The material of the chapter differs from that of others in the fact that the phenomena reported have all been known in history in all parts of the world.

Thus, and in spite of widespread modern skepticism, it is irrational to deny the existence of the observations reported in the chapter. It may well be that "seems to see" should replace "see" in reporting the observations but, - in respect to apparitions of the dead, - the collective nature of the sightings brings doubt upon the validity of "seems to" If it is necessary "to seem" one should say (as some philosophers do indeed want us to say), "I seem to be writing this chapter, or the "Sun seems to rise every morning," etc.

It seems unlikely that light on all these strange matters will come from further development of quantum mechanics, where some modern phenomena defy the rational (See Chapter III, Section 3.9.11). Thus, an observer is said to create his own Reality. However, this applies only in the quantum region (for subatomic particles) and does not apply directly to the macrophenomena which constitute paranormal events.

6.10 ACCOUNTS OF APPARITIONS, HAUNTINGS AND POLTERGEISTS IN TERMS OF THE PRESENT PARADIGM

Sociologists, psychologists and some parapsychologists find the phenomena reported in this chapter difficult to accommodate to the present physics. Thus, the first explanation is to stress the part played by fraud, hoaxes, - and particularly the faking of apparent photographs of ghosts (which, indeed, makes the available photographs of lessened value).

On the other hand, a number of sociologists and psychologists (and two parapsychologists) have published a recent book with articles covering a broad account of hauntings and poltergeists (27).

Thus, J. Nickel (54) stresses that much is to be studied in the effects of the will to believe. There may be forces as yet not understood which might lead to an understanding of Belief in apparitions and an ability to create phenomena in the imagination.

A. Roll and M. A. Persinger (27) present the most comprehensive accounts of modern hauntings yet in print. They stress a well-known fact, that poltergeist activity is always associated with the presence of a pubertal adolescent though the following table from their article makes clear that, the adolescent does not touch any of the objects which move.

Roll and Persinger stress unknown psycho-energetic forces. It is these, they suggest, which allow the connection which they have observed between poltergeist effects and geomagnetic disturbances. Further, they remind the reader that it is possible to use strong magnetic fields in the laboratory to cause a substantial sample of iron to float. They imply that there might be forces (unknown as yet) which could push vases off shelves, pull furniture across rooms, etc.

A more radical view is taken by J. Houran and A. Lange (56, p. 280). They present reasons for a rejection of the entire field of hauntings and poltergeists (presumably also of apparitions and ghosts) which they view as always due to delusions. They exemplify with

the figurine which crashes to the floor. There is no explanation immediately available, - for it is unknown to the observer that a heavy truck has passed nearby and caused a tremor in the house concerned. But once the observer has taken hold of a paranormal theory for the crash of the figurine, - the only possibility, as he thinks, - he will continue to apply the hypothesis whenever a normal explanation is not obviously available.¹⁷

In viewing the 14 articles in Hauntings and Poltergeists, one notices a trend which was clear in the present paradigm discussion of ESP. The attitude is that the alleged phenomena cannot be explained in terms of present science and therefore must be related to pathology in the observer.

There seems no doubt that this could apply to some cases, but, - as made clear by the eminent parapsychologist Gertrude Schmeidler (57), - there are many observations, - repeated hundreds of times in various countries, - of ghosts who turn up to give warnings, - or ghosts who are sighted by many people (and animals) at the same time. Those who have lived in a haunted house do not feel enlightened when they are told of the possibility that all the extraordinary things observed there are due to geomagnetic disturbances, or the rumbling passage of a heavy truck.

The observations related here cover a field which is a direct and strong challenge to contemporary physics and which demands its radical modification and/ or extension (Tiller et al. (58)).

Table 6.2
Movement of Experimental Objects in Miami Disturbances Case

When Investigators Had Target Area Under Observation
Hauntings and Poltergeists, Multidisciplinary Perspectives, 2001 James Houran & Kense Lange by
Permission of McFarland & Company, Inc., Box 611, Jefferson, NC 28640 www.mcfarland.com

Event	Object	Area placed in tier#	Area moved to aisle #	Object placed by	Target Area supervised by	Julio's Distance from object in ft.	Other Employees or Owners present	Julio observed by	
176	Alligator ashtray	3	4	Roll	Roll	4	C. Hagemeyer I. Rolden D. Rambisz	Roll had Julio in direct view	
181	Spoondrip tray	2	2	Pratt Roll	Pratt	8	A. Laubheim (and possibly others)	Pratt had Julio in direct view (arms & lower torso)	
183	Zombie glass	2(b)	2	Pratt Roll	Pratt Roll	5	C. Hagemeyer	Pratt and Roll had Julio in direct view	
194	Zombie glass	2(b)	2	Pratt	Pratt		C. Hagemeyer	Julio in direct view	
195	Alligator ashtray	3(a)	4	Pratt	Pratt		C. Hagemeyer		
198	Tab bottle	3(a)	4	Roll	Roll	7	C. Hagemeyer		
203	Zombie glass	2(b)	2	Roll	Roll	4	C. Hagemeyer I. Rolden	Roll had Julio in direct view	
207	Box of beer mugs	Shipping table			Roll	Roll	5	C. Hagemeyer	Roll had Julio in direct view
214	Iron beer bottle	3(a)	4	Roll	Roll	8	C. Hagemeyer A. Laubheim P. Wolfe R. May	Roll had Julio in direct view	
216	Beer mug	3(a)	4	Roll	Roll	4		Roll had Julio in direct view	

¹⁷ Houran and Lange (27) do not explain why the presence of an adolescent near puberty should be necessary for the delusions of the phenomena of the poltergeist to come into play.

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CHAPTER 7

LEAVING THE BODY

7.1 INTRODUCTION

The first to write in English about an out of the body (OBE) state was Hugh Callaway, a British occultist who began publishing in 1920 under the pseudonym of Oliver Fox (1). Then Marcel Forhan, sometimes called Yram (2) wrote a book published in English on practical astral projection.

The idea of astral projection was popularized by Sylvan Maldoon (3), a sickly youth living in Wisconsin, who wrote matter of fact accounts of his OBE's. He simply told how to leave the body temporarily under a variety of conditions, floated about, perhaps visited a friend and then returned to the body none the worse for the experiences.

In the 1960's Maldoon's accounts were expanded by Dr. Robert Crookall, a British geologist with a strong interest in parapsychology (4).

Dr. Hornell Hart (5), a sociologist at Duke University asked 155 Duke students about their OBE's in the 1950's and found that 27% of them had undergone at least one. Various other surveys were made and came to numbers such as 19%, 34%, 11%, 8%, 25%, 14%, and 20%. It is surprising to find that around one person in ten has had an OBE!

The Meninger Foundation of Topeka, KS was the site of important work by Twemlow and Jones (6). They tried to determine if people who have OBE's are psychologically different from other people and came to the conclusion that having an OBE is a widespread human potential; that anyone is capable of having one.

Twemlow and Jones' work made clear that the OBE is not a case of autoscopy, - seeing one's own body, - because in that case one sees only from the chest upwards, the vision is of a transparent body and one that mimicks the moves that the physical body makes. This is different from the independent entity one sees when one observes one's own body lying beneath one in an OBE.

The work of Palmer (7) at the University of Virginia is next. He worked with 60 volunteers trying to get them to make an OBE journey. The volunteers were subject to a state of mild disorientation through playing a monotonous sine-wave in their ears. They were asked to imagine that they had left their body and 42% said they did. A few of them succeeded in identifying a target picture in the next room.

Palmer taped half ping pong balls over the students' eyes and had them stare into a red light. Thirteen out of the 20 subjects told to leave their bodies felt they had done so. One of Palmer's students remarked, "I had a sense of sliding out of the back of the chair. I seemed to be still in my body, but there was a definite sense of motion. I seemed to raise up a bit, floating as in a bath of water. Palmer measured the ECG's of his patients and found that their theta waves were predominant during the described activity.

On the whole the OBE is reported as being a gratifying experience. *It demonstrates that the mind is an entity different from the brain and reduces the fear of death.*

The most senior worker to report OBE's is J. H. M. Whiteman, formerly Professor of Mathematics at the University of Cape Town. His work stands out because he has coupled his paranormal investigation with original developments in physics and mathematics (8).

Experiments in the home of the French worker, Durville (9), in 1908 involved 299

"sending" the subject's double into an adjacent room and instructing it to touch an observer. The trials were successful. The observer felt the touches and some thought there was a whitish apparitional figure. They also reported a cord-like extension protruding from the head or stomach leading back to the subject's physical body.

An important observation was made: that the room grew sensibly colder when an alleged apparition was there. Unusual was the observation that the fluidic body could produce raps, close a half-open door, etc.

Durville obtained two photographs, which showed a vaguely human form-white but opaque.

7.2 METHODS OF PROJECTION

7.2.1 Concentration

To produce an OBE the subject must learn how to "will" something to happen. Rogo (10) describes a psychic woman in New York who could focus on the objects she wanted to affect and will them to move. At this point, she felt that she merged with the object which she was trying to affect.

This is what the French worker, Lancelin, means by "dynamic willing". He advocated that people go to bed and try to impress upon themselves that they will exteriorize; it then tends to occur. This is similar to the christian concept of dynamic prayer: that through fervent desire and faith in the intermediacy of God, one can will something to happen.

The amount of will that one has to exert is great and the effort exhausting. One should approach the process slowly.

In 1965-1967, Rogo reports that he gained some control over his body. Belief is a key ingredient to the induction of an OBE. Darkness helps (10). Rogo found that he could project his presence to far off places and he had a friend called Dave to whom he made a fleeting appearance while Dave was in Los Angeles and Rogo was in New York (cf. My appearance in Adelaide, Australia, while I was near death in a hospital in Houston).

7.2.2 Relaxation

Celia Green (11), Oxford, England, showed that several of her informants reported OBE's occurring while they were meditating, relaxing, etc.

Muldoon (3) codified his method as follows:

(1) Lie on your back; (2) Take a deep breath; (3) Repeat the breath 8 times; (4) Close your eyes and concentrate on the top of your head. Try to tense the scalp muscles and then relax them; (5) Repeat with the neck muscles; (6) Repeat with the upper arms; (7) Repeat throughout the entire body; (8) Focus on the heart and feel its rhythmic pulsation; (9) Try to transfer awareness of your heartbeat to any part of the body; (10) Beginning at the forehead, go progressively down through your body and feel your heart beating at each location; (11) Now reverse the procedure and go back to the body until you reach the deepest and lowest part of the brain; (12) Focus attention on the heart and will it to beat slowly and steadily. According to Muldoon, the key to the relaxation approach is to get the heart to beat slowly and steadily. He said he got it down to 42 beats per minute. Then, exteriorization is likely to occur.

7.2.3 Visualization

The ancient Egyptians believed that images held in the mind enable one to bring about a certain effect. Scientifically obtained evidence now exists that diseases such as cancer can sometimes respond to mental imaging.

Roman Catholicism is not averse to teaching about visualization as a method of attaining higher mental states. St. Ignatius of Syria wrote a spiritual manual in the 1st century A.D. in which he advocated visualizing holy scenes as a method of experiencing ecstacy. (11)

A similar approach is one of those suggested by Rogo (10). One must drowsily think of projecting from the body and see it happening.

7.2.4 Work of Robert Monroe

The richest accounts of OBE's are in the book by Robert Monroe (12), particularly in the methods Monroe developed for intentionally leaving the body. Monroe was a successful American businessman, who found himself thrown in contact with a strange phenomenon.

Monroe describes in detail his first OBE. From lying flat on his back, he spontaneously found himself floating up against something. He at first thought he had fallen out of bed and felt back for the rug he thought must be underneath him. However, it did not feel like a rug. Looking down, he saw his wife and his body in bed. He was frightened and wanted to unite with the sleeping body on the bed, - whereupon he found himself instantly within it.

Next time, Monroe decided he would explore what he called Locale I, the ordinary locale of his house and its environs. He found that life in this second body was ideo-plastic (as earlier described for the Bardo state in the Tibetan Book of the Dead (13)). Walls provided no barriers. He arrived quickly at where he wanted to go. If he thought of visiting his friend, John, he found himself in John's house. He could not draw John's attention to himself in the OBE state but was able to believe in the reality of his visit because, - after returning to his normal physical body, - he would call John and ask him to describe details of what he was doing at the time at which he thought he had made the visit. He found John's description precisely what he had observed.

The ideoplasticity had to be used with care, - for example, - setting out to visit John, he might mind-wander to thoughts of Pam, - next, he'd be in a room in which he could see her, sitting knitting, etc. (verified by a phone call).

Then, Monroe made a discovery. When in the OBE state, he could transfer himself to a new and different world, which he called Locale II. This is the world which comes closest to the After Life described through mediums by discarnates of people already dead. It corresponds to some degree to the Hell, Purgatory and Heaven of the religious.

Thus, while in Locale II, where he spent most of his time in his later OBE's, Monroe experienced some incidents of high terror (cf. C. C. Ellwood (14)). For example, in total darkness, he came across a wall seemingly of iron, which seemed to bar his progress. He panicked, thinking he would not be able to return to his body this time, that he would soon be dead. Monroe had not prayed since childhood. But in these moments of terror, - in hell, perhaps, - he found that if he cried out and asked help from heavenly beings, Christ,

God, sometimes help arrived. It was in a form equivalent to the Guardian Angels pictured in the religions. He would find himself led out of danger by two beings.

On three occasions, Monroe experienced the state of bliss (Heaven), so often described by NDEers, the heavenly music, the feeling of total security, of being surrounded by love and peace (12).

In Locale II, time and gravity had no meaning. There were no families. On the other hand, he described meeting people. Sometimes, - particularly in Locale I, - Monroe could see people who did not seem to see him. However, occasionally, he would apparently be seen and cause fear among those who saw him. In Locale II, meeting people was normal and the people responded to his presence casually, usually with indifference (13).

Monroe devotes a separate chapter to sexual life during the OBE. In Locale I, he felt sexual arousal often and regarded it as a distraction. In Locale II, however, there was a kind of experience which he calls sexual but which was entirely different from the sexual activity in the physical body. There are, however, males and females in Locale II. He felt drawn to certain people whom he met quite casually and then, when he was close enough to one of them, he felt a sudden increase of force, and momentarily mingling of the two "bodies", and a pleasurable feeling, as if a low current electrical discharge was taking place between them. Then, it was all over, the "discharge" had occurred and there was rest and no attractions until it built up again (12).

Monroe also describes an area III, and here he differs from parallel accounts of others. Locale III is ordinary life again, gravity and time are back. It is "peculiar" in certain ways. There is no internal combustion to drive transports, life is slower than life in the 20th century. He saw people doing ordinary things, - building a barn, for example.

Finally, Monroe makes an intelligent summary of the conclusions from such experiences. Consciousness can exist without the brain. The existence of what spiritualists call the astral body in the afterlife, is inconsistent with the paradigm of present science, - and consistent to some degree with the theories of the churches. But Monroe saw nothing to support reincarnation (12).

When one analyzes many OBE accounts, one sees that the world perceived in them is a mimicry of the world that we inhabit. Most people who undergo OBE's do not examine their new environment closely enough to make this discovery, but here and there, there are spontaneous cases which indicate that the typical OBE world is an imitation of our own world. However, occasionally people will see a room, which has different curtains from the ones he knows it has at the Earthly home.

Thus, in the OBE one contacts a parallel of the real world, a plastic interactionary world that may alter when we physically alter our own. If I place a picture on a wall for example, the same object may appear in the parallel world, but this plane is more tenuous and less stable than the physical world of the 5 senses.

According to Prof. Whiteman, the Universe we normally perceive is a substructure of a vast realm of dimensions that lie beyond it. These higher worlds can be contacted only psychically. During an OBE we perceive a mirror image of this Earth's world, because that is the only world we know to imagine. We are chained to this mirror of reality by the limitations of our own mind (15).

A disciple of Whiteman's, John Poynton (16), argues that, during a first OBE, a close perceptual relationship exists between the OBE environment and that of the Earth

world. Thus, the OBE'er must constantly reassure himself that the experience is real and not a delusion. In time, our minds are allowed to peep into the new levels of the OBE. This occurs as the student becomes more at home in the out-of-body world.

Some discover tunnels (cf. The experiences of people who report experiences near death). Whiteman sees these openings before he leaves his body, i.e., is still in a pre-projecting state. A remarkable consistency exists among the reports of Monroe, Callaway, Forham, Fox and others about the way these higher worlds manifest. Some habitual projectors talk about three different worlds one might contact during the OBE. One is a world closely resembling our own. The second world is one of great beauty, a Garden of Eden. Sometimes the disembodied dead may be seen there. Occasionally, like a third world may be seen; it is a different and older version of our world.

7.3 SCIENTIFIC RESEARCH ON OUT OF THE BODY EXPERIENCES

Research carried out in the 1960's and 1970's attempted to establish that when a person claims he is able to leave his body and travel with full consciousness elsewhere, something actually occurs in our normal Reality.

There are several accounts given of this research, in particular that by Susan Blackmore (17), but also that described by Scott Rogo (10). There are several publications all of which have been used in the following account (although the outline by Scott Rogo has been the lead document in the investigation).

The earliest recorded U.S. research on OBE's was authored by Charles Tart of the University of California at Davis (18). He concentrated on the testing of Ms. Z., a young lady who said that she could evoke an OBE from sleep. Tart invited Ms. Z to spend some nights sleeping in his laboratory. He fitted her with electrodes, which monitored her brain waves. Meanwhile, Tart had built a shelf in the cubicle in which lay the camp bed he had arranged for Ms. Z. The shelf was well beyond her normal sight or reach. On the shelf was a piece of paper on which was written a five digit number. The first three nights of Ms. Z's stay in Tart's laboratory passed without incident. However, on the 4th night, Ms. Z called over the intercom and reported a successful exit and return - she had identified the number on a sheet of paper. Of special interest was the encephalographic recording which showed an abnormal pattern at the time Ms. Z reported she had left the body.

The leader of OBE research later came to be regarded as Karlis Osis (19, 20). He worked in New York with a well known psychic, Ingo Swann, who claimed he could induce an OBE at will (18a).

Swann was duly hooked up to a polygraph. Hanging suspended from the ceiling was a box and in it two pictures placed each at one end of the box. Swann was asked to travel up and look inside the box, identify the one picture; then "fly" round to the other side and identify the other picture. He was to describe each and make drawings. Swann had perfect success in these experiments and described the pictures, together with their colors (21).

Osis worked further with a divinity student, Alex Tanous, who claimed he could project himself and that his apparition could be seen by others. Tanous was also asked to go up and look inside a box but failed in the first attempt. Osis had the box rebuilt and placed beyond normal reach; this time, when Tanous experienced an OBE, he succeeded in identifying the pictures inside the box. Thus, Osis' experiments verified and extended those

of Tart with Ms. Z. When a person says she has an OBE, she has control of an entity with the ability to read and bring back new data (22).

Meanwhile, at Duke University a Psychic Research Foundation, under the direction of Robert Morris (24), was functioning. Morris' work on OBE's was entirely with one psychic, Blue Harrary. This man was confined to a room in one building, and in another building 20 yards distant Morris had placed certain targets which Harrary was asked to identify.

Blue sometimes succeeded and sometimes failed. But when he failed he was still able to report who was in the room containing the target. On one such occasion, the visitor was a certain Harry Posner; Blue reported this, though he missed the target. Mr. Posner said he saw an apparition at a time which coincided with Blue's record of an OBE.

Other experiments with Blue involved animals, in particular a kitten who showed arousal and excitement at the time of Blue's OBE's and a vicious snake, which bit furiously at the bars of its cage at a time coincident with one of Harary's claimed leavings of the body and transit to the room containing the animals (Scott Rogo, 25).

These experiments are strongly suggestive of man as a creature of body and soul. Are there reservations about this? Yes. One could perhaps say the psychics saw the numbers by far-viewing. However, the identification of targets in another room, the observations by others of the apparition there, and the behavior of the animals is inconsistent with this view.

One might think that research monies would have been available for further confirmation of such astounding and significant results, but the middle 1970's was the time at which accounts began to be circulated about paranormal occurrences around the time of death. These involve consciousness of an OBE in the "after death" state, i.e., they imply OBE's, so attention has gone in the direction of investigating these experiences rather than laboratory studies of OBE's.

7.4 NEAR DEATH EXPERIENCES

7.4.1 Examples of Near Death Experiences

The field of Near Death studies involves an area which, in its modern phase, began to be studied in the 1970's. It has arisen because of the remarkable accounts given by many who have been near to death, but were in some way revived. By and large, these accounts tell of a series of events, - usually pleasant, - sometimes climaxing in the meeting with a religious figure who asks "What have you done with your life?" As the people who survive to give their accounts do not die, it cannot be said that the study of Near Death Experiences (NDE's) leads to direct knowledge of the After Life. However, because the many accounts involve a core experience, which seems to be common to what is experienced by atheists, Christians, children and others, the experience is averred to be quite other than a dream. It seems reasonable to think it may foretell some part of an After Death Life (26).

Before going further, it is better to exemplify the nature of these experiences. Many dozens of such accounts by now have been published and are characterized by a certain uniformity. For a historical perspective, see Walker and Serdahely (27).

Raymond Moody bears the distinction of having been the first to have written about these experiences in book form (Raymond Moody, 28). In his second chapter he records a summarized account of what an NDE is like.

"A man is dying and, as he reaches the point of greatest physical distress, he hears himself pronounced dead by his doctor. He begins to hear an uncomfortable noise, a loud ringing or buzzing, and at the same time feels himself moving rapidly through a long dark tunnel. After this, he suddenly finds himself outside his own physical body, but still in the immediate physical environment, and he sees his own body from a distance, as though he is a spectator. He may watch resuscitation attempts from this unusual vantage point and is in a state of emotional upheaval.

"Later on, he collects himself and becomes more accustomed to his odd condition. He notices that he still has a body, but one of a different nature and with different powers from those of the physical body he has left behind. Soon others come to meet and to help him. He glimpses the spirits of relatives and friends who have already died, and a loving warm spirit of a kind he has never encountered before--a being of light--appears before him. This being asks him a question, nonverbally, which makes him evaluate his life and helps him along by showing him a panoramic, instantaneous playback of the major events of his life. At some point, he finds himself approaching some sort of barrier or border, apparently representing the limit between Earthly life and the next life. Yet, he finds that he must go back to the Earth, that the time for his death has not yet come. However, he resists, for by now he is taken up with his experiences in the afterlife and does not want to return. He is overwhelmed by an intense feelings of joy, love, and peace. Despite his wish to remain in the blissful surroundings, he somehow reunites with his physical body and lives.

"Later he tries to tell others, but he has trouble doing so. In the first place, he can find no human words adequate to describe these unEarthly episodes. He also finds that others scoff at him, so he stops telling other people. Still, the experience affects his life profoundly, especially his views about death and its relationship to life."

The above account is what Moody thinks covers most of the experiences reported. Here are three actual experiences from the same book.

1. "When the light appeared, the first thing he said to me was What do you have to show me that you've done with your life?, or something to this effect. And that's when these flashbacks started. I thought, Gee, what is going on? because, all of a sudden, I was back early in my childhood. And from then on, it was like I was walking from the time of my very early life, on through each year of my life, right up to the present.

"It was really strange where it started, too, when I was a little girl, playing down by the creek in our neighborhood, and there were other scenes from about that time—experiences I had had with my sister, and things about neighborhood people and actual places I had been. And then I was in kindergarten, and I remembered the time when I had this one toy I really liked, and I broke it and I cried for a long time. This was a really traumatic experience for me. The images continued on through my life and I remembered when I was in Girl Scouts and went camping, and remembered many things about all the years in grammar school. Then, when I was in junior high school, it was a real big honor to be chosen for the scholastic achievement society, and I remembered the feelings when I was chosen. So, I went on through junior high, and then senior high school, and graduation, and up through my first few years of college, up to where I was at the time of the experience.

"The things that flashed back came in the order of my life, and they were so vivid. The scenes were just like you walked outside and saw them, completely three-dimensional, and in color. And they moved. For instance, when I saw myself breaking the toy, I could

see all the movements. It wasn't like I was watching it all from my perspective at the time. It was like the little girl I saw was somebody else, in a movie, one little girl among all the other children out there playing on the playground. Yet, it was me. I saw myself doing these things, as a child, and they were the exact same things I had done, because I remembered them.

"Now, I didn't actually see the light as I was going through the flashbacks. He disappeared as soon as he asked me what I had done, and the flashbacks started, and yet I knew that he was there with me the whole time, that he carried me back through the flashbacks, because I felt his presence, and because he made comments here and there. He was trying to show me something in each one of these flashbacks. It's not like he was trying to see what I had done—he knew already—but he was picking out these certain flashbacks of my life and putting them in front of me so that I would have to recall them.

"All through this, he kept stressing the importance of love. The places where he showed it best involved my sister; I have always been very close to her. He showed me some instances where I had been selfish to my sister, but then just as many times where I had really shown love to her and had shared with her. He pointed out to me that I should try to *do things for other people*, to try my best. There wasn't any accusation in any of this, though. When he came across times when I had been selfish, his attitude was only that I had been learning from them, too.

"He seemed very interested in things concerning knowledge, too. He kept on pointing out things that had to do with learning, and he did say that I was going to continue learning, and that even when he comes back for me (because by this time he had told me that I was going back) that there will always be a quest for knowledge. He said that it is a continuous process, so I got the feeling that it goes on after death. I think that he was trying to teach me, as we went through those flashbacks.

"The whole thing was really odd. I was there; I was actually seeing these flashbacks; I was actually walking through them, and it was so fast. Yet, it was slow enough that I could take it all in. Still, the time span wasn't all that large. It just seemed that the light came, and then I went through these flashbacks, and the light came back. It seems that it was less than five minutes, and probably more than thirty seconds, but I can't really tell you.

"The only time I felt scared was when I was concerned that I wasn't going to be able to finish my life here. But I enjoyed going through this flashback. That was fun. I had a good time going back to my childhood, almost like I was reliving it. It was a way of going back and seeing it which you ordinarily just can't do (28)."

2. "This experience took place during the birth of my first child. About the eighth month of my pregnancy, I developed what my doctor described as a toxic condition and advised me to enter the hospital where he could force labor. It was immediately after delivery that I had a severe hemorrhage and the doctor had a difficult time controlling it. I was aware of what was happening, having been a nurse myself, and I realized the danger. At this time, I lost consciousness, and heard an annoying buzzing, ringing sound. The next thing I knew it seemed as if I were on a ship or a small vessel sailing to the other side of a large body of water. On the distant shore, I could see all of my loved ones who had died—my mother, my father, my sister, and others. I could see them, could see their faces, just as they were when I knew them on Earth. They seemed to be beckoning me to come on

over, and all the while I was saying, "No, no, I'm not ready to join you. I don't want to die. I'm not ready to go."

"Now, this was the strangest experience because all this time I could see the doctors and nurses, too, as they worked on my body, but it seemed as if I were a spectator rather than that person—that body—they were working on. I was trying so hard to get through to my nurses, the delivery room, the ship, the water, and the far shore—was just sort of a conglomerate. It was all together, as if one scene were superimposed right on top of the other.

Finally, the ship almost reached the far shore, but just before it did, it turned around and started back. I did finally get through to my doctor, and I was saying, I'm not going to die. It was at this point, I guess, that I came to, and the doctor explained what had happened, that I had had a post-partum hemorrhage, and that they had nearly lost me, but that I was going to be all right (28)."

3. "I had a heart attack, and I found myself in a black void, and I knew I had left my physical body behind. I knew I was dying, and I thought 'God, I did the best I knew how at the time I did it. Please help me.' Immediately I was moved out of that blackness, through a pale gray, and I just went on, gliding and moving swiftly, and in front of me, in the distance, I could see a gray mist, and I was rushing toward it. It seemed that I just couldn't get to it fast enough to satisfy me, and as I got closer to it I could see through it. Beyond the mist, I could see people, and their forms were just like they are on the Earth, and I could also see something which one could take to be buildings. The whole thing was permeated with the most gorgeous light—a living, golden yellow glow, a pale color, not like the harsh gold color we know on Earth."

"As I approached more closely, I felt certain that I was going through that mist. It was such a wonderful, joyous feeling; there are just no words in human language to describe it. Yet, it wasn't my time to go through the mist, because instantly from the other side appeared my Uncle Carl, who had died many years earlier. He blocked my path, saying, Go back. Your work on Earth has not been completed. Go back now. I didn't want to go back, but I had no choice, and immediately I was back in my body. I felt that horrible pain in my chest, and I heard my little boy crying, 'God bring my mommy back to me' (28)."

These three examples were chosen to typify the phenomenon. However, there are wide variations, as will be seen.

An obvious question at this early stage is: Why did experiences such as those above surface in the 1970's and following years?

The answer to this is that medical technology had progressed so that it has become no longer a rare event, - when a person, clinically dead for a short time, - is revived. Although some NDE's are spontaneous and take place without the triggering which medical intervention may bring, most recorded cases have occurred in hospitals and the accounts are told after revival machinery has been successfully applied.

But why the great attention, the many books, the new scientific journals (e.g., Journal of Near Death Studies) specially devoted to the study of these experiences?

1. The greatest difference between modern Western societies and those which have preceded it, is the banishment of death. Not only is all discussion, - or even reference to, - death is taboo in modern Western society, for the implication from the model of human

beings originating from Biology is that the being *is* the body. When the body dies, so does the being. Death is the End.

The Near Death Experiences suggest a contradiction to this view (29). They provide evidence for continuation of the Life after death. This, of course, is a revolutionary influx into a society based on the present science, which, if it becomes widely accepted and permeates Western Society, must radically change its nature, and join it in an acceptance of an After Death Life, the attitude of all pre-industrial societies.

2. Attention to these experiences shines a light on to the phenomenon of death. There seems a certain resemblance between the change in attitude towards sex, - no more than 75 years ago a taboo subject reserved for low voiced confidences in the doctor's office, or Roman Catholic confessional. We have learned to talk openly about sex, - this central fact of life, - and are we not the more healthy for it?

Similarly, these studies may bring about a revolution in the ease of discussing Death and looking frankly at it as the most certain thing about life. It may also raise the question of what happens in the After Life, whether our lives here influence our Life after Death.

7.4.2 Earlier Accounts of Near Death and After Life Experiences

The earliest recorded accounts of experiences at and after death come from The Egyptian sources. Egyptians were the first to take immortality as a part of the public philosophy. The soul passes to judgment at death and then begins a time of everlasting joy and happiness. Dead souls regain the physical strength and appearance of youth. Friends are met (B. Ross (31)).

Plato (427-347 BC) has a story of a person he names Er. Er is first seen witnessing the arrival of souls from one of two doors, the one called Heaven and the other Hell. It is implied that they have lived before and finished the reward or punishment merited by the previous life. He describes how all, - except Er, - take a potion of forgetfulness and proceed to choose the circumstances, of the next life.

Early in the Christian era, the apostle Paul referred to the after death state and to a Life Review and Judgment.

The 9th Century contributed two noteworthy documents relevant to Near Death studies. The first is well known and called *The Tibetan Book of the Dead*.¹ It recounts in great detail the alleged happenings to the soul between incarnations; it is a kind of guidebook on what to do while still within a body to attain a good death, with possible Enlightenment or probable reincarnation the result. It also describes meetings with dead friends and the appearance of people as if they were in the prime of life (35) (cf, the similar reports in the Near Death visions).

The other 9th Century document is a frightening one. Its author was a Benedictine monk, Bede. He gives an account of the alleged experiences of a Northumberland (UK) man, Drithelm (35), who suddenly appeared to die. However, shortly after the mourning has begun, Drithelm sits up and tells his terrified wife that he has undergone experiences which

¹ The original *Tibetan Book of the Dead* is difficult to obtain and not always understandable. A Tibetan monk, Sogyal Rinpoche, has written a fully modern book which is relatively easy to understand, - except for the over use of Tibetan names in describing spiritual practices (13).

will change his life. He has met an individual in a glowing raiment and been taken by him on a journey. They pass through a huge valley, on one side of which is fire and on the other side, ice. Drithelm sees dead (but conscious) creatures being tossed across the valley from the fire to the ice and from the ice to the fire. His guide tells him that these are those who are not damned. However, they repented of their sins only on the deathbed and must therefore undergo suffering before being admitted to heaven. Further, their release will happen only if those on Earth pray for them and fast on their behalf.

Then, Drithelm is shown Hell. It consists of a bottomless, stinking pit, and damned souls are constantly flung up from its depth and fall back again. At this point, a demon attacks Drithelm but is driven off by his radiant guide.

Eventually, they reach a place of Clear Light. There is an endless wall and over this they see pleasant meadows, blooming with flowers. Happy people are seen there. The guide explains this is a foretaste of Heaven, in which one experiences much greater Joys than those shown.

According to Bede's account, Drithelm told his wife his life must change. He becomes a Benedictine monk subject to the austerities of the monastic life² (fasting, little sleep, cold baths).

There passes, then, a gap of 900 years until the time of Emanuel Swedenborg, a most remarkable Swedish scientist and savant who has given clear evidence of having psychic power³ (L. Rhodes (36)). Swedenborg also offered evidence that he could pass from the common reality to Another Reality and from there brought some descriptions of the After Death state. Relations and friends are met - and they have become young again. Time has no meaning. "Close" does not refer to distance, but means emotionally close to relatives or friends. One's domicile in the other Reality is a reaction to the life just led. Thus, a thief will have a rough time among thieves.

A person who has led a life showing compassion and devotion to helping others will experience a blissful existence.

The next event of moment in the gathering of evidence concerning a possible After Life, the founding in London by academics from the University of Cambridge in 1882 of the Society for Psychical Research. In its early years, the Society was concerned largely with attempts to gain evidence of a possible After Life. A similar society was founded in the USA in 1886 by the eminent Harvard psychologist, William James. In spite of the enthusiasm and undoubted ability of the founders' of the two societies,⁴ the effect of the

²It goes without saying that Bede's account must be regarded with skepticism. Could the monk Bede have invented the story of Drithelm to encourage men to join his order?

³Swedenborg had earlier been an engineer and later worked in government. He lived alone, occupying a bedroom and study only. He practiced many austerities and claimed he was able to visit the other Reality at will. His reputation was increased after an incident in which Swedenborg brought to the queen of Sweden a message from her dead brother which contained information known only to her and the brother. Swedenborg died peacefully in London having told his landlady a few days before of the day of his death (38).

⁴Early members among whom was Sir Oliver Lodge, one of the first to send a radio message; and Sir William Crookes, who discovered the rare gas, krypton.

results which the Society obtained were reduced by the impact of Darwin's theory which required that human beings were merely "higher" developments of animals.

Noteworthy, in 1926, was the work of Sir William Barret, an Irish physicist (37). Barret was affected by the accounts of dying people given by his wife, an obstetric surgeon. Typical of these was that of a woman dying in childbirth. She asked that there be allowed no darkness, but suddenly looked with a radiant smile to a certain part of the room. "Oh: Lovely, Lovely" she exclaimed, - and described seeing her dead father and her sister who had recently died, a fact which had been kept from the dying woman.

Barret's accounts concentrated on experiences which recounted death-bed happenings in which the dying person seemed to see those whose death had not been known to her. Barret published his reports (37), and it can be said that his book began the modern study of Near Death Phenomena.

In the period (1930-1970) there is less to report. An experienced American psychic investigator, Gardner Murphy, published a paper analyzing the evidence for survival and came down tentatively on the positive side. Karlis Osis and Eleander Haraldsson (40) polled 2,500 doctors and 2,500 nurses as to their experiences of visions seen by dying patients. They included 704 Indian doctors. Eight hundred and seven replies were received, and among those were reports of those who saw relatives (90%); 67% saw a person, whom they interpreted as someone who had come to take them away. As to the difference between Indian (largely Hindu) and Christian accounts, the Christian reports (surprisingly) showed greater serenity by the experiencer than the Indian ones..

There is also to note a Gallup investigation (G. Gallup, 41). He found that 5% of dying people experienced death bed visions.

An excellent account of the historical development of the study of Near Death Experiences is in B. Walker and W. Serdahely (27).

7.4.3 Principal Authors of Modern Studies of Near Death Experiences

There are by now quite a number of authors in this field and it is useful to have the names of the most outstanding, in order of their date of first publication.

One can start with Raymond Moody who wrote the book, *Life after Life* (42). The book is a classic. Moody was a Ph.D. in philosophy from the University of Virginia. At the time of his writing, he was on his way to a career in psychiatry. The book gives a good account in 184 pages of his work with 150 cases reported. Most of the basic phenomena, now widely discussed, are described in this book, including attempted explanations within the present paradigm.

Then, in 1980, a book, *The Soul After Death*, by Fr. Seraphim, was published, which stands out as a sentinel of opposition.(43) It is by a priest of the Russian Orthodox Church, but written during his sojourn in the USA. Briefly, the book presents the view that the Near Death experiences are deceptions planned by evil forces to trap mankind into a false sense of security. At this time, Rawling's work on negative NDE's (Section 7.4.3) had not yet been published, and Rose faced accounts of a paradisical beginning to the After Life for all deceased. This book is not a religious tract. It represents a different account of the After Life, - a more threatening one, - and Rose's anxiety was that the account of NDE's being reported could lull humans into permissive living.

1984 saw the publication of the first book, *Heading Towards Omega*, from the most prolific author in the field (44). He is Kenneth Ring, who at the time of writing this book was Professor of Psychiatry at the University of Connecticut, in Storrs, Connecticut. After a full account of the field as seen in 1984, including the first published estimates of the frequency of observation of certain characteristics of NDE, Ring brings out a bold hypothesis. It is that the recrudescence of the phenomena now, - sparked by the greater number of people who are being revived from near death, is a symptom of what is happening to mankind. There is a Transformation going on from the nihilism of valueless science, - life without point, - to a life full of opportunity to give, to love, to help others. Ring suggests mankind is traveling the path hypothesized by Teilhard de Chardin in his well referenced book, *From Alpha to Omega* (45), where somewhat similar thoughts about the development of culture towards a rebirth of spiritual values is given (but cf. Spengler, *The Decline of the West* (46)). Ring's work is strictly that of a scientist evaluating data and speculating on what it may mean.

Next, in order of the date of publication is the book by Scott Rogo, a psychic and a psychic investigator. It is called *Life after Death* (47). Rogo's book is broadly based and Near Death Experiences are considered in Chapter 3. The rest of the book considers other phenomena which may throw light upon the Great Question of Survival after death (OBE's; spirit voices recorded; Reincarnation, etc.). It is a scholarly, low key work.

Then comes a work by Carol Zaleski, *Other Worldly Journeys* (30), written in the Religious Studies School of Harvard University. The book is strong on the historical side and brings out a conclusion of great importance. This is that, until and through medieval times, the content of the anomalous experiences on record was largely negative and terrifying, - similar to the 9th Century experience of Drithelm described above. During the last half millennium the tone has changed, until, now, most of the reported experiences are of a paradisical realm awaiting the deceased. Zaleski concludes that the near death experience reflects only the religious imaginings of the experiencer. They do not pertain to Reality.

Raymond Moody published a second book in 1988, *The Light Beyond*, published by Bantam Books (48). It expands the scope of his classical work of 1975. Among new matters introduced are the NDE's of children and the transforming potential of the experiences on the lives of experiencers. Moody's conclusion is that the experiences are so uniform between those of children and adults of various religious backgrounds, including those of atheists, that they must represent some kind of Reality.

Melvin Morse is the next author in respect to time of publication; he was at the time of writing an Associate Professor of Pediatrics at the University of Washington. His book is *Transformed by the Light* (49). He describes experiences reporting the usual phenomenology, Tunnel Passage, Peace and Tranquility, the Being of Light, The Life Review, etc. He stresses the transforming effect that the experiences have on those who return. They become compassionate, loving, eager to help others.

1992 saw the first publication by author Susan Blackmore who has become a recognized leader of opposition to the effect, reports of these experiences may have on the present paradigm. Her book, *Beyond the Body* (17), is largely about OBE's, but its evaluation of these is bound to be significant for the evaluation of the meaning of NDE's, which involve the implicit assumption of OBE's.

Susan Blackmore's work is outstanding in the degree of detail she gives to her description of the phenomena observed. This seems to add up to a ringing endorsement of a new and real phenomenon of great philosophical significance. However, bafflingly, at the end of the book, Dr. Blackmore (who is a lecturer in psychiatry at the Universities of Bath and Bristol in the UK) suddenly changes stance and gives reasons why she thinks apparent verifications of OBE's must involve mistaken interpretations, and is, in any case, based upon poor and uncertain data.

1992 also saw a further book by Ring, *The Omega Projects* (26), but now the author boldly goes forward to suggest a New Paradigm, strongly evidenced by NDE's - but also connected to the UFO phenomenon! The introduction of the latter probably lost Dr. Ring some university colleagues because in US universities the myth continues, - UFO's do not exist, - and they can only be reported by persons steeped in illusion.

1993 witnessed the publication of a second book by Susan Blackmore, this concentrating on the NDE (50). It continues the characteristics of the first. It is full and accurate in relating data. It is reasonable in criticizing weaknesses in the interpretation of the raw data. However, at the end Dr. Blackmore swings around to negative conclusions based upon her concept that in near death states the oxygen supply to the brain becomes limited. It is this which causes the feelings of love, security, eagerness to help and others, etc.

1993 also witnessed the first publication of a book by a nuclear engineer, Arvin Gibson (50a). Gibson and his wife advertised for people who had had NDE's, met with those who replied, and tape recorded their accounts. The striking thing about these accounts, gathered in the 1990's, is their vivid character, such that one often feels at the scene with them. Many of those interviewed by the Gibsons' were Mormons. An abnormal fraction of the accounts involves alleged contact with a religious figure whom the NDE'ers often said they took to be Jesus Christ. The experiences reported were mostly heavenly (often after physical suffering while still alive). But some experiences were hellish (5 experiences, 12%).

However, 1993 was a bad year for those who had up to this time a positive outlook arising from the NDE at that time available. 1993 was the year in which Maurice Rawlings, a cardiac surgeon, published his book, *To Hell and Back* (50). The book recounts many negative NDE's of horrific character, similar to that described by Driethelm in the 9th Century. Rawlings thinks that the prevalence of negative NDE's might be as high as 50%. He indicates that this is the kind of ratio he judged from cardiac resuscitants, who were too fresh after the experience to forget unpleasant experiences. He stresses a fact which can hardly be denied. If one has had a ghastly nightmare, with the very worst implication for your spiritual future, you are not enthusiastic to relate it to others, - it is a stain on your character. The blissful experiences reflect well on you and are remembered.

Rawlings' work was a huge ink blot on a lovely canvas. There has been much discussion among the authors as to its meaning. However, a decade after Rawlings, it seems to be now accepted that the after death state indicated by the experiences may be paradisical or it may be horrific. The remaining question is the ratio of Good to Bad experiences. Thus the rosey early picture of Kubler-Ross (52), - who told of a happy time for all after death, has not been confirmed.

Another book by Melvin Morse was published in 1994 (53) and this goes further than other books in the field in drawing conclusions from the data of NDE's about religious topics, *Guardian Angels, Divine Love*, - but also Hell and Punishment.

All of the work so far quoted comes from US authors, but 1995 saw the publication of a book by the President of the British Branch of the International Association of Near Death Studies, Dr. Peter Fenwick who, with his wife, Elizabeth, wrote *The Truth in the Light* (54). The book is strong on the scientific side - many interpretations are suggested. There is a beginning of attempts at a theory and cultural comparisons with reports from other countries.

Dr. Michael Sabom published in 1998 the book *Light and Death* (56); which arose out of the experiences of a cardiac surgeon who was initially reluctant to take parts of the phenomenon seriously. He faces the implications of Hell and punishment.

Another book by Kenneth Ring appeared in 1998 (57). Here Dr. Ring stresses the observations reported by experiencers from the operating room. Remarkably detailed (and verified) statements from the unconscious patient concerning the readings on certain dials in machines associated with the operation are recounted. NDE's of the blind are examined, - they can see in the After Death state! Children's NDE's are evaluated (they contain many of the elements of those reported by adults) and lessons of the Life Review are discussed.

Then, in 1998 came a book from an Assistant Professor at the University of Toronto, an exorcist and medium. He is Ian Currie and his book (58), is broad in scope. The book is a quiet, rational presentation of the evidence for an After Death state, several chapters of which are devoted to NDE's.

The challenge of the negative NDE is treated in great detail by Gracia Fay Ellwood in her book *The Uttermost Deep* (14). This work contains the largest concentration of descriptions of negative NDE's, in fact, their nature and interpretation is the main point of the book. One of the new insights brought to bear on the meaning of the hellish NDE's is that similar experiences can be had by the experimental use of LSD (Grof, 55); and are also recorded by mystics.

There is a hint at consistency with the after death account given in the book by Sogyal Rinpoche (13); an Tibetan Buddhist account of the After Death state, in which all souls undergo paradisal and hellish experiences.

The books summarized here are listed in Table 7.1.

There are other books, e.g., *Return from Death* by Margot Grey (59). Horrible NDE's are 12% for Grey; Greysen (29) has them at 1%. Ellwood's survey averages 15%.

7.4.4 Main Journals in Which Near Death Experiences Are Described

1. *The Journal of the Society for Psychical Research* (UK).
2. *The American Journal of the Society for Psychical Research*.
3. *Journal of Near Death Studies*.

Papers may be also found in other publications on parapsychology, but the main opportunities for publication under strong peer review are in the above.

TABLE 7.1
OUTSTANDING BOOKS ON NEAR DEATH EXPERIENCES

AUTHOR	ESSENCE	
William Barret, 1926	At the hour of death, paranormal happenings are sometimes seen.	Morse, 1994 Positive Implications for Reality of Religious Beliefs.
Moody, 1975	First definitive and general account of Near Death Experience. Positive.	Fenwick and Fenwick, 1995 British authors' general survey strong on scientific side; and statistical data from UK. Mirrors findings of US authors. Skeptical scientific attitude. Various alternative interpretations considered.
Rose, 1980	Experiences are demon-caused illusions meant to lull man into a false sense of security.	Sabom, 1998 Cardiac surgeon at first reluctant to accept findings. Became convinced as result of his own investigations.
Ring, 1984	Wide-spreadness of phenomena suggest radical change of civilization. Is developing towards Omega Point of Teilhard de Chardin.	Ring, 1998 Reality confirmed by accurate observation in OBE of patients who read dials of instruments. Blind see. Children! Life reviews teach much.
Scott Rogo, 1986	Low key, wide ranging account of paranormal phenomena Near Death Experiences an important contribution.	Gibson, 1998 Particularly vivid accounts of NDE's from general population, largely in Utah.
Zaleski, 1987	Nature of NDE's has changed over the last millennia. Until the Enlightenment most were hellish as with Drithelm. In the last few hundred years have become largely paradisical. Experiences are illusions.	Currie, 1998 Is general survey evidence for Life After Death. NDE's important component.
Moody, 1988	NDE's of children significant - same as adults. Experiences uniform independent of religious groups. Both points support Reality of phenomena.	Ellwood, 2001 Book devoted to descriptions and attempts to interpret negative NDE's. Evidence suggests quality of experience not related to life led! Similar positive and negative experiences shown in mystical and psychedelic states.
Morse, 1992	Presents full phenomenology. Tranquility, Tunnel, Being of Life etc. Stresses effect on lives of Experiencers.	Greyson, 2001 Balance of evidence in favor of spirit hypothesis.
Blackmore, 1992	Thorough review of OBE's apparently supporting reality of phenomena. However, author pulls back at the end. Apparent verification of experiments deceptive.	7.4.5 The Light The most striking phenomenon in the NDE is "The Light." This is often described as being at first a small light at the end of a tunnel. It may develop into a glowing cloud, the brilliance being greater than has been hitherto seen by the percipient (but the eyes are never hurt by the Light). A Being, - the Being of Light, - is met with at the end of the tunnel. It is glowing and its raiment illuminated. Saints and angels are sometimes seen in association with observation of the Light. The Light brings supreme joy and happiness. NDE'ers are transformed in character by the Light. They no longer fear death. Psychic power develops in some and pre-cognitive dreams occur. Spiritual values develop and NDE's feel compassion for others and want to help them. But the greatest change wrought by an NDE is the ability to Love. Love is the supreme value which the NDEer is taught her by the Light (57).
Ring, 1992	New Paradigm indicated by NDE's. Messages similar to many brought by aliens.	Reports of the Light go back to Plato. It is a central feature of the account of the After Death State given in the Tibetan Book of the Dead (13), which also describes a "Ground Luminosity" (a glow enveloping all things observed). Here is a brief description of the Light taken from "Lessons of the Light" by Ring. "There is an enormously bright light. It seems to cradle you. It is glorious and perfect. Your life is multiplied 1000 times. You know Everything in the Universe is OK."
Blackmore, 1993	As with OBE book remarkably thorough, objective survey of NDE phenomenon, surprisingly ending in conclusion that experiences are due to abnormal body chemistry at time of death.	
Rawlings, 1993	Cardiac surgeon. Bombshell book. Half NDE's are probably horrific. But people tend only to report the paradisical ones.	

Steve said, "We have the light inside us. Inside we are all like Him. We are all made to become like the person composed of this intense and bubbling light which meets us at the end of the tunnel.

"No one except ourselves shapes our destiny after death. The light may indeed reflect our true nature and dissolve our personal sense of sin, but it can never absolve us of the responsibility for our own lives, nor what we are in our essence. How we have, in fact, lived will be evidence, - perhaps painfully so, - after death."

7.4.6 The Frequency of Various Experiences within NDE's

The following table follows the work of Pasrich and Stevenson, 1986 (60) who compared the experiences of Americans and Indians and Feng and Lin (61) who compared Chinese and UK experiences.

One of the key questions in assessing the meaning of NDE's is to what extent are the experiences universal? Although authors, as with Fenwick (54) and Ring (57), have the opinion that intracultural similarities exist, there are difficulties in this view (see Table 7.2). For example, many Indian experiences report discovery of a mistaken identity, - when they reach the other side they are told there had been an administrative error. There are several other types of Indian experiences which have no parallel among the Western ones. Forty-four percent have information that another person is to die. Most Indians (81%) are brought back to their bodies by messengers, but only 24% for UK experiencers. Correspondingly, feelings of Peace and Joy, - often experienced by Americans, - are unknown to Chinese.

Table 7.2 Experiences within NDE's

	Indians %	Chinese %	US %	UK %	Sum of %'s
Life Review	50	22	27	17	126
Tunnel	16	32	51	99	
Brilliant Light	75	15	53*	72	215
Saw dead relatives or acquaintance	25	28	15	36	104
Described Return to body	81	15	20	24	65
Out of the Body Experiences detailed	43	27	65		135

*Obtained as average of US experiences. Thus, the observation of the Light is the most repeatable among the experiences listed (followed by the Life Review). It is experienced in more than one half of all experiences.

Data from Africa is scarce but the few examples have a different message from those in the West. On reaching a group of white robed figures, the Aspirant is told he is not wanted. There are dismaying differences in the fragmentary data from some Eastern countries, e.g., visions which picture "heaven" as a noisy New York City with its tall buildings (57).

The sparse intercultural information one has on NDE's early in the new millennium may be misleading. Research is needed, e.g., among radically "different" cultures such as the Australian aborigines or Shaman-influenced cultures which may still exist in parts of Russia. Nevertheless, when, later in this chapter, we ask ourselves about the significance of Near Death Experiences, it is disquieting to find the US and UK data giving a certain picture, while NDEers from other cultures report something rather different. These are not always easy to associate directly with differences in religion. These differences in NDEs from various cultures provide major difficulties on the way to an integration of NDEs into our knowledge of the After Death State. For example, although there is much overlap of the NDE experiences from US and UK sources and those of *The Tibetan Book of the Dead*, there is less overlap with descriptions of the After Death state arising from the accounts of Swedenborg, although his descriptions agree well with those of theosophists and spiritualists. Meek (52) has given the most recent account of the post mortem condition and it is more consistent with Swedenborg theosophy and spiritualists than that of the NDE's. (Of course, the NDE experiences are supposed to show only the first stages after death.)

7.4.7 Effect of Experiencing an NDE

It has been mentioned in describing the Light that those who experience it lead changed lives thereafter. Ring (57) divides the effects into the following:

1. Appreciation for Life

Having died, - or been pretty near to it, - and having been resuscitated would make anyone thankful to be alive. But it seems much more than that with NDEers. After the experience, the NDE'er savors every part of the normal life. A sense of wonder at "everything" permeates.

2. Self Acceptance

A greatly enhanced sense of confidence is noticed. One feels worthy on one's own. There is no more need to please the crowd.

3. Concern for Others

Compassion, - a feeling of pity in identification with the difficulties of the other, - is probably the most noticeable change.

4. Reverence for Life

Buddhists talk about reverence for "all sentient creatures", and this is a fair description of the expansion of concern from that for one's self and to those nearest you, to that for life forms in general, brought about by an NDE.

5. Anti-Materialistic Outlook

The pan-materialism and consumerism of life in the West with its major concentration on compensation, fades in importance.

6. Anti Competitiveness

Whether you are "better" than others matters little anymore.

7. Spirituality

It is not so much Church-going which matters more now. One's life is simpler and invaded by spiritual thinking and feeling.

8. Knowledge

Of course, such a tremendous experience as an NDE makes one think much more and ask questions.

9. Fear of Death

This simply ceases. Many who have the positive experience want to die.

10. Belief in God

It matters little what name is used but NDEers have a keen sense of Another Consciousness, in which, eventually, we all take part (57).

7.4.8 NDE's of Children

There is importance in gathering NDEs of children, particularly children from different cultures. The reason is that children have not been pre-conditioned to think in terms of certain conventional patterns. Hence, their NDE's are more likely to represent Truth, unadulterated by the religious thinking of their culture. Further, according to Moody (48), children below the age of 10 years do not have an image of death as something tragic, but rather that it is a vacation from which one returns.

Yet, examination of the record (admittedly of American children only) shows that they see their bodies from a point outside them; experience going through a tunnel; meet dead relatives; and experience the Being of Light.

Moody gives several accounts of children's NDE's; the first occurred when he was a resident. It is told by Sam, a nine year old who had almost died a year before from a cardiac arrest.

"I was chatting with him about his illness when he shyly volunteered: 'About a year ago, I died.'

"I began to coax him about his experience. He told me that after he died, he floated out of his body and looked down as the doctor pushed on his chest to restart his heart. Sam, in his altered state, tried to get the doctor to quit hitting him, but the doctor wouldn't pay any attention.

"At that point, Sam had the experience of moving upward very rapidly and seeing the Earth fall away below him. He then passed through a dark tunnel and was met on the other side by a group of 'angels'. I asked him if these angels had wings and he said no.

"They were glowing", he said, luminescent, and all of them seemed to love him very much.

"Everything in this place was filled with light", he said. Yet through it all, he saw beautiful pastoral scenes. This heavenly place was surrounded by a fence. He was told by the angels that if he went beyond the fence he wouldn't be able to return to life. He was then told by a Being of Light (Sam called him God) that he had to go back and re-enter his body.

"I didn't want to go back but he made me," said Sam."

Moody then tells of another nine year old child, Nina. During appendicitis surgery, she underwent a cardiac arrest and found herself watching the surgeons trying to resuscitate her from a vantage point above the doctors.

"I heard them say my heart had stopped but I was up at the ceiling watching. I could see everything from up there. I was floating close to the ceiling, so when I saw my

body I didn't know it was me. Then I knew because I recognized it. I went out in the hall and I saw my mother crying. I asked her why she was crying but she couldn't hear me. The doctors thought I was dead.

"Then a pretty lady came up and helped me because she knew I was scared. We went through a tunnel and into heaven. There are beautiful flowers there. I was with God and Jesus. They said I had to go back to be with my mother because she was upset. They said I had to finish my life. So I went back and then I woke up."

"The tunnel I went through was long and very dark. I went through it real fast. There was light at the end. When I saw the light I was very happy. I want to go back to the light when I die. . . . The light was very bright."

Melvin Morse (53) tells of a 7 year old girl who had nearly drowned in a swimming pool. The girl told Morse that she had had an NDE but she was embarrassed to talk about it, but finally the following came out.

"The patient said that the first memory she had of her near-drowning was being in the water. She stated, 'I was dead. Then I was in the tunnel. It was dark and I was scared, I couldn't walk.' A woman named Elizabeth appeared, and the tunnel became bright. The woman was tall, with bright yellow hair. Together they walked to heaven. She stated that 'heaven was fun. It was bright and there were lots of flowers.' She said that there was a border around heaven that she could not see past. She said that she met many people including her dead grandparents, her dead maternal aunt, and Heather and Melissa, two adults waiting to be reborn. She then met the 'Heavenly Father and Jesus' who asked her if she wanted to return to Earth. She replied 'no.' Elizabeth then asked her if she wanted to see her mother. She said yes and woke up. Finally, she claimed to remember seeing me which she was comatose."⁵

Morse delved into the patient's religious background. Being a Mormon, the girl was taught that Earth is but a stopping place on the way to heaven. She had been told that she would eventually be reunited with her dead relatives, including her aunt who had died two years before her near drowning.

NDE's make a profound impression on a child, - one which follows him or her through their life. They are happier than most, - more confident about the future.

7.4.9 Ring's Concept of a Relation Between NDE's and UFO's

There are still some (largely scientists in universities) who smile at those who take UFOs for real. However, the evidence for their reality is strong.

1. Since 1947, reports of the sighting of unidentified flying objects have come in abundance and from all parts of the world (D. Stacey and P. Huyghe (64)). The descriptions have often come from people such as airline pilots whose jobs would be endangered if it were thought that they were subject to hallucination.

2. The book, *The UFO Enigma* (65), contains an analysis of the physical evidence for UFOs made by persons who are professors of astrophysics, or astronomy, a blue ribboned Committee of the highest scientific integrity (The work was funded by Laurance

⁵ Morse, *A Near-Death Experience in a Seven-Year-Old Child* (63).

Rockefeller). From the evaluated evidence they quote, they leave no doubt of the physical existence of vehicles of extraordinary capability, frequenting our atmosphere.

3. Steven Greer, M.D.(66), heads a committee to investigate links between secret groups funded by the US government and which have made a number of reports on UFOs. The size of some vehicles has been described as a half-kilometer in diameter (measurements from French military radar).⁶ Such a vehicle could have space for some 10^5 people.

At first consideration, the UFO experience, including frightening abductions, is very different from the NDE, most of which show a paradisical realm and an experience in which LOVE is the strongest component. UFO abduction experiences often happen at night and are uniformly terrifying.

However, Ring (26) sees a relation. Both UFO and NDE experiences are "archetypes of an initiatory journey." Those who experience either show an increase in psychic power. They have transformed values, though those following UFO experiences are largely concerned with warnings that the spread of environmental degradation will make the planet increasingly unlivable.

Ring asks if UFO's are agents of Deconstruction. They show characteristic of Reality as emphasized in the books quoted. However, they also show "peculiar" characteristics. Thus, the appearance of the UFO has changed with time. In the 19th Century when we were experimenting with hot air balloons and airships, the UFO's of the day were reported to look like airships. Now, we see Starwars on TV and the starships shown have some properties similar to those of UFOs photographed in our atmosphere today. Many things are reported in the abduction phenomena which are impossible in our present Science. Thus, people appear to pass through closed windows and "ride up a light beam to the ship."⁷

Ring suggests that both NDE and UFO experiences are meant to shock us out of the deep materialism in which we have developed as a consequence of erroneous models of Reality arising from the stress in our present philosophy of contemporary physics and biology. They offer us a koan, an unanswerable riddle, the puzzling over which tends to change us into the New Paradigm, which Ring contends will spread with the number of people who have an NDE (26). Thus, if 5% of the population have had an NDE, - each person knows about 100 people - so that, even now, the NDE confronts thinkers everywhere on the planet, who must ask questions never before faced. But a similar thing may also be said about the UFO experience.

7.5 THE TIBETAN BOOK OF THE DEAD AND THE NEAR DEATH EXPERIENCE (13)

The *Tibetan Book of the Dead* (13), was a guide to be read and learned while in life and to be used in the after death state and until the next incarnation. It is of considerable significance that this ancient document, similar in content to a still earlier Egyptian book of the Dead, should contain many similarities with what the modern NDEer sees and feels.

⁶ The fullest treatment of evidence for the real existence of UFOs and for the existence of an intensive cover-up effort by the US government is given by M. Woodhouse (67).

⁷ But we have a version of that on the fictional TV StarTrek program which presents an ability to "beam people up."

Thus:

1. According to the Tibetan book, at the moment of death, the "Ground Luminosity" or Clear Light dawns in splendor. The Buddhists state that the consciousness of the dead person is inseparable from this luminosity and dwells in a great expanse of light. Such a description is reminiscent of accounts of "the Light", the most consistently described feature of the NDE.

2. In *The Tibetan Book of the Dead*, the description of Life in the Bardo (the state between incarnation) is similar to the state felt at the start of an NDE, - e.g., one sees one's own body from a vantage point above it hinting that one is dead, or, at least, is undergoing an OBE.

3. In both descriptions one sees dead relatives and tries to communicate with them. However, one finds they cannot feel your touch nor communicate with you. Feeling frustrated, you are now convinced you are dead.

4. In the Tibetan book, the mental body experienced in the Bardo is the you in your best years ("a body of the golden age") and a similar picture is described by NDEers. Both you but also the relatives and friends you meet, are in their prime years.

5. In both accounts, the world in which you exist is ideo-plastic. One can travel instantly anywhere by the power of one's thought.

6. In the Bardo, the mental body is able to provide the experience of celestial visions, e.g., cities. Similarly, some NDE's are of paradisical scenes, palaces, transcendent music, etc.

7. In the Tibetan account, experiences in the Bardo vary depending upon the quality of the previous life. Fear, panic, loneliness, desolation, and gloom are part of the experience for some. In the same way, at least some 15% of NDE's are hellish, and contain descriptions of experiences which are like those described in Dante's famous account of hell. Margo Grey (59) describes a woman who told her she experienced "a large pit, hands and arms stretching out to drag me in. There was a terrible wailing noise, full of desperation."

The reader may conclude that the similarities and parallelisms described (arising from cultures which could hardly be more different, and apart by ~ 2000 years) provide strong evidence that the states described are of the same alternate Reality.

7.5.1 The Deloks

A phenomenon in Tibet is that of the Delok (Sogyal Rinpoche, (13)) well known in pre-1950 Tibet. The Delok travels to hell and can witness people being condemned to suffering. However, they also visit paradise.

In a typical case, a Tibetan woman dies and tries to communicate with her family, but they take no notice of her. She experiences a hail of puss and blood which falls upon her and which causes her intense pain. However, she feels happiness when living people pray for her. She finally meets a spiritual master who knows of her death and who has been praying for her.

The woman then hears her dead father calling her and she follows him until she reaches a country. In this place she sees a bridge which leads to hell, where she sees "The Lord of Death" judging those recently dead. She saw a very highly developed person (a "Yogin") come to Hell to liberate beings suffering there. In her case she is told it is not yet her time and she must go back to her body.

In Tibet, the Delok was a highly developed phenomenon (and is still met with in remote mountain regions). Some Deloks could go to the regions of the After Life and visit with people there, bringing back requests for prayers on their behalf. The Delok acts as an intermediary between the living and the dead. Their activity is similar to activity carried out by the Swedish savant and psychic Swedenborg (38).

7.5.2 The Negative NDE

Until 1978, the experience of the NDE reported had been uniformly positive and hopeful. Thus, upon death, complex phenomena were experienced (including the stresses induced by a revealing Life Review) but finally, one finds one's self surrounded by Love and Forgiveness.

In 1993, there appeared the book by Morris Rawlings (68), a cardiac surgeon.⁸ The book pointed to the experience which his position as a cardiac surgeon had given him. He had seen many resuscitations and some of those accompanied by description by the patient were of a terrifying experience, the picture being the conventional picture of Hell referred to throughout the religious literature of the world. Rawlings is a practicing Baptist.

Rawlings has a reasonable theory as to why he reports so differently from the "Death is wonderful" picture developed originally from the work of Kubler-Ross⁹ and Moody (42). His explanation is two fold. On the one hand, - being there in the operating theater during the resuscitations, he was more likely to hear the truth rather than what is remembered often after many years. Correspondingly, Rawlings points out that pleasant experiences, - especially good NDE's, - are more readily remembered than the horrible ones which can be regarded as nightmares and forgotten.

Two examples of negative NDE's, the first taken from the work of Sogyal Rinpoche (69), follow:

"I found myself in a place surrounded by mist. I felt I was in hell. There was a big pit with vapor coming out and there were arms and hands coming out trying to grab mine ... I was terrified that these hands were going to take hold of me and pull me into the pit with them ... then an enormous lion bounded towards me from the other side and I let out a scream. I was less afraid of the lion, and more that he would push me into that dreadful pit ... It was very hot down there and there was steam coming out."

The experience of a woman described by Moody (51) is as follows:

"Their head was bent downward; they had sad depressed looks; they seemed to shuffle, as someone would on a chain gang ... they looked washed out, dull, gray. And they seemed to be forever shuffling and moving around, not knowing where they were going, not knowing who to follow, or what to look for."

⁸ There is a second, less quoted book by Rawlings (51) which in spite of its title, seems more concerned with the radiant, positive NDE, rather than those of Hell.

⁹ Kubler-Ross is well known for her many studies of death (mainly by bedside observations)(52). In the Preface to Moody's original 1975 book (42), Kubler-Ross became the first to propose a theory later developed by Ring (26), namely that the perception of death as a frightening experience is overcome by a calm study of it: a New Age had begun.

"As I went by they didn't even raise their heads to see what was happening. They seemed to be thinking. 'Well, it's all over with. What am I doing? What's it all about?' Just this absolute, crushed, hopeless demeanor—not knowing what to do or where to go or who they were or anything else.

"They seemed to be forever moving, rather than just sitting, but in no special direction. They would start straight, then veer to the left and take a few steps and veer back to the right. And absolutely nothing to do. Searching, but for what they were searching I don't know."

M. Sabom, also a cardiac surgeon, in his own book (56) makes an evaluation of Rawlings' work (51) and is critical of it. His main points concern the small number of experiences upon which Rawlings bases his conclusions, but also that one of the accounts given by Rawlings in his 1993 book concerns a Baptist Sunday School teacher, who had suffered three cardiac arrests. His first NDE was hellish and the second two, heavenly. The question arises, points out Sabom, as to why a Sunday School teacher should be sent to Hell. However, Sabom notes that in the second account Rawlings comments that the man had not been a proper Christian before his first NDE.

In spite of some defects, Rawlings' work (51) has precipitated a large amount of work aimed at finding accounts of negative NDEs. There is now no doubt that the negative NDE is accepted as part of the phenomenology. There is still, however, doubt as to what fraction of the experiences are negative.

Thus, Margo Grey (59) reports a number of such experiences but the best evidence comes from Greyson and Bush (B. Greyson and N. Bush (70)), who collected 50 negative NDEs.

Ring (K. Ring (71)) suggests a theory of these experiences, which differ ontologically from the positive experiences. Ring follows Greyson and Bush in dividing the negative ones into three subtypes.

1. Inverted
2. Hellish
3. Meaningless.

In the inverted ones, Ring suggests that they begin with the normal course of events (Tunnel, Light, etc.). But the experiencer is terrified by the threatened loss of his Ego, - his personality, - and fights to remain in control. There comes a point at which the surrender occurs ("God, please help me") and then arrives the Love and Peace of other the experiences. It was fear of Hell and the unwillingness to let go of the personality of the last incarnation which at first prevented the experiencer experiencing the Love and Peace.

As to the experiences which are Hellish, Ring suggests that they are a stronger version of the inverted type. However, the truth is that they do not always convert to the Love and Peace that are found in the inverted model.

Ring quotes an experience recorded by Corneille (72).

On June 1, 1985, Howard Storm, an art professor, found himself in Paris on the last day of a European tour he had been conducting for students. Suddenly, he screamed in pain and collapsed, the victim of a perforated intestine, which is often fatal. He was rushed to a hospital, but the necessary operation was delayed for many hours and Storm experienced pain so unendurable that, he said, had he had the means to kill himself, he would have. At one point in his ordeal, he found himself standing next to his physical body and, because he

was an atheist and expected that death would be followed by the extinction of his consciousness, he was disconcerted by this perception of undeniable reality. His wife and hospital roommate proving unresponsive to his pleas, Storm then found himself travelling through a dark region with a group of beings who had appeared benign at first, but who soon proved unrelentingly hostile. Eventually, they taunted Storm and then began beating and kicking him to the point where Storm felt physically annihilated, parts of his body having been severed. At this moment of complete despair and exhaustion, Storm heard a voice within him urging him to pray, but because of his life-long atheism, he rejected this action as contemptibly hypocritical. The voice continued to insist, however, and Storm ultimately yielded. His prayer, "Jesus, save me," caused the hostile beings to disperse, but Storm still found himself utterly alone and now apparently abandoned by all. Not for long, however: a speck of light that soon grew into an enormous brilliant glow began hurtling toward Storm, engulfed him, and swept him up into what can only be described as a "heavenly journey". Storm described a dazzling encounter with a divine power, in which he was flooded with intense, overwhelming love and cosmic knowledge. The experience had such a profound impact on him that he eventually left his position as an art professor and is now a minister in Ohio (H. Storm (73))."

Ring then goes on to apply a theory which he has developed from the material in the well known book, *A Course in Miracles* (74). The material in this book came from channeling, originating, it is hypothesized, from Christ. The only Reality, it avers, is the Light, which is also our expanded Consciousness. It is the Light which gives Total Love, complete acceptance and universal knowledge. The temporary Ego, to which we cling so tightly, is rooted in Fear, and in the Illusion that we are separate from God. But the Ego is a temporary manifestation, made up of the effects of happenings in the given previous (and perhaps other) lives.

If this hypothesis is true in all the hellish experiences, there will be a turning point at which the Ego is given up and Love from the Light floods in. However, most of the hellish experiences do not show this second stage.

A third type of experience, called meaningless void, Ring observes that most of them were with women in childbirth under anesthesia. They involve horrible experiences, being knocked about and ridiculed. The effect is to make us cling to our Ego's even tighter. Thus, Ring thinks this third type of NDE might better be termed a nightmare induced by the partial recovery from anesthetic (71).

There have been some further developments in the theory. Thus, there is the paper by C. Bache and N. Bush (76), and one by Ring in the same edition of the journal.

Bache uses a model due to Grof and Joan Halifax (77). The effect is to unite the explanations of the three types of negative NDE's into one. Bache raises a most important objection. If the basic cause of these negative NDE's is the Ego fighting against its devolution, why are there not many more such experiences? Ring seems to agree with Bache here and express puzzlement at this apparent contradiction.¹⁰ But, he speculates, perhaps all NDEs begin with the Ego struggling before relaxing and allowing the Light to appear. With most "good" experiences, this Ego struggle is brief and we forget it. If it

¹⁰ There is also the sameness of the negative NDE with its picture of stinking pits, of desperate people, of background flames. Would these images always occur when the Ego is fighting for its existence?

persists, the happening becomes a negative NDE (71). But it seems that Bache thinks that the ontological status of the negative near death experiences is not that of the radiant NDE.

Bache (*loc cit*) criticizes Ring for trying to minimize the bad NDE. Ring maintains his position: The cause of inverted and hellish NDEs is a reflection of the Ego's struggle to defend itself.

In another article, Ring (79) brings up information given him by a Dr. Zenny on the effects of nitric oxide as an anesthetic. He concludes that the type of Bad Experience suffered under these conditions (nullity of life, it is a cruel joke) is best interpreted as typical emerging reactions (nightmares), not a true NDE.

A somewhat more general and integrative account of the negative NDE is given by Gracia Ellwood (14). Her book concentrates on the reality of the bad experiences and contains very many examples of the genre. Ellwood brings out aspects of negative NDE's, which show we have far to go in researching the nature of these experiences. For example, she quotes instances which imply that there is no simple relation between bad persons and a bad NDE. Some people, whose lives appear to be normal or even outstandingly good, suffer terrifying experiences in negative NDE's.

Correspondingly, Ellwood exemplifies from the lives of the saints, how they have gone through extremely tortured experiences. She quotes St John of the Cross and his writings on, "The Dark Night of the Soul". More puzzlingly, Ellwood describes Grof's work (77) in which he gives an account of the induction by the use of LSD of ghastly experiences corresponding often to the dramatic pictures which have been drawn by imaginative authors (e.g., Dante) depicting the horrors of hell.

Finally, Ellwood draws a big conclusion. It is that we shall all undergo both bad and good experiences after death, although she does not relate the relative duration to our journey through the previous life. In the end, Ellwood's stance is that the ultimate Reality is the Light and that to reach it and Unity, we have to overcome our illusion of separateness.

She tries to end a work, in which there are many horrific descriptions, on a positive note. There is nothing to fear, she avers, for the horrors are not real (i.e., not permanent).¹¹ One has to control one's fear, keep one's eye on the prize, choose to love, - and "you will be home in the morning."

Whether to take negative NDE's for real (an indication of doubt-filled prospects in the After Life) or to be rationalized away is the greatest question at present surrounding these extraordinary experiences. They clearly need more research, above all in different cultures. As of 2004, most authors seem to see Bad NDE as real, alternative experiences to the radiant ones (14). A key here is to correlate Bad NDE's with previous lives. If the NDE is to be interpreted as a true glimpse of the After Life, it seems unlikely that basically different "bad trips" would arise from one culture to another. However, as brought out in Section (5.8), there are enough dissimilarities between NDE's from different cultures to arouse questions as to the nature of the phenomenon.

¹¹ There are examples cited in which the attacking fierce animals turn into tame domestic pets if confronted by love (sic), i.e., the apparent horrors of the After Life may be ideoplasic.

7.6 OTHER ACCOUNTS OF THE AFTER LIFE

7.6.1 General

The accounts given by those who have experienced paranormal happenings near death appears to give us, - essentially, - two extreme impressions of at least the beginning of an After Life existence. The one suggests paradise, - the paradise of Christianity and Islam. The other suggests torments more extreme and terrible than any devised here on Earth. Meanwhile, the world's literature and art through the ages has depicted these two states dwelling more on the horrors of hell than the pleasures of heaven (cf. Grof and Halifax (77)). In fact, herein lies probably the origin of the tone of sadness and tragedy accompanying the last rites of the dead, at least in the Western eschatology. Thus, it seems inconsistent, particularly in Christianity, that the members of a religion which exalts in the possession of the Savior, - the Savior from after death torment, - should always hint, in the tone of sadness and tragedy accompanying funeral practice, at the failure of the mission in respect to this particular dearly departed. Why are not services for the saved joyous?

It is obvious that all this will be regarded by intellectuals, - and above all by the scientists, - to be ontologically nonsense and illusion from top to bottom. It may, therefore, be useful to present some models of the After Life, allegedly obtained from sources, none of which has been influenced by Near Death Phenomena.

7.6.2 Jesus Christ

Jesus Christ made several statements which refer to an After Life. Thus, in one parable (80), He tells of the unrepentant rich man who, upon death, was sent to Hell. There, he suffered dreadfully. When he sees a poor man afar off, in Heaven, with Abraham, he cried out and asks that a drop of water shall be put on his parched tongue. However, he is refused by Abraham. The rich man is in Hell. The poor man is in Heaven. This, the story implies, is final.

A more famous statement by Christ is from the cross. He is hanging between two criminals who are being crucified with him. To one, - and one only, - he says, "You shall be this day in Paradise with me."

Christ's sayings clearly imply a Paradise for the good, a Hell for the bad. Some have seen the two kinds of NDE's as giving some confirmation of the two extreme states in the After Life.

7.6.3 Paul

Christ's apostle, Paul seems to have encountered an NDE while alive. He wonders (2 Cor. 12:2) whether he has been in his body or out of it, when he experiences "the Seventh Heaven".

7.6.4 Tibetan Book of the Dead

This document gives the most detailed account of the After Death state on record. However, it is more informative to read what is, in effect, a modern version of it, the book by Sogyal Rinpoche (13), who was born in Tibet, brought up in a monastery there from the age of six months and was, until choosing to flee from the Chinese, a monk in a Tibetan Monastery.

The content of the Tibetan Book of Living and Dying (Rinpoche (13)) is a detailed statement of the Tibetan Buddhist view of the living and dying. In the living part it emphasizes, - in common with Christian concepts, - the primacy of Love and Compassion "to all sentient creatures", of devoting one's life to helping others; and living a life in which the giving part is more important than the getting.

The book follows the process of dying through in great detail. Much is stressed on the concept of RIGPA which seems to mean Consciousness, but which bears a broader meaning than the English word. There are astonishing and very significant overlaps with the modern NDE. These involve the Light, the presence of a mental body after death, and the meetings with dead relatives and friends. To the After Life Being, the world is ideoplasic. The state between incarnations is called the "Bardo" and in this, numerous complex things can happen. One great and wonderful thing is that your soul can be sufficiently developed so that it attains "Enlightenment" and that ends the incarnations. Most people have to go back after death and try again. The account given in this book supports the two NDE's model because, - depending on the life you have lived, - experiences in the Bardo can be paradisical or terrifying. But the time spent there is limited on average to about 49 days¹² and soon one has to choose a new body, - about which much advice and instructions are given.

7.6.5 The Christian Churches

Although one might think that the Christian churches would welcome information obtained from the Near Death Experiences, the converse is the case. Roman Catholic theologians tend to eschew such phenomena and are loath to discuss them. Even the many appearances of "The Virgin Mary" are regarded, with the exception of that at Fatima in 1917, and an earlier vision in Guadalupe, Mexico, - with suspicion. The nightly appearances of the Virgin in a suburb, Zeitoun, of Cairo (where hundreds of photographs were taken and miraculous cures observed) is regarded by the theologians as a happening to be viewed with distrust.

The Protestant and Baptist branches of the Christian churches thrust aside "visions" with the hint that they arrive from a devilish plot to deceive the Christian and distract him from the proper practice of his religion.

This negativism of the Christian religions has been expressed in a book "The Soul after Death" (31)), which is a counter statement about death and the after life from the Russian Orthodox point of view. There is more emphasis on sin and punishment than in the Tibetan version. There is one life and one cannot try again. There is much more discussion of the struggle between God and his angels, - who want to help the soul after death - and Satan and his demons who want to possess it. There are few parallels between happenings at death in the Orthodox version and what happens in an NDE.

7.6.6 Emanuel Swedenborg

Swedenborg is sometimes called "The Buddha of the North" (48). He was a polymath, but in later life he lived and claimed that he could "go among the angels."

¹² Other estimates of the time between incarnations are much longer and average about 50 years of Earth time.

Swedenborg turned away from a many faceted career as inventor, scientist, and overseer of Sweden's mining industry and from his 56th year devoted himself to the study of the After Life. His books and papers were products of his own experiences. When a person dies, he seems to be in a material world much like the one he has left, so much so that he has at first difficulty in believing he has died (E. Swedenborg, 82).

However, at the moment of passing, the dead person sees a light, at first hazily and a life review follows. She meets with dead friends and relatives. Life is ideo-plastic. As soon as one thinks of a loved one, he is there. There are parks, cities. Education takes place in preparation for a rising to a higher plane ("Heaven"). In this first plane after death, there are law courts, churches, marriages, schools. The differences with respect to life is that everything is on a more spiritual level than the counterparts on Earth and there are aspects, e.g., the ideo-plastic nature of location, which bring one up against the fact that one is in a "different" - a spiritual - existence.

Hell is there, too, but it is not the Hell of Dante and of Hieronemus Bosch with its steaming pits, sulphurous fumes and devils with pitchforks. The soul may find itself with people eaten up with self love and who have committed evil acts. Life in Hell is rough and cruel - to a degree which one has caused such hurts in the previous life, so will one feel them in Hell.

During his life, Swedenborg was considered to be insane, but his views were taken seriously by the great German idealist philosopher Kant, who was impressed by proven examples of Swedenborg's clairvoyance (38).

Swedenborg died in 1722 in London where he occupied one room in a boarding house.

The identity of several aspects of Swedenborg's description of the After Life and those of the *Tibetan Book of the Dead* and of the NDE seems significant.

7.6.7 Theosophy

This is a school of philosophy set up by the remarkable Russian medium, Helena Blavatskaya (83) in the late 19th Century. It concentrates on information allegedly given by mediums on the After Life (84).

Theosophy's model (as that of Mormonism and Spiritualism) of the After Life is similar to that of Swedenborg. There is no radical change in appearances on dying. Depending on the quality of life led in the previous incarnation, one starts on an appropriate level of the astral. The lower ones are less refined and spiritual. The astral has many planes and each is more refined and more spiritual as one ascends (in a joyous state) towards Heaven.

7.6.8 Myers

Frederic Myers (1843-1901) was Professor of Classics in Cambridge University in the UK. He was a founder of the Society for Psychical Research (London) and was devoted to the search for proof of survival (Chapter 8). About 23 years after his death, Myers began to "get through" to mediums in several countries (Cross correspondence, see Chapter 8). In some of his communications, he described life after an incarnation.

There is a brief period of unconsciousness after death. However, in some cases it is prolonged and results from a belief that nothing but blankness follows death.

There is, at first, Hades, the lowest realm of the post mortem existence. Those who are here are in the realm of the haunting spirits and ghosts (Currie (58)).

Then, there is a plane which Currie reads from Myers as "consciousness without sensory input," i.e., a zombie existence. Spirits in this state wander in darkness and mist. If they come in the vicinity of a psychically active person (bright aura), they are drawn to her and may possess the victim. Spirits get into this plane because of their extreme selfishness while on Earth.

The next plane "up" seems to be like the normal physical environment of the living. But the dead person has no body and cannot gratify herself in her old pursuits. She may become a haunting ghost and in this state can be trapped for centuries.

Now, most of us will not, - Myers communicates (Currie, 58), - have to endure darkness or be condemned to haunt. Most go into the middle astral plane. Myers was ambivalent in his own feelings about this plane. At first, he called it the lotus - flowered-paradise. It is clearly "heaven". However, he has to learn that there were planes above it, and when he knew this he began to call "heaven" the "plane of illusion".

Thus, Myers communicated that each of us begins as a rudimentary psychic entity. Through repeated embodiments, the psychic entity ascends the chain of matter. One crosses over into Buddhist thought. Thus, for those who are insufficiently spiritual, the next incarnation may not be as a human, but as one of the lower life forms, as an animal or even a plant (Grof and Halifax, 77)!

Further planes above the astral were also described by Myers. The general picture he paints is consistent with the Tibetan Buddhist view and the earlier Egyptian one. Every Being must pass through a number of lives and each corresponds upon death to arrival on a certain plane. The ultimate goal is union with God.

Myers describes this plane of illusion to which most of us will go, at first, to consist of a subtle form of matter which is responsive to human thoughts and emotions (the ideoplasticity described by Swedenborg, the Tibetans and others). But the human has just arrived from earth life and hence the world created by him in his New Life are those of his Earth life. The thought creators of their worlds do not understand the origin of the world they make is made by themselves, - a world in which every desire is gratified. This is the "Heaven" of most religions.

However, boredom eventually sets in as a consequence of the easy satisfaction of every whim; a wish for challenge arises. At this point, there is a possibility, - if the soul is sufficiently developed, - of a person going up into the fourth plane. More usually, he chooses reincarnation once more on Earth (where the soft lights, old habits and a new body attract) (cf. The Buddhist wheel of life: when "Enlightenment" comes, one may leave the wheel and incarnate no more).

Myers (Currie, 58) was able to communicate descriptions of three further planes above the fourth, and those become more rarified as one ascends. In any case, this chapter is intended to give information on descriptions of the happenings around the time of death, so that description of the higher planes here is hardly relevant. In any case, not much is known about them, for those who attain higher planes are no longer interested in communicating with embodied lives on Earth.

7.6.9 Robert Crookall

Robert Crookall (85) was a British geologist, in fact, he had held the position of the Principal Geologist of H. M. Geological Survey, London. He took early retirement with the objective of determining, - as a scientist, - the truth about the After Life. He worked entirely with mediums' statements from those alleged to be dead. Many of the "messages" Crookall used were taken from accounts of mediums in the popular press, some from mediums of a more reliable kind, and a few from the great mediums of the 19th and 20th centuries.

Crookall presents a clear sequence of events at death. He wrote several books but the main material is in "The Supreme Adventure" (85).

7.6.9.1 The Call

A dying person sends out a call to relatives and friends.

7.6.9.2 The First Life Review

Very soon after death-transition, - one sees, unemotionally, - an objective record of the life just lived.

7.6.9.3 Shedding the Body

One feels one's self rising from the body into a position just above it. A silvery cord leads from the solar plexus of the new body to the head of the corpse. When the cord breaks, death is final.

Now, one can sometimes see relatives and friends and if so, one tries to make contact with them. However, one is ignored.

7.6.9.4 Tunnel

One sees one's former body beneath one and passes through a tunnel or goes through a door. One feels an expansion of consciousness. One is light and feels free.

7.6.9.5 Sleeping and Awakening

It is unclear from Crookall's writing when these two events occur. After the tunnel? The norm of the sleeping is three days. Older, tired people, sleep up to a week. One wakes to an acute sensitivity - the air is now vital, trees, flowers of extraordinary beauty are seen.

7.6.9.6 Judgment

Your life plays through again but this time the events are shown with the emotion of their moment attached. You feel the joy and suffering you had at each moment. But, perhaps more importantly, - you feel the other person's feelings, too. It is often a humiliating process. You judge yourself - and are the better for it.

7.6.9.7 Assignment

All is now out in the open about you and you are to go and be with people like yourself. There are seven mansions (planes?) - each of which has many rooms.

In your new life, the meaning of Time and Space is different from those experienced on each Earth. Affinity in feeling is nearness. Opposite emotions are equivalent to a far-off distance.

There is still Duality, i.e., material and consciousness. At first, matter dominates. As one progresses up the spheres, the importance of matter diminishes. Consciousness increases (85).

7.6.10 Meek

George Meek (62) was an electronics engineer and business man who prospered so that he could retire early and, moreover, have sufficient funds to do a great deal of world travel. This travel had always the same purpose, which was to visit and discuss with those who might help his search for an answer to the question. "After we die, what then?" He published a book of this title in 1987 (62).

This book surveys the fields which he studied, which led his conclusions about the course of the After Life. He studied principally OBE's, Apparitions, Materializations, Reincarnation, Mediums and Channeling. Meek's conclusions are quite similar to those of Myers and of Crookall, though these famous workers are not mentioned.

Thus, Meek concluded that the After Life is lived at a series of levels of advancing rarity. They are shown in Fig. (7.1).

When a human being dies, he may go into any of the astral levels. A very few saint-like people, who have worked by means of ascetic practices, including fasting, prayer, and the practice of giving to help others, - jump straight to the higher astral plane. Such people do not reincarnate again and may prepare themselves for still higher planes (Fig. 7.1). However, the majority of us (those who give somewhat, and have compassion for others, who love) go to the middle astral plane.

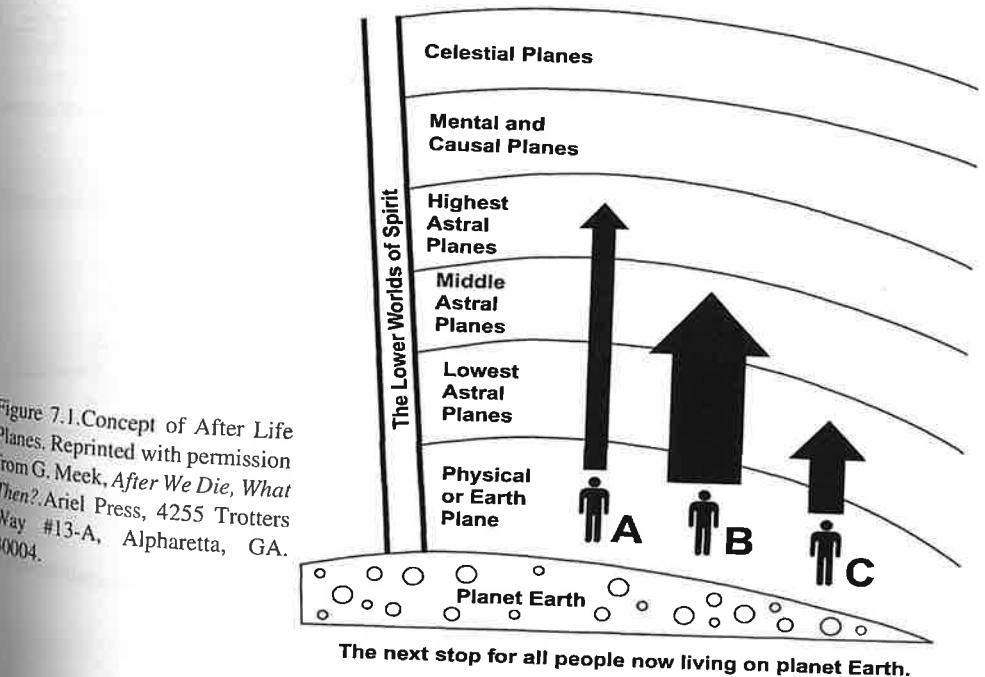


Figure 7.1. Concept of After Life Planes. Reprinted with permission from G. Meek, *After We Die, What Then?*. Ariel Press, 4255 Trotters Way #13-A, Alpharetta, GA. 30004.

The next stop for all people now living on planet Earth.

Then, the question is, do they develop enough, while on the middle astral, to avoid reincarnation and go on to higher planes, or must they be rejected back into yet another yelling baby? Then what about the lowest astral? This is the plane to which those whose lives were not satisfactory have to go. They are people who were so wrapped up in themselves and their achievements, so keen on the things that money can buy, so eager to get that they have not learned to give, to love, to have compassion, to help others. The lower astral is then the place which Catholics call Purgatory. How long they remain in torment, frightened by darkness, by wild animals, by terrible stenches and awful temperatures, by horrible sights of revolting bodies, is completely individual. It may be that the lesson is learned rather quickly, - or in centuries. But such souls will certainly have to try again.

Meek's concept of the characteristics which may lead to the highest astral and onwards are shown in Fig. 7.2.

Meek was a very modern researcher and worked with an engineer, O'Neil, to try to develop electronic contact with the dead. The results were controversial but in one case, several sessions of rational conversation with a discarnate man is recorded. He identified himself with a social security number, Q clearance, etc. These details seems to have been verified (Meek, 62). Similar work on an electronic approach to contacting the dead is ongoing in Europe.¹³

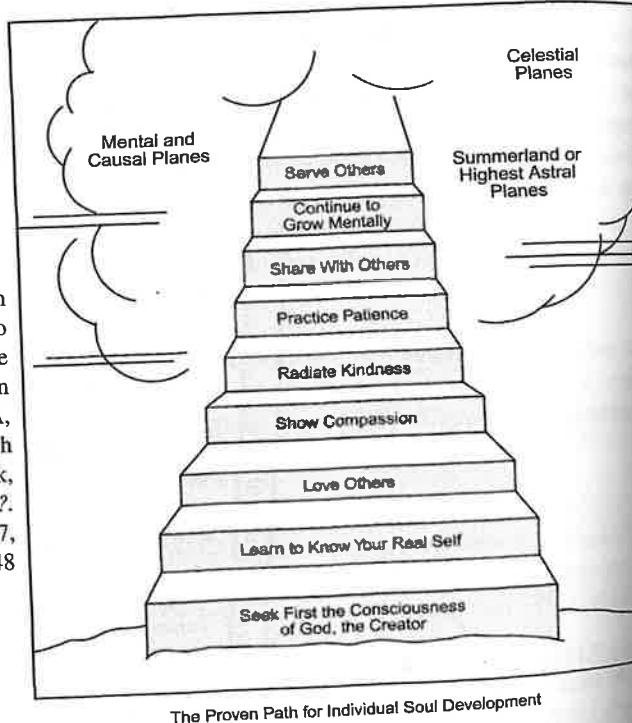


Figure 7.2. Human Characteristics Which Lead to an After Life in a Higher Plane (G. Meek, *After We Die, Then What?* Ariel, Atlanta, GA, 1999). Reprinted with permission from G. Meek, *After We Die, What Then?* Ariel Press, P.O. Box 297, Marble Hill, GA. 30148 (1999)

¹³ One of my colleagues, a professor of physics, has had what he calls "success" (i.e., contributions to his own life) by collaborating (2003) with one of the European groups.

SUMMARY OF CONCLUSIONS CONCERNING AFTER DEATH STATES

Jesus Christ

There are many mansions in the After Life. But Hell seems to be forever. Only one thief offered pardon.

St Paul

He has been in "the Seventh Heaven."

Tibetan Book of the Dead

Love and compassion, helping others, are the main positive aspects denoting the quality of a life. Dead relatives met. World of the dead is ideoplasic. Possibility for very developed souls to end reincarnation. Experiences in the After Life horrible or paradisical depending previous life. Must choose new body for next incarnation.

Christian Churches

Loath to discuss detailed nature of past death state. Even Mary's appearances regarded skeptically. Some branches christianity regard NDE's as devilish plot. Greater emphasis on punishment than love.

Swedenborg

Upon death will be at first in environment similar to that of life. A Light is seen. Life review follows. Dead friends and relatives met. Ideoplasticity of surround. Parks and cities. Education continues. Hell is there but not that of Dante. Evil people will find a rough, hard life - the life they gave others in previous life. Note similarities to content of *Tibetan Book of Dead*.

Theosophy,
Spiritualism,
Mormonism

Similar to Swedenborg. Astral states have many planes of increasing spirituality.

Myers post mortem

Firstly, brief period sleep. Lowest level is Hades. Ghosts. Then a state in which spirits wander in dark and mist, for people who lived lives extreme selfishness. Then a plane similar to environment in life but cannot gratify old pursuits. Possibility being trapped for centuries as haunting ghost. Most will not have to endure all this but will go paradise. Eventually boredom. Move to higher psychic plane? Repeated embodiments, move up to ever higher planes. Further higher planes exist but Myers knew little of them.

Crookall (from
mediums)

At death one feels one's self rising from body. Silver cord. When this breaks, death permanent. Relatives and friends but

cannot contact them. Sees own body. Tunnel and expansion consciousness. The Light. Wonderful scenes, extraordinary beauty. But now Life review with emotion. Result: one goes to live with people of your level of goodness. Progress up planes.

After Death Life led at series different levels (planes). At death go to level appropriate to your life. A tiny fraction of ascetics who have given their lives to helping others will go to highest astral and not incarnate again. Higher planes. Stress on compassion and help to others as key to progress. Meek claimed contact electronically with discarnate spirit who discussed in very matter of fact way and identified himself by name, social security and Q clearance numbers (verified).

7.7 THE LIFE OF THE NEW BORN CHILD

These findings are contributed to by the work of Stern (86) and Trevarthan (University of Edinburgh), quoted by Stern (87). These authors studied the abilities of newborn children through the first few months. They concluded that the newborn was conscious and intentional in its behavior in a way which is inconsistent with the model due to biologists, which depends on the development of wiring to the cortex (which occurs much later). It appears that, - contrary to the normal biological model-the infant is born with an original self which acquires successive layers of a social self, or ego.

7.8 AN OPEN ENDED CONCLUSION

In this chapter I have presented evidence concerning the reality of the OBE's. I have described in some detail the strange phenomenon of Near Death Experiences, but left open a conclusion as to the nature of these phenomena. Rather, I have chosen to give brief vignettes of a number of independent methods of reaching information about the After Death state. The next step is to see to what degree these various methods give information which is parallel to, or even the same as, that of the NDE.

But such a comparison will best be done in the next chapter, which is on Survival.

7.9 THEORIES OF NDE'S IN TERMS OF THE PRESENT PARADIGM/

1. An early and simple theory is due to Pfister (89), who suggested that the main elements of an NDE are due to the patient's imagination. However, the theory does not stand up to the fact that NDE'ers experiences often clash with the concepts they had previously held of the death experience. Again, there are many records of NDE's of children (90). These correspond to those of adults, although some of the childhood NDE'ers are too young to have imbibed the cultural conditioning.
2. Sagan (91) suggested that one of the principal characteristics of NDE's - seeing a light at the end of a tunnel, - could be explained as a memory of birth. However, Becker (92) pointed out that infants being born do not have the visual acuity to make such a hypothesis acceptable.

3. Persinger (93, 94) has proposed that the NDE arises as a result of an intrusion of the right hemisphere's sense of self into the left hemisphere's sense of awareness. Persinger passed various wave forms of electricity through the brains of people while they remained awake and could thereby evoke a feeling of floating, strange noises, etc. However, detailed examination of Persinger's results show that the main reaction in these experiments is that the patient feels dizzy and this is not at all characteristic of the extreme clarity of an NDE. Further, the patient remained in the mundane world, could speak and describe his feelings during the experiments.

Susan Blackmore (95, 96) is well known for the very detailed description of the OBE and NDE. An important part of her interpretation is in the hypothesis that dying people suffer from anoxia (lack of oxygen to the brain). She suggests that the sense of being out of the body arises from the brain's attempt to reconstruct reality, as the normal sensory input breaks down due to diminishing sensory input, caused by the anoxia. Although the various sequences suggested by Blackmore would probably occur in anoxia, the difficulty of accepting the hypothesis is that there is no evidence of anoxia as a characteristic of NDE's.

The theories here, briefly restated, all assume that the mechanism of the NDE is caused by malfunctions in the brain. Alternatively, it may be that the brain mediates experiences around death.

Among evidence for hypotheses which involve the separation of body and mind (soul) at death are the frequent accounts patients give of being able to see the operating room and the robed doctors and nurses from a point above them. Some report in detail such items as the comb in the hair of a nurse only briefly in the room; the braid on the shoes of another nurse not present while the patient was awake; conversation (much of a non-medical content) among the doctors, etc.

The most remarkable of operation room accounts is that of a woman (Sabom, 56) who suffered from an aneurism in an interior artery of the brain. In order to operate on it, the woman was made to undergo a cessation of normal blood flow, her heart and breathing were stopped and her EEG was flat; in short, she was medically dead. In addition, her eyes were taped over and white noise played in her ears. However, in spite of all this, the patient was able to describe the scene in the operating theater in detail, e.g., she described the 20 doctors present, although she knew only two of them while alive. When she was brought back to life, she described an NDE, the tunnel, the light, etc.

Among evidence which makes a spirit hypothesis seem the most consistent with the observations, is the finding by Ring and Cooper (97) of 31 children who report being able to see during their NDE's, yet who were blind in normal life. Moreover, there are records of people who, on the death bed, exclaim about the dead relatives they see, - although the passing of these persons had not been known to the patient (37).

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CHAPTER 8

EVIDENCE SUGGESTIVE OF SURVIVAL AFTER DEATH

8.1 INTRODUCTION

In all cultures except the present Western one it is accepted that some element of a person survives the death of the body. The idea is rejected in the present prevailing Western philosophy because of the belief that only material things are real.

The numerous accounts (1) given of what happens to some essence of a person at death divide themselves into two great types as described below.

8.1.1 Western

Here the "soul" is simply given one lifetime, in which to prove itself, - after that a judgment occurs. Depending on the results of this, it is received into a blissful existence and remains there forever. On the other hand, persons whose lives do not "pass" the examination are condemned to suffer, and some features of this are more terrible than anything ever done in torture of humans on earth. Such torment may be temporary (the Catholic purgatory) and then follows paradise forever. For persons who have died unrepentant, torment is forever, - or, until repentance is obtained.

8.1.2 Eastern (and some Western)

The soul has many chances for improvement. There are incarnations into new bodies (1) and this continues while the soul develops. The reincarnation may be up or it may be down. After a certain number of lives a degree of perfection may be reached which allows the soul to forego further reappearances in new bodies, and begin to experience lives in increasingly rarified spiritual levels. The soul could eventually find union with God. Between incarnations, the soul spends a time at a level of happiness corresponding to the balance between vice and virtue in previous lives. The interlife may also be unpleasant, depending again on the quality of the last life (Grasping for own advantage? Unloving?); or blissful (Compassionate, selfless?).

Many scientists following the present picture of Reality provided by Physics, find it impossible to accept the survival of a person after death. According to the present paradigm, there is nothing beyond energy, atoms and molecules. This leads to the idea that a person is her body. The idea that consciousness with its senses survives death, is inconsistent with basic elements of the scientific (materialistic) model of human beings. It is understood how, for example, sight works; this understanding involves a complex series of photoelectrochemical happenings. The idea that something survives death and can see is utter nonsense, for the mechanisms of sight are all material and these fall apart, after death!¹

Scientific (materialistic) ideas were developed out of the great success of the contributions of Copernicus, Kepler and Newton in explaining mathematically the heliocentric solar system. These ideas led in the 18th century to the commencement of a

¹ Surprisingly, towards the end of the 20th Century, the percent of the US population which professed a belief in an after life was still more than 75% in the USA. Church-going, however, had decreased much further (2).

science-based technology, fulfilled at first by the development of steam engines followed by the agricultural and industrial revolutions and the present Western world of technology (Chapter 1). That so much could be achieved on the basis of materialistic thinking and particularly from the introduction of Darwin's thinking concerning the origin of species in the 1850's, - and Nietzsche's dissection of Christianity around 1900, - began to make it difficult by, say, 1914, - to believe any more in "stories" about angels with wings and an Almighty God who created all.

A few scientists, even now, still shyly maintain interest on Sundays in the Church. However, such scientists do not publicize any religious practice for fear of harm to their careers.

The discoverers of the scientific method of reasoning which led eventually to a decrease in Belief in a non-corporeal life, were men who professed a strong belief in a deity.² Only Freud professed Atheism.

8.2 OUT OF THE BODY EXPERIENCES (cf. Chapter 7)

A version of such alleged events has been published by an author (Carlos Castaneda) who alleges that, during field work for a Ph.D. in anthropology from a West Coast University, he met a strange man (Don Juan) who tells him that by imbibing certain drugs, he can give him the experience of flying to distant places. Castaneda agrees to subject himself to this experience, duly feels that he is flying, observes buildings passing beneath him, etc. He recovers his normal perception of reality in a place far from where he started. Don Juan describes himself as a sorcerer and claims to be able to bring about paranormal events essentially by his own will, trained over many years of extreme self disciplines.³

The extensive anecdotal evidence for OBE's, together with the three scientific investigations having by and large positive results (cf. Chapter 7) makes the phenomena a contribution towards the concept of something which has normal senses, but which exists independently of the body (3).

The richness of the Near Death Experiences, - which all imply OBE's, - has diminished the impetus for further experimental work on direct OBE's (4). Such work is difficult because the number of psychics who can "turn on" an OBE at a given time while wired up in the laboratory is very limited. Even Robert Monroe, who set up an Institute to teach people to exteriorize, when examined under laboratory conditions, failed for several nights to produce one, - though later there was evidence of an experience.

Nevertheless, OBE research should be pursued because, when suitable subjects are found, it lends itself to more definite experiments on the real existence of an extra-corporeal essence than do the NDE experiences which cannot be instrumented and planned.

² However, it is little known (5) that Newton attempted to contact "the Devil" uttering chants and standing at night in a proscribed circle in the woods.

³ Of course, some may doubt the veracity of Castaneda's accounts (6) and point out that, after the excellent sales of his first book, the author was financially motivated to produce further work of the same genre. Is the first book also fiction? There are hints that it might not be, for example, the efficacy in healing of the Mexican cuandoros witnessed by Pulos (7).

8.3 GHOSTS (cf. Chapter 6)

Some facts about apparitions, ghosts, haunting and possession have been stated in Chapter 6. The term "apparition" is used more for appearances of live people in an inexplicable way. The term "ghosts" tends to refer to the appearance of dead people.

Survival and the evidence for it was principal object of the Society for Psychical Research in London, 1882. An analysis was made of replies to a widely distributed questionnaire. The result was a monumental work, "Phantasms of the Living," which came out in 1886. A further book by F. W. H. Myers, *Human Personality and Its Survival of Death*, (9) was published posthumously in 1903. A theory of the phenomena produced at this time was that the apparent presences were projections created by the observer after unconscious telepathic contact between him and the person whose image is seen (9).

However, this theory (8), - could not stand up to the observation of ghosts by several people at the same time; and the fact that descriptions of what was seen by various observers from different vantage points changed in a way expected if the ghost had 3D reality. (10, 11)

It is characteristic of ghosts that they appear to pass through walls (12), or are seen as if walking at levels long since raised or lowered by building operations since the presumed date when the ghost flourished. Further, although ghosts seldom speak, when they do, what is said is relevant to the situation between the observer and the ghost.

Among the more puzzling phenomena is the appearance with the ghost of clothes appropriate to the date or period of their death, as well as the fact that, although often seen as solid figures, ghosts may sometimes appear as semitransparent entities. Photos and ghost are rare, easily faked (26).

The related phenomenon of haunting is connected to a strong emotional tie between the deceased and the place of death, which may have occurred more than 100 years before the observation. It is as though the entity cannot leave the place where such emotional interaction occurred in the last life (27).

Possession is treated at present by psychiatrists (within the present paradigm) as an illness ("multiple personality disorder"). However, this view does not explain the facts of exorcism (10) which appear to be consequential on an invasion of the healthy person by some other entity. The very experienced Michael Whiteman (11) thinks that the further study of possession (which, under the name "multiple personality", is not rare in modern society) may be the fastest way to realization that there is reality in the concept of a non-corporeal personality.

These phenomena suggest the existence of an entity which survives death of an individual.

8.4 MEDIUMISTIC

8.4.1 General

"Mediums" have been described since Biblical times. They are rare people who claim to be able to "bring through" dead people who speak through the medium, usually to a person present ("the sitter"), or sometimes in remote contact by telephone or fax machine.

Mediums (often women) employ various techniques (12). Some appear to fall into a trance and remain unconscious of what transpires through them during the trance. Others

enter a distantly altered state of consciousness. Most do not need to experience trance phenomena, particularly platform mediums.

Typically, from the medium issues the voice of the deceased entity. That it is the voice and not an imitation is judged by those who have known the deceased in life. They sometimes say that the voice emanating sounds exactly the same as that of the dead person's voice, particularly with respect to the inflections and mannerisms of the deceased during his life. The face of the medium may become distorted (so-called transfiguration), so that a recognizable resemblance to the dead person is claimed to appear (8, 13). It is as though the medium's body had been temporarily taken over by the deceased.

Along with these surprising phenomena goes the phenomenon of the "control". This is another personality who seems to act as a kind of organizer in "arranging" who should come through, etc.

Mediums who stand up to the rigorous scientific testing carried out, e.g., by the scientists of the London-based Society for Psychical Research,⁴ or by its American equivalent, are rare, but seem to exist. A typical test given to mediums is to ask intimate details concerning the deceased's life and to talk with him through the medium. What was the nickname of his household cat? Why did he get a new garden gate? By what name did he address his wife? Correct answers to these questions were taken as a powerful sign that the person speaking through the medium was indeed the discarnate entity it claimed to be.

8.4.2 A Downturn of the Influence of Mediums

The heyday of the trance medium was in the early 20th century. Since then, the reputation of mediums, and the acceptance of their phenomena has undergone a decline. There are two reasons for this.

(1) **Discovery of cheating.** Most mediums, if observed over a sufficient number of years, can be caught in some form of deception.⁵

Consider the person who, in her early years, discovers she has mediumistic abilities. After many convincing demonstrations of this, such a person may not be unsympathetic to the acceptance of a fee for holding a seance with a stranger at a certain time. She is expected to evince paranormal powers at this certain time and place. On the other hand, it is characteristic of people who show paranormal abilities that the "power" comes and goes. It does not switch on like an electric light. Faced with an appointment and lacking psychic power, the medium must either forego her fee or invent material.

2. Presentation of messages from allegedly dead people who turn out later to be living!

Thus, it was discovered (14) that in some cases (cf. Cornell, 26) the "dead" person who "comes through" is indeed alive! The information given is largely true (as is easily

⁴ The founders of the Society were nearly all academics from prestigious Trinity College, Cambridge University.

⁵ This applies more to physical mediums than to voice mediums. In rare cases physical mediums appear to be able to materialize dead persons for a short time. The insistence of such people for darkness for their power to work, of course, arouses suspicions (15).

checked). This suggests, therefore, that the person claiming to bring through dead people can access the consciousness of others by ESP.

The manifestation of such powers (plucking information from the consciousness of a living person) puts a different light upon the apparent ability to show up such a detailed knowledge of the deceased and his life. Most of the answers are known to living persons, be they now far away, and it is proposed that the medium may be able to gather the information telepathically from them ("super ESP").

Thus, the evidential value of the information obtained through mediums about survival has been reduced. Nevertheless, the work carried out with certain mediums in the late 19th and early 20th century continues to impress (12, 16, 16a). I refer to the continued testing over many years of Mrs. Gladys Osborne, Mrs. Leonora Piper, Mrs. Margaret Verrall, and Mrs. Eileen Garrett by the American and British Societies for Psychical Research. The ability of these ladies to bring through so many dead persons and their personality characteristics veridically seems difficult to explain in terms of wide-ranging ESP.

8.4.3 Case of George Pelham (17)

Thus, Sir Oliver Lodge and others in the early 1890's, examined the phenomena of mediumship using Mrs. Piper, the subject being a man called George Pelham. This person came through in a particularly convincing way, because of the manifestation of mannerism, known to be characteristic of the man.

Before he died

In 1888 a promising young professional man, whose real identity has been concealed in the published records under the name George Pelham, had a sitting with Mrs. Piper. The sitting was under an assumed name, and Mrs. Piper did not learn Pelham's identity.

The post-mortem communications

Four years later, a month after his death, communications seemingly from Pelham began to be received through Mrs. Piper. During the next six years, at least 150 sitters were present when 'Pelham' communicated. From among these, he recognized 30 whom he had known when living, and he never claimed acquaintance with a sitter whom he had not known. The network of associations with his friends was revived with convincing and dramatic realism. Richard Hodgson, who followed the case closely, felt that, through the course of the years, the manifestations of this communicator behaved like a continuous, living and persistent personality, and that whatever change was observable was not of disintegration, but rather of integration and evolution.

This failure seems evidential

Even the failure of Pelham to recognize a certain young lady, whom he had met before death, seems to point towards the existence of a real surviving personality rather than merely a fragment of Mrs. Piper's unconscious. The young lady, a Miss Warner, had been only a little girl when Pelham saw her eight or nine years previously. She had changed greatly. If Pelham had still been in the flesh when he encountered her after this lapse of time, the natural thing would have been for him to have forgotten her, as his alleged surviving personality did in this sitting. But if the supposed personality was a mere construct by Mrs. Piper's unconscious, patching together telepathic information, it would have been

natural for Miss Warner to have been 'recognized.' Both she and Dr. Hodgson were aware of the fact that Miss Warner had known Pelham when she was a little girl, so that sources for telepathy were at hand. Moreover, correct information not known to the sitters was given about Miss Warner's relatives, so that the unconscious of Mrs. Piper must have been aware of her identity. The non-recognition thus seems to be an argument in favor of the independent existence of Pelham.

Among the tests given to the disembodied Pelham was that of exposing the manifestation to the several dozen persons whom Pelham had known while alive. In nearly all cases, the voice from the medium recognized the person and was able to carry on a relevant conversation with him or her (19).

8.4.4 Welsh Speaking Father (Deceased) and Son

One of the séances described in the book by H. D. Bradley (18) concerns phenomena involving a medium, Edward Wright, a Caradoc Evans, a Welshman, and a voice. The latter appeared to be similar to that of Evans' father. It was reported as emanating from the floor and ascending through Caradoc Evans' feet. The noteworthy thing about this séance is that Caradoc Evans spoke Welsh, as did the voice. There are two reasons for a paranormal interpretation. The first is that the voice did not seem to emanate through the medium but from a space in front of Caradoc Evans. But the stronger point is the fluent Welsh spoken by the son and the alleged deceased father. Thus, the likelihood that Mr. Edward Wright (the medium) could speak Welsh and show the intimate knowledge exhibited by the voice is vanishingly small. Here is a part of the conversation, as reported in Bradley. (18)

Caradoc Evans Do you want me?
The Voice Yes.
Caradoc Evans Who are you?
The Voice Your father
Caradoc Evans Father! Can't be. How do you know that I am here? Who told you?
The Voice Edward Wright.
Caradoc Evans Well, look: if you are my father, siaradwch a fy yn eich laith.
The Voice Beth i chwi am i fy ddweyd?
Caradoc Evans Eich enw, wrth gwrs.
The Voice William Evans
Caradoc Evans Yn le marwo chwi?
The Voice Caerfyrddin.
Caradoc Evans Sir?
The Voice Tre.
Caradoc Evans Ble mae'r ty?
The Voice Uch ben yr avon. Mae steps--lawer iawn--rhwng y ty ar rheol.
Pa beth yr ydych yn gofyn? Y chwi yn mynd iu weled a ty bob tro yr rydych yn y dre.
Caradoc Evans 'Nhad----

8.4.5 Cross Correspondence

The cross correspondences are the best line of evidence for survival. They took place between the dates 1901 and 1932 and consisted of a number of automatist's writings and some utterances of mediums. With the exception of members of the "Mac" family, all the mediums were women and most of them associated with the Society for Psychical Research. In one case, there were contributions from a medium in India, another, Mrs. Piper herself, was mainly in Boston. These writings interconnect, i.e., all appear to be fragments of meaningful communications but scattered among different mediums, so that no single fragment made any sense in isolation.

Many of these communications contained abstruse references to ancient Greek history and literature. Myers had been a leading classicist of Greek at Cambridge University.

The communications were alleged to be authored by F. W. H. Myers, who died in 1901, Henry Sedgwick, who died in 1900, and Edmund Gurney, who died in 1888. All three had been deeply concerned with the problem of survival.

The automatists had among them, Mrs. Margaret Verrall, wife of Prof. A. W. Verrall, a well known classical scholar, and their daughter Helen. Scripts and utterances were studied and collated by five leading members of the Society for Psychical Research, Ms. Alice Johnson, for many years SPR secretary, J. G. Piddington and G. W. Balfour, and to a lesser extent Sir Oliver Lodge and Mrs. E. M. Sedgwick.

One of the problems of the analysis of these interconnecting communications was that the great quantity of material which had to be scrutinized needed persons expert in Greek and Latin phrases and other literary illusions. The principal senders (the alleged deceased) had all been classical scholars.

To give some idea of the voluminous nature of the material, 52 papers on aspects of the cross-correspondences, some of them book length, have appeared in the Proceedings of the Society for Psychical Research. Much of the material in the form of the text themselves and voluminous annotations has been privately printed, and became available for inspection only in 1995 (20).

A good example of a cross correspondence has been given by Allen Gauld (21, 22) and the following has been taken from that source.

The Hope, Star and Browning case was triggered on 16 January, 1907, when J. G. Piddington suggested to 'Myers', who was communicating through Mrs. Piper, that he should indicate when a cross-correspondence was being attempted by, for instance, drawing on the script a circle with a triangle inside.

This notion was apparently taken up by the 'Myers' when communicating also through Mrs. Verrall's automatic writing. He wrote on 23 January 1907: 'an anagram would be better. Tell him that - rats, star, tars and so on ...' (Myers was in life greatly addicted to anagrams).

Mrs. Verrall's Myers toyed further with the anagram idea in her script of 28 January 1907. He wrote 'Aser' (Greek for 'Star') and 'Teras' (Greek for 'Wonder'). He then apparently proceeded to free associate on the themes of wonder and star, producing a jumble of quotations from the poetry of Robert Browning, together with some related Greek phrases, as follows: (21)

The world's wonder
 And all a wonder and a wild desire -
 The very wings of her
A WINGED DESIRE
hupopteras eros (Greek for 'winged love')
 Then there is Blake
 and mocked my loss of liberty
 But it is all the same - the winged desire
eros potheinos [Greek for 'passion']
 The earth for the sky - Abt Vogler for earth
 too hard that found itself or lost itself - in the sky
 That is what I want
 On the earth the broken sounds threads
 In the sky the perfect arc
 The C major of this life
 But your recollection is at fault

There followed drawings of a triangle inside a circle and of a triangle within a semi-circle, a clear response to the proposal Piddington had earlier made to Mrs. Piper's communicator.(22)

On 3 February 1907, a supposed 'Myers' influence upon Helen Verrall's script drew a monogram, a star and a crescent, and wrote, 'A monogram, the crescent moon, remember that, and the star.' This shows a knowledge of what Mrs. Verrall's Myers communicator had written, and perhaps, in the reference to a monogram, hints at a knowledge of Piddington's original proposal to the Piper-Myers.

On 11 February 1907 Mrs. Piper's Myers communicator showed undoubtedly knowledge of what Mrs. Verrall's Myers had recently written. He wrote: 'Did she [Mrs. Verrall] receive the word evangelical [later corrected to Evelyn Hope, the title of a poem by Browning]? I referred also to Browning again. I referred to Hope and Browning ... I also said star ... look out for Hope, Star and Browning.'

Next, the Myers influence on Helen Verrall's script picked up the Browning theme. On 17 February 1907 he drew a star, and then wrote: 'That was the sign she will understand when she sees it ... No arts avail ... and a star above it all, *rats* everywhere in Hamelin town [reference to Browning's poem on the Pied Piper of Hamelin].'

Lastly came three scripts from Mrs. Piper's Myers communicator, the second of which supplied the supposed 'key' to the whole.

On 6 March 1907, the Piper-Myers told Piddington that he had given Mrs. Verrall a circle and a triangle, but doubted that the latter had appeared. (In fact it had.)

On 18 March 1907, the Piper-Myers claimed that he had drawn a circle and a triangle for Mrs. Verrall, and then said, 'But it suggested a poem to my mind, hence BHS' (i.e., Browning, Hope, Star). Myers here offers an outright explanation of the obscure references that had appeared in the scripts of the other automatists. He says, in effect, that Piddington's original proposal about drawing a triangle within a circle suggested certain anagrams (rats, star, etc.) to his mind, and these in turn suggested certain passages of Browning. He developed all these themes (triangle, circle, rats, star, Browning, etc.) in the scripts of the other two automatists, and then returned to Mrs. Piper to give an explanation of what he had done. (12, 13, 21)

The collection of such communications initiated by Myers, held in London (23), offers a mine incompletely explored.

8.4.6 The Code

Many are still agnostic about survival of the personality after death, usually because, with confidence in materialism, they cannot understand how memory, etc., can survive decay of the brain. One way of testing survival still more would be for an experimenter to invent a code (24), leave behind a passage of writing in that code and then, after death attempt to impart the key to the code to a psychic with the request that she pass it on to the possessor of the deceased papers - and see if it translates the coded writing. One might have to be patient. Myers continued the cross correspondence for some 30 years after his death.

8.4.6.1 What Weight Should Be Given to Mediumistic Evidence for Survival?

The reaction of scientists unaware of the breadth and quality of the available literature will inevitably be negative ("trash" or "garbage"). However, this emotional rejection precludes a relaxed and open minded assessment of the evidence. It stops clear thinking, unshackled by the bonds of the present (always temporary) paradigm. It is like the initial reactions to the Copernicus theory of the heliocentric solar system. "The suggestion is absurd. We can see the Sun revolving round the Earth every day. If the Earth turned over each day, we should all fall off at night." One must stand back and allow the evidence, the pluses and the minuses, to percolate through the mind. It is the validated facts that matter. It is the paradigm which has to adjust to accommodate data inimical to it (30).

It may be asked why the availability of women and men with the gifts illustrated has fallen off so remarkably since the 1930's. One reason is the spread of the materialist paradigm of science through the population. A young person who feels strange thoughts of contact with dead people will increasingly tend to reject them. "How could this be? They're dead. I must be going crazy." If the thoughts persist, he will seek the help of a psychiatrist, who will help him find security in terms of a theory connected, e.g., with his childhood trauma. It is of interest to note that, at 2000, there is one country in which the phenomena which were earlier reported frequently in Europe and America are sometimes reported now. There are several organizations in Brazil (28) in which paranormal phenomena are being assessed in a relatively unbiased way. The attitude among intellectuals there seems to be more open-minded than it is among Europeans and Americans. However, the availability of physical mediumship in Europe in the 21st century is evidenced by the Scoble report (61a).

8.5 MEMORIES OF PAST LIVES

8.5.1 Introduction

It is well known in the Eastern communities, - and occasionally happens here, - for a child (usually between the age of 3 and 9) to say that she knows another mommy and has brothers and sisters, apart from the ones she clearly has now (29). Sometimes, the alternate family speaks a different language than the one she is being taught and this language protrudes in odd words and phrases into the life of the present child. In most cases, all this is suppressed by the TV-watching, smiling, modern family; the mother finally becoming angry, even violent when another family is mentioned. ("Shut up! Do you want people to think you are crazy?") But now and again the parents are sufficiently puzzled, - insufficiently nailed to the TV-present, - and travel the 100 miles to where their daughter says this other family is living. Several examples of what happens when alternate and present meet are given below.

This knowledge of at least one past life can be interpreted in terms of an entity, which seems to manifest in OBE's and NDE's in ghosts, hauntings and possession, and which appear to be able to activate the vocal cords of rare mediums. This entity occupies successively a number of bodies in successive lives.

8.5.2 Work of Ian Stevenson

In some sciences, a single name obtrudes above all others as having made seminal contributions which outshine the work of all others. The quintessential example is Newton in the introduction of action at a distance due to a force called gravity. Correspondingly, it is certainly Ian Stevenson, Professor of Psychiatry at the University of Virginia, in Charlottesville, who has made the seminal contributions in establishing the facts of reincarnation at a modern and scientific level. His tenacity in pursuing such studies (which has led to evidence for ideas inconsistent with the present paradigm) is the more remarkable in that it has been done while he has remained in a major position at a major US university (an example of Academic Freedom working well).

Stevenson has pursued cases of remembered earlier lives in countries far from the USA, - in the Middle and Far East. He has hired interpreters and used tape recorders and movie cameras to get to the truth of what begins as a "story". When he has heard of claims to an earlier life (usually about a child less than 10 years old), he has followed them up by traveling with the child and members of her family to the village or town in which the child claims the former family is located. He has witnessed instant recognition and joyful reunions. He has been able to communicate with members of the earlier family in their homes and check dates of the death of their child, and fitted it to the date of the birth of the present child. Particular attention has been given to the mode of the death (often a violent one).

Why are most of the cases to be found in the Eastern countries? A tentative answer may lie in the influence of social factors as to what is acceptable. The USA, having the most materialistic culture, would be the extreme example. The reader is asked to imagine a US family, three children, mother and father, both in work. Suddenly, when she is three or younger, the middle child begins to tell at breakfast of another life. She quickly finds that it is not to her advantage to mention her thoughts. No one in the family is likely to have heard of reincarnation, and if they have even looked it up in a dictionary, they would find

it refers to some nonsensical foreign garbage about death and then living again! The child's brother and sister titter; her mother and father frown menacingly, and soon attention is re-established to the wide screen TV.

The emergence, then, of memories of an earlier life needs not only a child in whom the memories are strong enough for her to desire "my other Mommy", etc., but an encouraging, acceptive, benign atmosphere. Countries (fast disappearing) in which materialistic Science is not the Religion of the people are those which may give rise to a sufficiently acceptive atmosphere. In India, reincarnation among Hindus is a familiar idea and the child may get a better hearing (though even there some of Stevenson's reports show a reluctance of the parents to respond positively).

8.5.3 What Is Supposed to Reincarnate?

Most people familiar with religious concepts will reply, "The soul, of course." However, semantic caution is required here. When the Buddha attained his unexcelled complete Awakening, he said he had seen many past lives (31). On the other hand, in Buddhism, there is no soul which reincarnates: there is one basic entity which activates all beings. This universal stuff is imprinted with the marks of a certain personality according to her last life.

It is this bundle of characteristics impressed, as it were, on the One Consciousness, which is passed on from life to life. There is much to be discussed here, e.g., the idea of an imaginary ego. Thus, it is proposed in Eastern Theory that the John of this life is simply an imprint or dressed up disguise of the real underlying entity which carries with it a record of other incarnations, so that the meaning among Eastern Mystics of the statement, "All is Illusion," refers principally to our strong concept that each of us is an individual and not a machine encompassing an immaterial entity, the one Consciousness. However, development of these themes would take us off our path.

8.5.4 The Typical Reincarnation Case

Here is a synthetic account which tries to involve typical elements of the actual cases.

It concerns a little girl living in an Indian village with her father and mother and four siblings. In teaching her how to talk, the parents try to ignore the fact that the little girl's prattle sometimes seems to contain some odd foreign sounding words. By the time she is five, going to school and speaking well, the unknown words (in a language the parents had never heard) become more noticeable. They ask the girl, Shanki, about them, but she seems embarrassed to talk about it but finally says they come from "where I lived before." This leads the parents and other relatives to more questions and finally, in bits over several days, it all comes out. The girl thinks she used to live in a town over the border in another state, where most of the people do not speak her present parents' language, Hindi, but another language, Urdu. Not only does she name a village, but gives directions about how to get to it, and even an address! By now the parents are "hooked". The mother wants to go and find the woman who seems to have a close relation to her little daughter. The father is reluctant, - a waste of time and money, - but after much ado, the family sets off by bus, finally arriving in the indicated village, then finding the address.

As they approach the little house, Shanki becomes excited. She finally runs ahead of her parents, and knocks vigorously on the door. A woman answers and Shanki jumps up and hugs her. For a moment or two, the woman hesitates but then reacts as a mother to her child clutching Shanki in her arms and lifting her up better to see into her eyes.

Meanwhile, her present parents stare, open mouthed. They hear Shanki talking fluently in that other language. But soon, she has run off and starts talking to several boys and girls, - as if they were older brothers and sisters, - calling them by their first names. She goes to a cupboard on top of which she claims she will find what she says is a special toy, which she indeed finds.

It takes time to find an interpreter and finally, the story takes shape. Shanki had been born to her present mother in 1989. It was now 1994. Shiral-lal had been a child of the Urdu speaking family but, alas, she had dashed out onto the road at the age of seven, in 1987, and been mowed down and killed by an overcrowded bus.

Shanki tearfully described how the great bus had come upon her so suddenly. She had even jumped to avoid it but was knocked down and crushed to death.

Typical stories now differ. Sometimes the Shanki becomes the Shiral-lal again and stays with her new parents, speaks Urdu and is proud of her Hindi. Sometimes, Shanki returns with her Hindi speaking parents and there is little more contact, though Shanki now finds she can speak Urdu fully and fluently.

8.5.5 Case of Ravi Shankar (29)

The case of Munna/Ravi Shankar of Kanauj in India is a good, real, example, published in the book by Gracia Fay Ellwood (32). The following account is taken from that source:

On January 19, 1951, the six-year old son of Jageshwar Prasad and Mano Rama Prasad, nicknamed Munna, was viciously murdered by two neighbors named Jawahar and Chaturi, one a relative of the family who evidently hoped to inherit Jageshwar's property in his place. Munna was enticed from his play and taken to the neighborhood of the Chintamini Temple, where his head was cut off. His body was found buried near the river and the severed head in the vicinity of the temple. Because someone had seen the three go off together, the two men were arrested. Chaturi confessed unofficially but later retracted his confession, and because there were no witnesses to the crime, the case against them collapsed.

Six months (sic) afterwards in a neighboring district of the town, a boy named Ravi Shankar was born to Babu Ram Gupta and Ramdulari Ram Gupta. The baby had a long mark like a knife scar on his neck. Between two and three he began to tell his mother and others that he was the son of Jageshwar, a barber of Chhipatti District of the city, that he had been taken to the riverside and murdered in an orchard by a washerman named Chaturi and a barber named Jawahar, who cut his neck with a razor and buried his body in the sand. This caused the mark on his neck. He insisted that his present house was not really his and once he tried to run away to his former home. He had things there, he said: a slate, a book bag, an ink pot, a toy pistol, a wooden elephant, a figure of Krishna, a ball on a string, a watch, and a ring--and he kept asking the Ram Guptas to get them. When he was five, he told his story to his teacher, who wrote it down.

Neighbors told Munna's father Jageshwar Prasad, who went to the Ram Gupta house to investigate. Because Ravi Shankar's father would not speak to him, Jageshwar went later, on July 30, 1955, when Babu Ram Gupta was not home. In a 1963 letter to Stevenson, Jageshwar described this meeting. He sat outside near the door of the house, the and "Do not be afraid" and "[You] used to take money from me." After hesitating perhaps as much as twenty-five minutes, Ravi Shankar sat on his lap and said, "Father, I used to read watch on Jageshwar's wrist. He described the murder, which matched what Jageshwar had reconstructed from the confession of Chaturi, the mutilated state of the body, and his own inspection of the site. Another time when Munna's maternal grandmother (who lived in Kanpur) was visiting a family in the city, Ravi Shankar was taken to the house. Asked who had come, he hesitated and then said, "Nani (mother's mother)....She has come from Kanpur."

Babu Ram Gupta reacted violently to these happenings. He quarreled with his tale-bearing neighbors, insisted that everyone forget the story, and beat the child severely to shut him up. Ravi Shankar became afraid of his father and spoke much less about Munna; he was also afraid of Chaturi. Seeing Chaturi once in a crowd, the boy trembled with terror, although no one had told him who that was (his mother did not know). He was also fearful near the Chintamini Temple, and afraid of razors.

Babu Ram Gupta died not long after these events, but Ravi Shankar did not again talk freely about Munna. Some of the other witnesses were also reluctant to speak, because the murderers were still at large.

Several Indian scholars began investigating the case, one in 1956 and others in 1962. In 1964 Stevenson examined the birthmark and interviewed the witnesses, including Munna's mother and neighbors. Ravi Shankar, his mother and siblings, a classmate, and the above mentioned teacher were also examined. Stevenson returned in 1969 and 1971 for further interviews. Among them the witnesses testified to twenty-six correspondences between Ravi Shankar--his claims, behaviors, and birthmark--and Munna's life. Virtually all Ravi Shankar's claims were verified, with only one or two being uncertain. Thus, two sets of witnesses disagreed about whether Babu Ram Gupta had taken his son to Jageshwar's house.

Stevenson considers fraud and forgotten memories as possible explanations. It is very unlikely there was fraud by the Ram Gupta family, who kept having to hear how much the boy preferred his previous family; the wide diffusion of the reincarnation story also made them fearful of the murderers. The gruesomeness of the murder, the murderers' escaping punishment, and Ravi Shankar's further suffering under his father's battering (hardly karmic justice) all make the case unlike the stereotypical past-life romance. Jageshwar wanted to believe that the child was his lost son reborn, which might have influenced his memories of their meetings in 1955. But much detailed evidence came not from him, but from the Ram Gupta family and their associates early in the case.

Stevenson asks whether forgotten memory explain the case? Munna's murder had been well known, and, although the families were barely acquainted, Ramdulari (then three months pregnant with Ravi Shankar) had gone to the Prasad home to offer sympathy. Could Ravi Shankar as a toddler have overhead talk of Munna, forgotten it, then unconsciously

formed an identity as Munna? The problem here is that the details of Munna's toys were definitely not public knowledge. The two households were only about a half mile apart, but the intervening roads had many turns; it was unlikely that a closely guarded Indian child between two and three could have wandered this distance by himself and entered the Prasad house. Stevenson concluded that normal explanations for Ravi Shankar's knowledge could be ruled out. Furthermore, the boy's fears of the temple area and of razors, which lasted for years after his imaged memories faded, are hard to explain normally.

8.5.6 Scale to Measure Children's Claims of Previous Lives

Tucker (34) devised a strength of case scale, which assigns weights to features of each case which are more suggestive of a paranormal explanation than a normal one. Examples are the records of the dietary craving which must have been developed in another life; unusual skills or aptitudes which could have been developed in another life; behavior related to the opposite sex in respect to friends or relatives; desire or reluctance to return to the previous place identified.

Many other factors are taken into account on this scale, for example, any knowledge of the family of the child in its present life and that in its claimed earlier one; difference in social status between the two lives; difference in economic status; difference in cast (Brahman down to untouchables).

Around one thousand cases are in the data base.

Tucker points out that a number of factors have been found in his work to correlate with the scale score. Among these are the early onset of statements about the previous life; the amount of emotion the subject shows when discussing previous life; the amount of facial resemblance between the subject and the deceased individual. He concludes that the reincarnation hypothesis is a better explanation of these correlations than other possible interpretations.

8.5.7 The Time between Incarnations

It is sometimes unclear, in the Stevenson cases, when the first birth and death occurred. However, among his cases and other literature one finds a wide spectrum and reincarnation may occur "at once," or it may be delayed for centuries. According to Wambach, the average time is 58 years (48).

In accounts of the After Life (Swedenborg, Theosophy, Spiritualism), the time depends on what is needed to provide the soul with equipment needed in the next life. In the Bardo, of *The Tibetan Book of the Dead*, the period between incarnations averages only 49 days.

8.5.8 Birthmarks Which Seem to Connect to Happenings in the Previous Life

Stevenson has taken the position that if Reincarnation occurs, in particular if in life A, X was violently assaulted and murdered, then, in X's life B there should be some marks on the new body corresponding to those which caused the violent death of life A. Stevenson has published an entire book (35) which is concerned with birthmarks and their relations to happenings in putative earlier lives. The book contains 33 colored pictures of birthmarks (two of which are shown in Figs. 8.1 and 8.2).



Fig 8.1a Birthmark at the back of Chanai Choomalaiwong's head as it appeared in March 1979, when he was 11 ½ years old. It was a round, puckered, hairless area of increased pigmentation, approximately 0.5 centimeter in diameter. This birthmark corresponded to the bullet wound of entry on Bua Kai. Reprinted with permission of Greenwood Publishing Group, 88 Post Rd.West, Westport, CT 06881-5007, taken from Ian Stevenson, Where Reincarnation and Biology Intersect (P, 1997).



Fig 8.1b Birthmark at the front of Chanai's head in March 1979. It was a hairless, puckered area of increased pigmentation. It was about 2 centimeters long and 0.5 centimeter in wide. This birthmark approximately corresponded (with allowance for some shifting) to the bullet wound of exit on Bua Kai. Reprinted with permission of Greenwood Publishing Group, 88 Post Rd.West, Westport, CT 06881-5007, taken from Ian Stevenson, Where Reincarnation and Biology Intersect (P, 1997).

There has been some research recently on the distribution of accounts of reincarnation, and there is a particularly puzzling case in the fact that the cases in India, - the Pashicha has examined this in detail and found a number of cases in southern India which were unreported. There are 450 cases reported in the North. The number of cases reported in the South is less than 9 and it is not clear why this discrepancy occurs, since the idea of reincarnation is just as prevalent in the South as it is in the North.

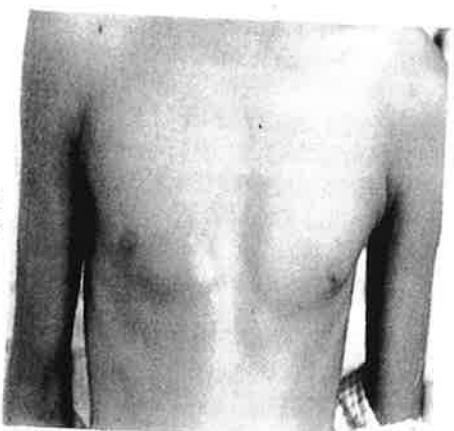
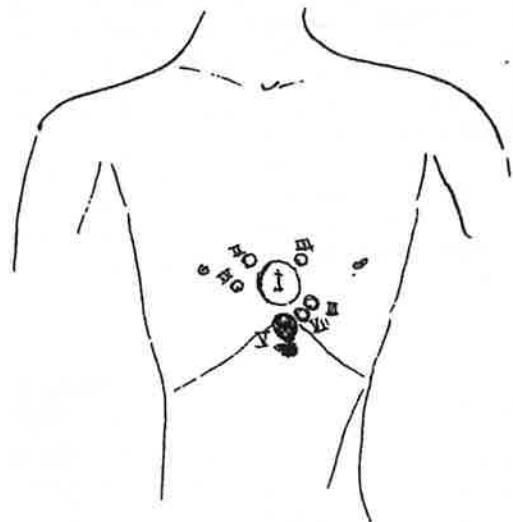


Fig 8.2.a. Birthmark on Hanumant Saxena's chest as it appeared in 1971, when he was 16 years old. The birthmark was an area of lessened pigmentation. Reprinted with permission of Greenwood Publishing Group, 88 Post Rd.West, Westport, CT 06881-5007, taken from Ian Stevenson, Where Reincarnation and Biology Intersect (P, 1997).



Sketch showing location of fatal wounds on Maha Ram Singh. Dr. S.C. Pandeya (Civil Surgeon, Fatehgar, U.P. India) drew the circles on the lower chest and upper abdomen. The Roman numerals correspond to the different wounds described in the autopsy report. Number I was the largest wound. Note the characteristic smaller wounds on the periphery of the large central wound. This is due to the scattering of the shot after they leave the barrel of the gun.

Fig 8.2.b. Reprinted with permission of Greenwood Publishing Group, 88 Post Rd.West, Westport, CT 06881-5007, taken from Ian Stevenson, Where Reincarnation and Biology Intersect (P, 1997).

8.5.9 Interpretation of Accounts of Reincarnations

The first tendency of the scientist is to deny the validity of the alleged evidence, to picture it as worthless. Reincarnation and the evidence for it sounds at first like strange tales from a disordered mind. This is a difficult position to maintain after one meets Professor Ian Stevenson, who comes over as a low-key, relaxed and extremely knowledgeable scientist. Of the evidence for survival this has the greatest degree of support from work carried out systematically with meticulous care over many years. It is not reasonable to deny the reality of the facts reported.

Stevenson himself has seemed sometimes reluctant to interpret the data literally. He has often examined other hypotheses (37). For example, it could be that, sometimes, deception has been contrived by the families usually involved. Collaboration before the "foreign expert" arrives might be aimed at obtaining financial gain. Indians often think of white men as highly gullible, and very wealthy (38). Each case has to be looked at in the light of several hypotheses. Stevenson's view is that most of his cases are best interpreted in terms of reincarnation of a non-corporeal entity.

8.5.10 The Story of Er

The idea of reincarnation is an old one. One account of it which concerns a person called Er, is due to Plato (39). Er finds himself in a place within, it might be said, the reincarnation mechanism. He sees two doors, one marked Heaven and the other, Hell. People step happily out of the first door and stagger, terrified, from the second. Soon, these people are given a Forgetting Potion, they will *not* remember the last incarnation and face the next with what they have learned in the previous ones, but the source of their knowledge is unknown to them. Soon, Er sees these people lining up and along comes a Being who drops in front of them, a large number of plaques on each of which is written a few words which describe the characteristics of a certain kind of family. For example: medical doctor

and physician wife; gymnasium teacher and his wife; a wealthy property owner and family; a philanthropist and family; a teacher; chariot maker; a temple priest; politician; unemployed worker; an adulterer and open marriage-thinking wife; a successful thief with collaborating wife.

Er sees them choosing the life which they would most like to live. He begins to understand the working of the world.

8.5.11 Two More Cases of Reincarnation

Much of the evidence for past lives, - and thus survival, - arises from accounts of people who have claimed to have lived in a former life (and in some cases several former lives) and have given information in the present life which is veridical and often can be checked. Here is an example from the book by Ian Currie (40).

"I was born in 1915, and what first dominated my mind was the feeling of homelessness. I experienced this within myself, the images didn't come until later.... I often wept, and it took several years before I taught myself to laugh and be happy. It was during that first lonely time that the image of the loss of my son first surfaced. He was a bit of myself torn away--I can't explain any better: that was how it felt.

"In my third year I began ... to smooth my pillow and lie down and caress the pillow as if it were my boy's cheek. In my memory pictures he was four years old, never older I used to hold myself very carefully upright, with my neck straight, and I felt I was grown up. So strong was my anchor into the past that I felt exactly how the clothes covered my ankles and that my sandals were soft. I had a hard time learning to sit on chairs....

"The pictures from the past ... came and went.... Only my love for that little boy remained there all the time, first as a pain in my soul, later as a kind of knowledge about that one particular little person. The pictures have been the same since early childhood ... [but] one ... remained burned into my mind....

"The place we lived in, in that memory picture, must have been a very big house. The windows are high, like ordinary doors, with deep niches but no glass panes. I can't actually see that they have no glass, but I know it, definitely. The floor is made of thick polished tiles.... They look like marble ... red-brown and gray-green. If I were to stretch out my hand as I lie on my divan, I could touch a tile which has an unusually big red-brown design. It feels as if my divan is placed almost in the center of my room. To the left, diagonally behind my head on the same side as the two windows, a couple of steps lead to a roof garden with a dazzling white balustrade. There's no door, but half of the wall is missing, and there, in front of the opening, my son is playing. Sometimes he comes over and playfully traces his fingers over my face. That's the memory which gives such pain.... [He] is dressed in white, not Western style; he has bare feet. My clothes are thin, I'm resting on my left hip, and on my left foot I see the soft, lion-colored sandal. I lie there looking down at my brown wrist with the thin soft fabric around it. Though I can't really see it, I know I have white pearls in my black hair. Even in this present life, I "know" that my hair is black though it never has been black.... As a child I was always so disappointed when I saw my mirror image--I didn't recognize myself at all....

"I began to suspect that it might have been India where I lived in [this] former life. A friend suggested that I read about that country because she found so much which could be connected with India in my images and personal characteristics. Then, with the joy of

recognition, I found the lotus flower I had started to draw even before I went to school. But also OM, the holy sign, the symbol of God, was something I recognized and ... had mulled over in vain since the age of five, when I saw a beautifully stylized number 5 on my father's cigar box and was absolutely convinced that it had to be something other than a number, which my father told me it was.... I've never forgotten how I used to trace the number 5 on the wood of the box while deep inside I struggled to remember."

A second example (40) arises from the work of Joan Grant, an English psychic, and remarkable because she claims to remember not only the last life, but also several lives, and she has written a book about these lives, or about her experiences in them.⁶

In a real life incident she was invited to go to visit a Belgium friend and there met a six year old boy named Robert who was staying with the friend rather than living with his own parents.

One morning soon after arrival, Joan Grant found herself awakened by the boy, studying her intently. He told her he wanted to show her something and asked if she could come immediately (40).

He took me to a box-room where there was a large unopened packing-case. He foraged in a cupboard and handed me a hammer and cold chisel. "Open it, please. I cannot do it myself with one hand, and I have promised not to use the other one until the bone is quite mended. I broke it falling off my pony...."

"Are you sure your grandmother wouldn't mind? It's addressed to her, and ..." "Please open it. Now! He was quivering with impatience. "It's me in the packing-case."

I thought that he meant that it contained something which belonged to him.... I began to prize the nails from the wood. At last I got the lid off, and found that ... it held a large oil-painting. I propped it up against the wall and flicked sawdust from the glass. It was the portrait of a young man in khaki. Who was it? Obviously someone the boy knew very well, for he was gazing at it with intense excitement and a deeper emotion very close to tears. Then he turned and looked at me solemnly. "You will not laugh at me, will you?" I wanted to hug him, but I knew the matter was too serious. "I never laugh at true things." He nodded. "Then you will tell my grandmother that this is not just a picture of my Uncle Albert, it is a picture of me."

I went at once to tell her. I think she had asked me there only for confirmation of what she already knew. Eagerly, as though it was a profound relief at last to accept evidence which her religion made it difficult to believe, she told me many things which substantiated Robert's story. Her elder son, Albert, had always meant far more to her than her younger son, John. She had separated from her husband, who was English, when both children were quite small. Albert had spent most of his time with her in Belgium, and had been killed in

⁶ The impressive thing about Joan Grant is that sometime ago, she wrote a book in which the action was supposed to take place in ancient Egypt. In this book she described a person having chicken pox and said that there was a great smell associated with the disease. The modern form of chicken pox is known to produce no smell, and therefore there was an outcry to the effect that her memories must really be coming from her own personality as fictions and were not coming from the much earlier time of 2000 or 3000 years ago. However, an Egyptologist stepped in and said that, in those times, there was evidence that chicken pox did cause an odor, a remarkable piece of evidence for the veridicality of what Joan Grant writes was given.

1915, a captain in the Belgian Army, at the age of twenty-three. John, just too young for the war, had been sent to school in England and had married an English wife. He saw his mother very seldom until she went to stay with them for a few days when Robert was two years old. To the other grandchildren she was still only an elderly woman whom they hardly knew. To Robert she was the only person who really mattered. If he was with her he was cheerful and healthy. With his parents he sulked or was violently disobedient until they were thankful to send him back to Belgium.

Robert was always a brave little boy, she said.... When he first saw a swimming-bath, and he was then only three, he ran along the diving-board and dived in. Albert, too, was a very fine diver. One day someone came here with a cinema camera. When he pointed it at Robert, turning the handle with a clicking noise, Robert screamed, "Don't! Don't! They killed me like that last time!" I tried to calm him, but he became so hysterical that I had to send for the doctor, who gave him a sedative. Albert went out alone into no-man's land at night to stop a German post enfilading his men with a machine gun. There were eight bullets in his body when they found it, but he did not die very quickly. He had managed to crawl nearly back to our own wire before morning...." There were tears in her eyes, but she continued composedly. There have been so many other things, pet names which Albert used to call me, likes and dislikes which used to be a private joke between us, trivial in themselves, perhaps, but altogether so certain. Now I shall hang up their portrait. I have kept it hidden all these years because even a snapshot of Albert made Robert behave so-so strangely. But now it is not strange to us any more than in 1915 Albert only left me for a little while.

Ian Stevenson has a total of 1,700 accounts of the memory of past lives and throughout his long career, Stevenson has always left open the possibility that there may be another explanation of these accounts than that of reincarnation (cf. Stevenson (29)).

There are two factors of interest which come into these accounts. The first is that nearly all of them come from children between the age of about two and nine years old, by which time the child has usually got the idea that such tales are not wanted or the memories have simply faded. They must be absurd according to his parents and his friends at school. So, when he still has these memories, he suppresses them and forgets.

The other frequently met characteristic is that many of these accounts involve a violent death, - somebody assaulted and murdered, or killed in an accident.

This brings up the question of whether the accounts gathered by Dr. Stevenson and others indicate that the reincarnation evidenced by the accounts of the young people who have suffered untimely deaths might indicate that reincarnation takes place but is exceptional. It is almost as though the unfortunate soul, having had such a short time incarnate, is encouraged to have another try at a life. On the other hand, as will be seen below, there is evidence that each person has lived several lives before.

8.5.12 The Work of Grof

Grof (41) is the leading expert on the use of drugs to release memories of other lives. His work has led to conclusions, some of which may be found to be repellent. Effectively, Grof studies consciousness. He regards the statements made and feelings shown by people under LSD as indicating the surfacing in their Consciousnesses of some of their experiences in previous incarnations. Some of the facts imply that reincarnations may not

only occur in human families but also in animals and plants. Grof's work is too new and too different to be evaluated as yet. However, it seems significant that *The Tibetan Book of the Dead* indicates that in some cases, reincarnation in a human body may not be appropriate.

8.5.13 A Question of Culture

The work on reincarnation is of importance to our comprehension of where we stand in respect to the evidence for survival. However, before we try to incorporate its significance into our New Paradigm, it would be good to know the results of similar work in other cultures. One should expect little from countries where materialism dominates. But the high living standard world is only one third of the whole. What of the Australian Aboriginal with his 40,000 year old culture? What of American Indians? What of modern Japanese who describe themselves as Buddhists but also practice Shinto in which ancestor worship is a part? Zulu culture? Shamanic lives? Eskimo culture? We need to study the evidence in all these cultures for more than one life.

As with Near Death Experiences, one has to be sure one is on firm ground before introducing the seemingly New Knowledge into philosophy. Correspondingly, it is unreasonable to have two largely different philosophies between Eastern and Western authors, each appearing to ignore the other.

8.6 XENOGLOSSY

This is an ability to "talk in tongues," i.e., suddenly to find that one can speak another language, - sometimes with an accent appropriate to a certain part of the country. Occasionally, the new language is spoken in a version belonging to earlier times. The reincarnation hypothesis is attractive. An example is given by the Baktivedanta Trust. The case is that of an American woman living in Philadelphia who was put under hypnosis and asked to remember an earlier life. She manifested the personality of a Swedish peasant farmer. She spoke fluent Swedish, although she had no knowledge of Swedish in her present life (47).

8.7 REGRESSION: THE WORK OF HELEN WAMBACH (48)

The account to be given in this section concerns the practice of regression, a technique utilized by some psychiatrists who hypnotize the patient, and then by suggestion bring her back to earlier lives whereupon she is asked to relate the characteristic she remembers from these earlier lives including such items as clothing, type of dwelling, food, and also an account of old age and death.

Helen Wambach, a psychiatrist working at first in the Monmouth Medical Center at Long Beach, NJ, made about 2,000 hypnotic regressions between 1968 and 1978. She devoted herself to obtaining answers to the basic questions that many of us ask: how we lived before, in what state and how did we die?

Dr. Wambach's technique was to gather groups of about 20 people, tell them they must devote several hours to the session, have them lie down on blankets and then hypnotize the entire group. Of course, some people made clear that they did not feel like being hypnotized and had no particular memories of early lives, etc. However, the majority seemed to undergo some kind of regression under Dr. Wambach's influence and write down answers containing apparently veridical information.

In her book, Wambach tells of an early instant, - in which she had hypnotized a woman, - Anna (48). *The following follows from Wambach's book.*

"Anna had been born in 1938, so in the next session I moved her back year by year through the twentieth century. She reported, "Just drifting," down through the years until I came to 1917. Then she described a living room. She was looking out of the window of the house, but when I asked her to look around, she described the furnishings in detail. Her voice quality was different now from what it had been when she was Rachel, the early pioneer in 1800. She seemed intelligent, but had none of Rachel's liveliness. She appeared to be unhappy. As I probed further, she vividly detailed her feelings.

"She was bored in the small town where she lived. She read from a newspaper masthead that the town's name was Westfield, New Jersey. She described her feelings of attachment to the house she lived in and told me how she herself had made the curtains that hung at the windows. I took her to encounters with neighbors and friends and into shops on the main street of town, and she was able to give me many details. She told me that she felt dissatisfied in the life in Westfield; wanting excitement, she found herself involved in a plot to sell World War I government supplies on the black market. She told me that her husband was in the army and overseas, but she expressed no strong attachment to him.

"I explored her involvement in the black market. Her voice shook with emotion as she described her fear of being exposed and her shame at the thought that she would be accused of profiteering while her husband fought overseas. As I listened to her, I could empathize with her feelings. She talked about the hatred of Germans and the total involvement of her community in ideas of the glory of warfare. It seemed as though the When I brought her to the death experience, I was shocked to find that she had killed herself.

'I put the gun to my head and then all I see are magnificent colors. I don't hear any explosion. Oh! I haven't escaped--I'm still aware of everything.'

"This was my first experience of suicide in a past life. As Anna described it to me, it was as though when she shot herself, she experienced no pain, but stayed conscious. She was outside of her body. She had the feeling she had not escaped anything at all: She was still aware and still filled with the emotions of shame and confusion that had led to the moment of suicide.

"I was concerned about the effect of this experience would have on the Anna of the here-and-now. Out of hypnosis, she said she was shocked at suicide, and hadn't thought of it in her current lifetime. 'I've been unhappy at times, but suicide has never seemed to me to be a way out. Maybe it's because I know from this past life that it solves nothing!'

"I regressed Anna to that same lifetime on three other occasions. I pressed her for the kind of evidence and data I could check, and I was rewarded by an outpouring of details of life in the small town. The name of the druggist on the corner, the description and name of the police chief, and the name of the town constable who had discovered the black-market plot were all reported explicitly. Anna talked about her home, which she said was on Mud Lane, and gave other street names and places. She described a great fire in 1896, and told how the fire bell rang in her schoolroom though the fire was blocks away.

"I hurried to the small town of Westfield, 50 miles from where I then lived. The other members of our research group were as interested as I in seeing if the details checked. On my first trip to Westfield, I was happy to find that the local newspaper had been

microfilmed to as far back as 1885. The newspaper solved the "fire bell in the schoolroom puzzle." It reported that the fire bell rang in the school because that is where the only bell in town was. An old newspaper report was accompanied by a photograph of Captain O'Neil of the Westfield Police Department in all his mustachioed glory. He was indeed handsome, as Anna had told me under hypnosis. All the other details she gave me, such as the name of the druggist in 1916, also checked out. The only problem was Mud Lane, where the house was; the street directory did not list it. But then I found a newspaper report in 1924 that said that Mud Lane had been changed to Crestwood Drive when it was paved.

"A problem arose when I tried to check Anna's burial in the local cemetery. I found the family plot and the headstones of named family members as she had described them, but there was no headstone for her. I checked with the cemetery records and discovered that there were two unmarked graves in that family plot, including one from 1917 that could have been Anna's. As she had been a suicide, perhaps the family had buried her very quietly."

Dr. Wambach's technique with regression of her groups under hypnosis was to provide each person with pencil and paper, hypnotize them and then ask them to go back to the time of their birth and the process of being born, life, and then to earlier times, - she took period by period back to 2000 BC (48).

Before she brought them out of the hypnosis, she made a strong suggestion that when they recovered from the hypnotic experience, they would still be able to remember most of what they had realized when she had asked them about their lives in the various periods in the past, she asked them to write down everything they could remember.

The first concerns the question of race in past lives and is shown in Fig. 8.3. She divided the races into Caucasian, Asian, Indian, Black and Near Eastern, and found the relations shown, the dominant point of which is that the Caucasian races were fewer than 25% of the people remembering persons in them, but rose up to approximately 68% in the time AD 1500-1900. An interesting point is that in very recent times the dominance of the Caucasian races among the lives remembered has dropped off and the Black and Near Eastern peoples lives have featured to a greater extent in the lives remembered.

An encouraging aspect of Wambach's work is the distribution of male and female persons who her patients remembered. Of course, it should be about 50/50 if they were really remembering the many lives in the past and that is what it turns out to be, as is shown in Fig. 8.3.

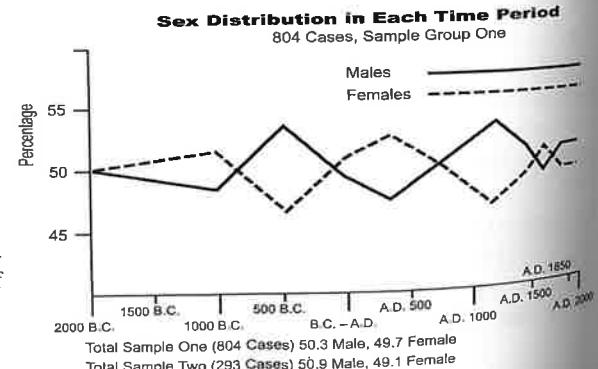


Fig. 8.3 Sex distribution of persons 2000 BC - present in respondents' memories. H. Wambach, *Reliving Past Lives*, Barnes & Noble, New York, 1978. Reprinted with permission from Helen McGrath & Associates, Agent for the Estate of Helen Wambach.

Wambach also examined the clothing worn in past lives. She made three groups: hide or rough tunics; draped garments; or dress and/or pants. Here again, Fig. 8.4 shows an increase in the number of people wearing a dress or pants and a decrease of those in draped tunics or rough tunics. The fact that the draped garments have increased in the last few decades, while the dress-pants mode has decreased seems anomalous but may reflect an increasing number of Moslems.

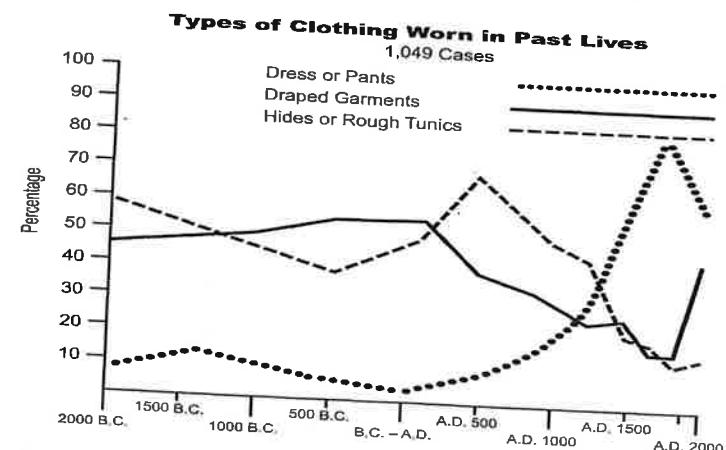


Fig. 8.4 Clothing 2000 BC to present - from memories of regressed respondents. H. Wambach, *Reliving Past Lives*, Barnes & Noble, New York, 1978. Reprinted with permission from Helen McGrath & Associates, Agent for the Estate of Helen Wambach.

Wambach went to the foods eaten and divided them into meat dishes, cereal and vegetables only; wild animals, roots and fruits. The results are in Fig. 8.5. They show the dominance of the cereal and vegetable only diet for most of the time, though not in the most

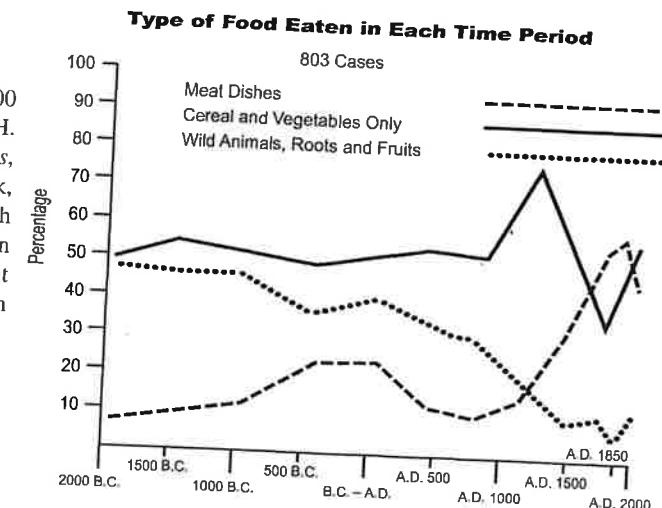
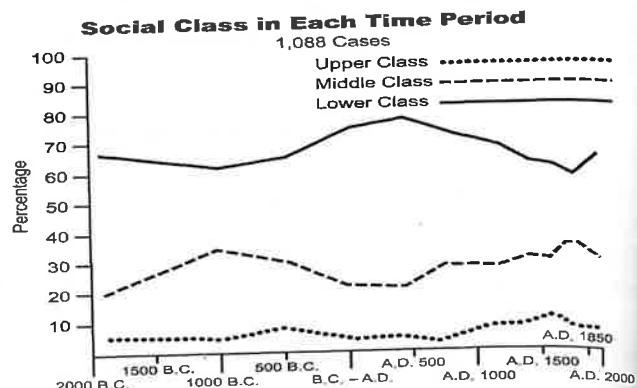


Fig. 8.5 Types of food 1500 BC to present. From H. Wambach, *Reliving Past Lives*, Barnes & Noble, New York, 1978. Reprinted with permission from Helen McGrath & Associates, Agent for the Estate of Helen Wambach.

Lastly, the results of the social class in each period gives support for the veridicality of her results. Thus, it is seen that the lower class type of life dominates in the memories of her patients while those who relate having had an upper class type of life generally comprise less than 5% (Fig. 8.6).

Fig. 8.6 Social Class, 2000 BC to present. From H. Wambach, *Reliving Past Lives*, Barnes & Noble, New York, 1978. Reprinted with permission from Helen McGrath & Associates, Agent for the Estate of Helen Wambach.



Thus, were the results to originate in fantasy, one would expect that most people would put themselves into a higher class level.

Some parapsychologists do not accept Wambach's results as real, because of the inferred ease of hypnosis of so many - they consider this inconsistent with independent experience on hypnosis (49). However, it seems that the agreement between post-hypnotic memories of regression and what Wambach says she has examined in books and social history of the times, - seem to make the work a significant contribution to the history of past lives.

8.8 CHANNELING

It is worthwhile getting quite clear about the relationship between channeling and the statements of mediums, about the lives of dead people.

Normally, a medium is associated with a control who claims to be able to "call up" appropriate dead persons who might wish to communicate with sitters or response to their wishes.

In channeling, the channeler has no control personality and does not necessarily experience communication with a specific discarnate. Typically, she claims to hear a voice which tells her certain things which may or may not be anything to do with persons she knows or has known.

Of course, channeling and mediumistic phenomena are related in the sense that in both phenomena, it is alleged that information is coming from discarnate entities. The stress in the past has been on the medium's work because of the wish of some to be in contact with deceased relatives, whom they have loved. On the other hand, the channelers often bring forth material which is of more general interest. There are famous channelers of the past such as Madame Blavatsky, who produced four remarkable books which she claimed, were

channeled to her by a "master" whom Blavatsky named as Koot Humi.⁷ The most well known modern channeler is probably Seth (50), the discarnate entity whom housewife Jane Roberts claims to have been channeling for several years.

Does the information really come from afar or is it a conscious or unconscious fabrication of the channeler? The medium is probably better off in claims of veridicality because there are specific questions about intimate and personal matters which can be asked of the alleged discarnate, and specific answers which can be compared with what is known. Some of the channeling material can be checked, too, but more often this concerns remote things, - often philosophical systems, (even poems and books are channeled). Here, it is more difficult to tell whether the phenomenon is genuine or not (51).

The most famous case of all in the ancient world, is the information produced by the priestess in Delphi, Greece. Delphi was a place where people went to obtain information and they put the question to a person who was a kind of secretary of the priestess and an analogue of the "control" exhibited by some mediums. The priestess herself sat upon a high rock, above the place where the questioner stood and she inhaled fumes from a furnace. She gave her answers to the questions in a rather indirect way and sometimes it had to be interpreted by an accompanying wise man (51).

Alleged channeling has become a common phenomenon in California in the last two or three decades. Belief in the veridicality of the material tends to decline in so far as the channeler makes a profession of her alleged ability, and charges those who wish to hear what she has to say.

8.9 ELECTRONIC VOICE RECORDINGS OF ALLEGEDLY DISCARNAME ENTITIES

The development of the claim that dead people can come through on certain radio frequencies goes back to the work of Raudive (1942), the Latvian doctor who was the first to develop the technique (53). It seems to be an underdeveloped and poorly controlled method: few people seem to be able to make a success of it. Perhaps few want to.

George Meek has been a successful contributor in this area (54). He has published material which he alleges was recorded by his assistant, Bill, of conversations the latter had with a deceased Dr. Mueller who identified himself by giving his social security number and Q clearance (both verified). The following is an excerpt.

Excerpt 6	Dr. Mueller	Technical Advice	2.37
Bill:	Just a minute, Doctor.	I know you are here but I got to ...	
Dr. Mueller:	I am gonna cut down the volume of these other frequencies.	Very well, William.	
Bill:	I want to cut them down to a level that won't ah ...		
Dr. Mueller:	I am not sure, William but ... I don't feel too comfortable with that one frequency.	What's that again, Doctor?	
Bill:		I said I am not too comfortable with that one frequency.	
Dr. Mueller:			

⁷ As with Seth and Jane Roberts, the depth and variety of the material in Blavatsky's four books would be very difficult to believe came from a single author, albeit that Blavatsky was abnormally well educated and had had 7 years in Tibet.

Bill: Well, we will see. Maybe we can change it later on, Doctor.
 Dr. Mueller: Very well, . . . oh yes, William . . .
 Bill: Yes?
 Dr. Mueller: Ah . . . I think we have . . . a problem with . . . the Spiricom we are working on.
 Bill: Spiricom? Oh you mean Vidicom.
 Dr. Mueller: Oh yes, William. I am sorry, Vidicom. I think the problem is . . . I know that your wife's relatives . . . television receiver, however, William I think the big problem is an impedance mismatch into that third transistor.
 Bill: Third transistor?
 Dr. Mueller: Yes, the transistor that follows the input.
 Bill: I don't understand.
 Dr. Mueller: The pre-amp, the pre-amp!
 Bill: Oh, the pre-amp?
 Dr. Mueller: Yes, I think that I can easily correct that by introducing a . . . by introducing a 150 or 100 . . . I am not sure, William, a 150 ohm one-half watt resistor in parallel with a .0047 microfarad ceramic capacitor. I think we can overcome that impedance mismatch.
 Bill: Oh boy, I'll have to get the schematic back.
 Dr. Mueller: You rather have the schematic?
 Bill: I'd rather mark it on the schematic, Doctor.
 Dr. Mueller: Very well.
 Bill: The schematic is over there in the file.
 Dr. Mueller: Very well. Oh yes, William one other thing.
 Bill: Yes, Doctor?

 Dr. Mueller later describes his death.

 The Mueller voice is very robot-like, a point commented on by Dr. Mueller.

Excerpt 10

Bill: Yes.
 Dr. Mueller: I am very happy William, that surgery was not necessary. There are times when surgery becomes necessary. Don't worry about it William. Don't worry. Worry does not help the situation. . . . Should surgery become necessary in the future, since it's not a malignancy . . . it's benign, there's nothing to worry about, William. Did you understand? Hopefully you will not have to have that surgery, William . . . but should you have to have that surgery, please William, please, worry will not help. Do you understand, William?
 Bill: Yeah, I understand, but do you understand, Doctor. I know I am not getting any younger.

Dr. Mueller: I know. I understand, William. Well . . . In my case . . . Well I was fortunate . . . It was sudden . . . however, . . . you know in advance. The important thing . . . the one benefit that you will find as the result of our contacts you are aware! I was not aware of this side. I didn't know the potential over here before. So when I got over here it was like waking up in the morning and not knowing where you are at. Like having a bad dream . . .

Meek has left us (1999) as has his assistant, Bill. Parapsychologists do not attach much credibility to this method. However, Mark Macy (55) has written a book extolling it. There seems to be more work in Europe than in the USA, the most active group being led by Maggy and Jules Harsch-Fischbach in Luxemburg and more recently, on an international level, by Dr. Anabelle Cordosa. Conversations recorded by the Luxemburg group with a discarnate calling himself "Technician" seem consistent with the Swedenborg-theosophy-spiritualist model of the after life.

8.10 REMARKABLE MEDIUMS

8.10.1 Home, Kluski, Leonard

The prince of mediums in the prime time of mediums (1850-1950) was certainly Daniel Dunglas Home(1833-1886). He had an impressive range of being able to bring about extraordinary happenings and made his living by illustrating them in full daylight to people in Europe and Russia. The most famous of Home's effects was levitation and there is an account, witnessed by people of substance, including leading scientists of the time in London, of Home being able to lie flat and float out through a window in his house, above the ground and come back through another window. An unnerving situation was to observe Home, apparently sitting comfortably at a table and realize that he was really three inches above the chair (56).

Home was examined in detail by Sir William Crookes, among the most eminent scientists of the 19th century and the discoverer of the rare gas, krypton. A part of Home's repertoire was his ability to move things at a distance without touching them and play an accordion without touching it, and when it was locked in a box. He was able to pick up live coals and hold them in his hand without a burn resulting. Such abilities can only be equalled by those of Sai Baba.

Home was never discovered cheating and was thoroughly examined in London by numerous prominent people of the time. He became well known throughout Europe and was a friend of numerous notables, including the Russian Czar.

In Poland, between the dates 1873-1943, Kluski (57) materialized phantom humans and animals; and conjured phantom hands which made impressions in wax. A medium called Rudy Schneider (born in 1903) produced phantom arms which could play musical instruments. An Italian woman, Eusapia Palladino, levitated tables without touching them, played two handed musical instruments at a distance and conjured spirit hands to accomplish this in front of her sitters (58).

An example comes from the mediumship of Mrs. Leonard (1882-1968) who sprang to fame during World War I through some remarkable teachings given to Sir Oliver Lodge and Sir Arthur Conan Doyle.

The interest in this particular account is that it is the first recorded one to use book tests (59). Here, ostensibly speaking for a deceased personality, suggests to a sitter a message which will be found on a specified location on a numbered page in an identifiable book to be found on a particular shelf in her library. The sitter eventually finds the book in the place described.

In this case, as with most other mediumistic utterances, there is the intervention of an extra personality who is a kind of director of happenings and who purports to be able to "bring in" various discarnates to speak through the mediums.

In Mrs. Leonard's case, so-called "control", was a personality called Feda, and during a sitting with Mrs. Leonard, Feda gave a description of a book. The precise description of the happening is from Hornell Hart as follows (59):

"Suddenly Feda began a description of a book

"She said it was made of leather, dark in color, and she tried to indicate the size. Mrs. Leonard showed a length of 8 to 10 inches with her hands and a width of 4 to 5 inches. Feda said: 'It is not exactly a book; it is not printed. Feda wouldn't call it a book, it has writing in it.'

"Mrs. Talbot found this description quite tiresome, but she finally connected it in her mind with a red leather notebook of her husband's. Feda seemed puzzled at this and the replies were rather inconclusive. Feda insisted that Mrs. Talbot was to look on page 12 or 13 for something written there which a communicator indicated would be 'so interesting after this conversation.' Mrs. Talbot responded half-heartedly but Feda was not satisfied. She started all over again and went on to say: 'He (the communicator) is not sure of the color; he does not know. There are two books. You will know the one he means by a diagram of languages in the front.' Here followed a string of words, including 'Indo-European, Aryan, Semitic languages' and others. Feda said: 'There are lines, but not straight-going like this,' drawing with her fingers lines going out sideways from one centre. Then Feda repeated: 'A table of Arabian languages, Semitic languages.' Feda kept saying: 'Will you look at page twelve or thirteen. If it is there, it would interest him so much after this conversation.' Finally, in order to close the sitting, Mrs. Talbot promised to look for the book.

"The verification came later.

"That evening, on the insistence of her niece, Mrs. Talbot (still insisting that it was all nonsense) went to the bookshelf, and, after some time, right at the back of the top shelf, found one or two old notebooks belonging to her husband, which she had never felt she cared to open. One, a shabby black leather, corresponded in size to the description given, and Mrs. Talbot absent-mindedly opened it. To her astonishment, her eyes fell on the words 'Table of Semitic or Syro-Arabian Languages,' and pulling out the leaf which was a long folded piece of paper pasted in, she saw on the other side: 'General Table of the Aryan and Indo-European Languages.' Feda's description of the diagram as having lines going out from the center was correct; this branching out from points and from lines happened repeatedly in the diagram."

8.10.2 The Sitting with Mrs. Garrett (60)

The preliminary to this sitting was the disaster which befell the huge British airship R101, on its maiden voyage to India. The airship carried an important Minister in the

government who was to preside at some ceremony in India. Because the date of the ceremony was unalterable, the Minister insisted on leaving England not later than a certain date - which turned out to be too early for the completion of tests on the airship. Its maiden voyage to India was therefore identical with its first test flight, - with disastrous consequences. Not having sufficient lift power, the airship collided during the first night of the voyage with hills in France and all but four of its occupants were killed in the ensuing fire.

Two days after the disaster, while the causes of the crash were still unknown. Harry Price was holding a seance at his 'National Laboratory of Psychical Research' in London. Through the mediumship of Mrs. Eileen Garrett he was attempting to make contact with the spirit of Sir Arthur Conan Doyle, who had died three months previously, leaving instructions in his will that such attempts at contact should be made. As Mrs. Garrett went into trance her voice changed to a masculine quality. But instead of giving a message from the author of Sherlock Holmes, she spelled out 'Irving or Irwin.' The man who appeared to be speaking announced himself as 'Flight Lieutenant H. Carmichael Irwin,' who had been captain of the airship R-101. He spoke in staccato sentences as though under great difficulty:

'The whole bulk of the dirigible was entirely and absolutely too much for her engine's capacity. Engines too heavy. Useful lift too small. Oil pipe plugged.'

The voice gained depth and authority as it continued:

'... Flying too low and never could rise. Disposable lift could not be utilized. Load too great for long flight Cruising speed too low and ship badly swinging. Severe tension on the fabric which is chafing ... Engines wrong--too heavy--cannot rise. Never reached cruising altitude--same in trials. No one knew the ship properly. Weather bad for long flight. Fabric waterlogged and ship's nose is down. Impossible to rise. Cannot trim.'

"Almost scraped the roofs of Achy. Kept to railway. At inquiry to be held later it will be found that the superstructure of the envelope contained no resilience and had far too much weight in envelope. The added middle section was entirely wrong ... too heavy, too overweighted for the capacity of engines....'

On 1 April, 1931, the Court of Inquiry issued its report. The basic facts communicated through Mrs. Garrett were essentially established. Among other things, the village of Achy, though not on ordinary maps of France, was located on the route traversed by the airship.

8.11 CONCLUDING REMARKS

There are several accounts pertaining to Survival of the personality after death. Among the more evidential discussions are those by Ian Stevenson (62); Alan Gould (21) Scott Rogo (12), Stephen Braude (19), Carl Becker (12) and Gracia Ellwood (32). The multiauthored volume on the Varieties of Anomalous Experiences (63) is oriented towards the psychology of the experimenter but contains good, solid accounts of background relevant topics (e.g., Past Life and Near Death Experience, Accounts of Mystical States, etc.).

Looking detachedly at the evidence of this chapter gives, one could find tentative hypotheses for the alleged communications from those who have been declared dead. For example, mediums who produce the voices of discarnates and are able, seemingly, to be instruments for these entities to discourse with living friends and relatives, might be getting

the information by super ESP. Each reader must judge the likelihood of the alternative explanation (in any case, a paranormal one) in each case. One line of evidence which would not be subject to the super ESP explanation is the cross-correspondence: (a) because of the obtruse and rare material involved, and (b) because each medium, getting bits of what only later could be seen to fit together, knew nothing of what was going on with other receivers, what she would have had to search for, to make any sense of the fragmentary and meaningless communication.

The most recent example of physical phenomena is given by the Scoble Report of 1999 which gives impressive communications from several discarnates, together with a large number of associated paranormal events (61).⁸

It is when the several lines of evidence are put together that the conclusion that some people survive the death of their bodies becomes compelling. There is insufficient evidence to make clear conclusions about the *time* of survival, final state, etc.

Of course, it is not possible to weigh the evidence for survival without looking at the other evidence that is inconsistent with the present materialistic or mechanistic view of life. Indeed, the general objective of this book is to present evidence of the limited nature of the present paradigm - see Chapters 9 and 10 - rather than to concentrate only on the (nevertheless, mighty) question of survival. However, taken together, the scientific evidence for OBE's, the multiple evidence for NDE's; the occasional observation of ghosts; the meaningful messages from some mediums and the very detailed evidence for reincarnation, looked at with a mind unshackled to the present paradigm, seems compelling in favor of survival.

8.12 CORRELATIONS BETWEEN NEAR DEATH EXPERIENCES AND PREDICTIONS OF THE AFTER LIFE ACCORDING TO VARIOUS THEORIES

8.12.1 Discussion

Perusal of Table 8.1 shows a number of correlations between the reports of those who have undergone a near death experience and the After-Life according to traditions and disciplines. The horizontal headings are the "results" from a large number of NDEs (not observed *in toto* for any given NDE).

Then, underneath these headings are what is expected for each characteristic on the basis of various disciplines; and from two secular analyses of the evidence of happenings at and after death (Crookall (42) and Meek (1)).

A somewhat greater degree of agreement is between what has been reported by those who have had NDEs and the theories is given by Hindu and Buddhist disciplines. Each of these latter sources gives about 85% degree of agreement with what is reported in NDE's. The next nearest Agreements are from the works of Myers and Crookall (42).

These correlations are evidence for survival. Thus, Hindu and Buddhist teachings originated, respectively, about 4000 and 2500 years ago. Crookall and Meek's accounts are modern. The information from NDE experiences is from the last 25 years. It would not be

* The events reported are impressively veridical in that they could be reproduced when the mediums moved to a number of other countries. Conversely, the absence of infra red photography weakens the strength of the evidence.

rational to suppose that the characteristics reported in NDEs should be those expected from the eastern disciplines by coincidence. Thus, a negligible fraction of the NDEers had any knowledge of what these two disciplines have to say about death and what is to come thereafter; it is thus not reasonable to think that connection occurred between knowledge of the disciplines and what people say they have experienced.

Correspondingly, the correlations can be used as experimental evidence for the degree of truth in the theories of the various traditions. However, the correlations increase the probability that there is survival of some element of the individual, together with her memories of previous and (sometimes) other incarnations. The senses generally thought to be associated with the functioning of the material body are evidently retained by the entity which appears to survive the dying body.

These conclusions also lead to negative results. It is evident that the structure of present biology is radically incomplete. A detailed account has been built up during the last 250 years of the functioning of the body. However, the available evidence suggests that the body is "associated" with a corresponding non-material entity. It is this which provides the action of the OBE, and is the origin of apparitions and ghosts. It is this which comes into mediums and is the origin of their utterances; and it is this which reincarnates.

Accounting for the association of a discarnate entity with the material biological forms of the present model in biology must be a part of the New Paradigm.

8.12.2 Other Considerations from Table 8.1

1. Among the more remarkable correlations in the Table may be thought to be the meeting with discarnate friends and relatives and the unexpected result given earlier by the Buddhists that these people appear in their prime. For this is what NDEers report in 2000.

There are some discrepancies. Thus, *The Tibetan Book of the Dead* (43) predicts an average time between incarnations of 49 Earth days and other literature reports it to be more variable and much longer. Thus, the time between lives is short for a "bad" life and long for a "good" one. According to Ian Stevenson (44), the average time is ~ 20 years. According to Myers (45), it is 58 years. After Saint-like lives, the period may be centuries.

2. In respect to the spirit forms, it seems that there is a range of "densities". The denser forms cannot pass through walls; the less dense can.⁹

3. There are no "forevers". Each life involves a certain time in a body; and then one experiences an interval, pleasant or unpleasant depending on the person's last life, and thereafter one has the chance to try again.

⁹ Cf. Modern reports of abductions in which passage through windows and walls is described (46).

Table 8.1
COMPARISON BETWEEN EXPERIENCES IN NEAR DEATH EXPERIENCES
AND VIEWS OF VARIOUS GROUPS

NDE Exper-iences	Ghosts	Judgement	Where Go?	Punish?	Hellish	Ordinary	Heavenly	Rain-carnation
Christian	Yes	Yes, Judged by Christ	Heaven Purgatory Hell	Yes	If die un-repentant in mortal sin	Tineeland Purgatory	Eventual solace if repentant	No
Islam	Yes	Judged by God	Depends on single life	Yes	8 levels of Hell	No comment	7 levels of Hell	No
Hindu Philoso-phy	Yes, if over- attach- ment	Yes	Bardo = intermed- iate state	Yes	Fierce animals	Like last life	Yes	Yes
Tibetan Buddhism	Yes	By self with feeling	Bardo, before reincarna- tion	Wild animals, stench	Animals, Stench, Burning	As in life	Joyful for holy persons	Yes
Sweden- borg: Theoso- phy: Spirit- ualists	Not featured	No	With people you like	Yes, get life you gave others	Life can be stressful	Yes	Even- tually	No
Myers	Yes if get too attached to earth	Implied	Level justified by earlier lives	Yes, in lowest level	Some pain, frustration	Similar to last life led	Heavenly state v. attractive. If cannot go higher Gets boring	

NDE Exper-iences	Ghosts	Judgement	Where Go?	Punish?	Hellish	Ordinary	Heavenly	Rain-carnation
Christian	No	No	No	No	Yes	Yes, stressed.	No	
Islam	No	Yes	No	No	No	No	Yes	
Hindu Philoso-phy	Exactly	No	Yes loved ones only	Yes, due expansion- conscious- ness	Not featured	Not stressed	No	
Tibetan Buddhism	Exactly	Not featured	Yes	Yes	Yes	Compa- son, love, service to others	Yes	
Sweden- borg: Theoso- phy: Spirit- ualists	No	Not mentioned	No	Yes	At first hazy. Then brighter	Not featured	Yes	
Myers	No	Yes	No	No	No Not featured	No	Yes	

Continued next page

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CHAPTER 9

PSYCHOKINESIS, ANOMALOUS HEALING, MIRACLES AND CONSCIOUSNESS

9.1 PSYCHOKINESIS

9.1.1 Introduction

In children's play, one of the games for the parents is to pretend that one is a magician and can influence events by pointing at them with a wand. Thus, (knowing the object is going to move), one says loudly some magic words such as "Abracadabra" and the event happens. Universal laughter and glee.

One of the aims of parapsychologists is to take the thought of being able to influence external events "by the power of the mind" seriously and see if it happens. Anecdotes that it does are plentiful and more recently, Qi Gong practitioners (working in collaboration with the Chinese Academy of Science) have published papers describing changes brought about in the behavior of chemical and radioactive materials over a distance of 10,000 km (1).

However, it is not always necessary for persons to undergo severe and lengthy training before a psychokinetic ability appears. The ability can sometimes (though rarely) occur naturally. A well known example is that of a Russian woman Galina Kulagina (2), who was able (but with enormous mental exertion) to separate the white and yolk of an egg from a distance. Her ability was recorded on camera and seems to have been accepted by Russian parapsychologists.

Related to these abilities of rarely found persons is a corresponding phenomenon, namely an unconscious effect which some have, upon scientific experiments. The eminent quantum theoretician, Pauli, was notorious for what happened when he entered a physics laboratory. Computers stopped working, beakers fell off benches, electrical systems short-circuited, etc. (3). Correspondingly, there are those in whose presence difficult experiments work abnormally well. In the early days of cold fusion, - around 1990, - it was still very difficult to get replications. A group in Salt Lake City was trying to replicate the synthesis of tritium from deuterium, a nuclear reaction which (within the paradigm of 1990 nuclear physics) had zero probability of happening in the room temperature electrochemical cells which the experimenters were using. However, when Nigel Packham, at that time a graduate student working with me (and who had been the first person to get the deuterium to tritium experiment to work) visited the Salt Lake City Laboratory, the workers there immediately found tritium, too.

There are many reports of the macro-psi implied by occasionally observed events of the kind mentioned above. However, reports of such events are, of course, regarded by scientists with great skepticism. Scientists want to have a reproducible experiment which can be carried out by anyone skilled in the art. Evidence of this kind (albeit in small degree) has also been obtained and this will now be described.¹

¹The examples and facts of the section have been largely based on the description given by D. Radin

9.1.2 Dice Experiments

Experiments in which the operatives tries to influence the (expectedly random) fall of a dice by concentrating their minds on it were begun by Louisa Rhine (6) in 1935 at Duke University. By 1997, about 150 such studies had been published (6). However, the results appeared to be irreproducible, and it was not possible to draw a definite conclusion on the question, the answer to which is of very considerable significance for the reigning paradigm.

However, in 1991, Diane Ferrara and D. Radin (5) carried out a meta-analysis of dice experiments published between 1935 and 1987 (52 investigations and 2568 people involved). There were also 31 control experiments in which no thoughts were directed towards the dice. Obviously, 50.00 is the expected result (50-50 - no effect). The control experiments gave, indeed, 50.02 but the experiments in which influence had been directed towards the dice gave an average of 51.2. Radin (7) states that the odds that such a result would come about by chance is $10^9:1$. Moreover, Ferrara and Radin looked into the file draw problem and found that, in order to influence the result, there would have had to have been 121 results "put away" for every result counted to alter significantly the result claimed. Such a large number of aberrant actions is deemed to be very unlikely (Fig. 9.1).

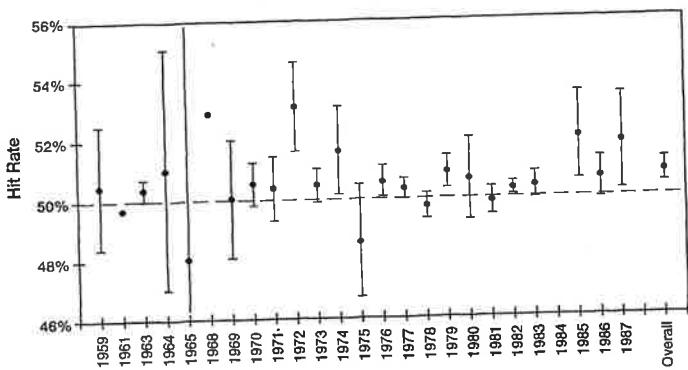


Fig. 9.1 Fifty-percent-equivalent hit rates for all experimental dice-tossing studies, listed by year, with 95 percent confidence intervals. For years with a single study, the hit rate is indicated as a single point with no confidence interval. The overall combined hit rate is shown at the right. Reprinted with permission, from Dean Radin, *The Conscious Universe*, Harper Collins Publishers, 10 East 53rd Street, New York, NY 10022, published 1997. Reprinted with permission Harper Collins Publishers.

These investigators also performed experiments to ascertain the effect of the fact that the coming up of all six sides of a dice is not strictly equally probable because the markings on the dice (which involve a digging out of material of the dice) would slightly affect the probability of which side came uppermost. The effect was observed and quantified but found to be negligible (8).

The Ferrara-Radin experiments were the first non-anecdotal, scientific, experiments which showed, in systematic experiments, that the behavior of an external object could be affected by the intention of an experimenter. The work is, thus, of great historic significance.

9.1.3 Random Number Generator Results

Recent experiments on psychokinesis use a random number generator. This is an electronic device that produces electronically a series of 1's and 0's in a random fashion. The machines are shielded against interference from outside electromagnetic fields. It is at once admitted, - as with the work with dice, - that the measured effects of the influence of mind on the result, are small (micro-psi), but they have advantages over experiments on macro psi. Thus, the results represent mean effects using hundreds and sometimes thousands of operatives. They purposely avoid the influence of the "star" (psychic or sensitive) person. Further, the macro-psi effects, which can occasionally be observed, not only involve exceptional persons (e.g., Qi Gong "masters"), but their ability is not always available at a time chosen by the experimenter (9).

The random number generator (RNG) was pioneered by Helmut Schmidt, an investigator of anomalous effects whose earlier career was as an engineer in the Boeing Aircraft Corporation's laboratory (10). R. Nelson and D. Radin (11) were the first to apply a meta-analysis to the results of various persons concentrating upon the random number generator (11). They found 152 papers in the 1959-1987 literature in English. These publications involved 532 experiments with concentration "on" and 295 experiments in which no concentration of thoughts upon the machines were in operation (See Fig. 9. 2).

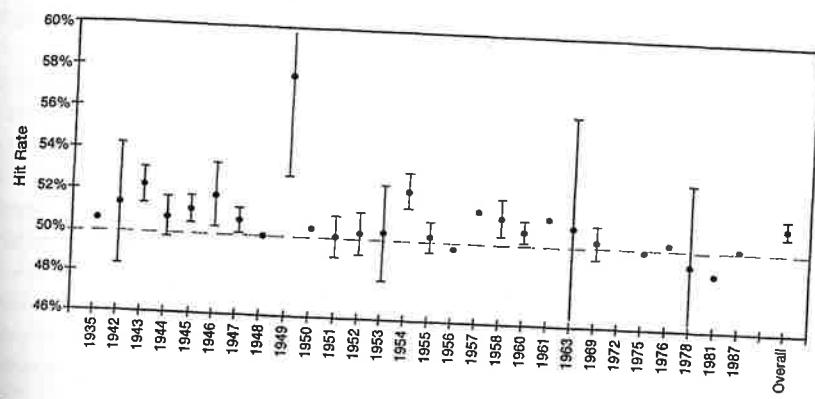


Fig.9.2 Yearly hit rate point estimates and 95 percent confidence intervals for RNG studies of mind-matter interaction. In some cases the confidence intervals are so small that they are obscured by the point-estimate dots. . Reprinted with permission, from Dean Radin, *The Conscious Universe*, Harper Collins Publishers, 10 East 53rd Street, New York, NY 10022, published 1997. Reprinted with permission Harper Collins Publishers

The overall result of the concentration "on" experiments was 51% (chance = 50%) and the probability that such a result could occur by chance was estimated by Nelson and Radin (11) to be $10^{12}:1$ against. File drawer effects would have been significant had the experimenter hidden 90 failed experiments for each success counted. It was found that two people concentrating at the same time on a given RNG led to an increased effect on the machine but less than a doubling. Women (individually) had a lesser effect than men but

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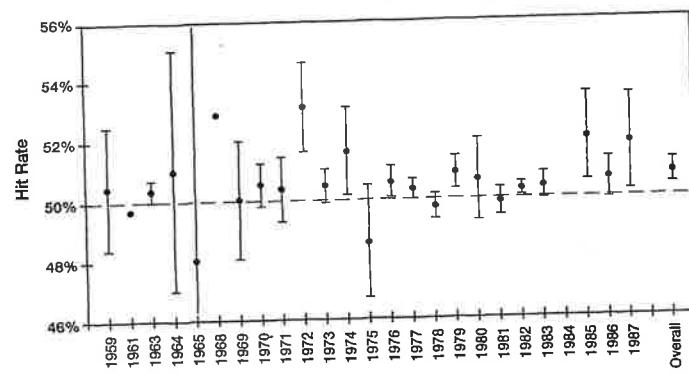


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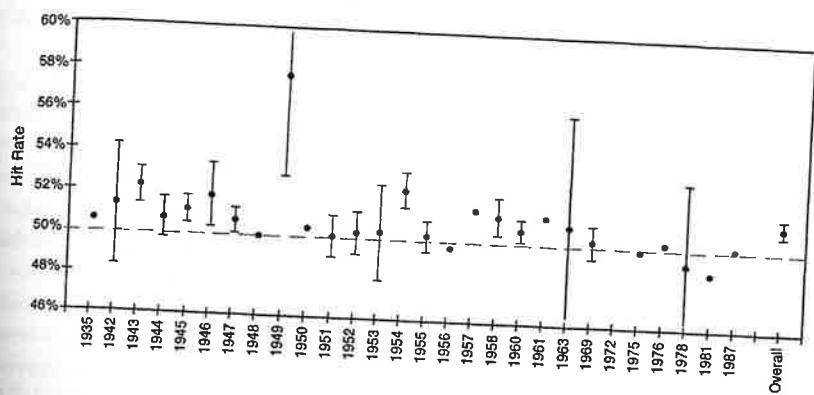


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were more likely to try. Remarkably, the effects were equally strong if the operative was in the same room as the machine, in the next room, 100 to 1000 km distant.

In many ESP experiments, effects, strong at first, tend to die away as the operator continues to repeat the experiment. Such an effect was visible here, but the decline sloped off after a while and the stable result, independent of the number of tries, was the accepted one.

These results are clearly significant, and suggest some degree of credence also to the account of macro-psi effects.²

9.1.4 SORRAT and SCOLE

The group of quite separate phenomena under these names constitutes a remarkable series of experiments which might be described as macro-psi under laboratory conditions. For those who accept the veridicality of the reported phenomena, they represent evidence of spontaneous psychokinesis and beg acceptance of events impossible in normal reality.

The word SORRAT means "the Society for Research on Rapport and Telekinesis". The Society was founded by John Neihardt in 1961. He had the idea that the manifestation of psychic events was made more likely if a group of people were associated together (Rapport) and if the participants observed relaxed conditions in regular meetings for a time of a few months (meeting once per week).

Neihardt found that - thereafter - his group did hear the traditional rappings and knockings, observed movement of tables when no hands were in contact with them, - and sometimes even the temporary levitation of a table.

Then, the group received a suggestion from Rhine for using a technique which has set its work off from those of others. Rhine suggested that a sealed container should be used and what happened inside it continuously observed.

From 1969, the group was taken over by William Cox and he worked with students of the University of Missouri at Rolla. He applied Rhine's suggestion in the form of an aquarium fish tank, inverted. In later versions, it was sealed and later locked, in some instances with a locksmith signing off on the integrity of the closure.

Several ordinary objects, balloons, leather rings, candles, letters addressed to individuals (some outside the country) were placed inside the tank and a movie camera was set to switch on light and record for 30 seconds if anything in the sealed tank moved.

Cox et al., found in the first batch of photographs:

1. Balloons inflated and deflated.
2. Candles lit themselves.
3. Rings made of leather linked themselves together, although no cut in the leather could be later found.
4. Coins, placed in the tank, were found outside it.

² Karimov et al. (12) have suggested that hydrodynamic systems would be ideal for test objects for experiments on the effects of Consciousness on external objects. Because hydrodynamic phenomena are subject to tiny stimuli in their initial formation steps and such may be subject to effects of Consciousness. Correspondingly, Bryan has suggested confining $^{138}\text{Ba}^{+}$ in a Pauli trap at low temperatures. Blue-violet laser induced fluorescence is observed. If an operator is able to flip the electron's spin, laser-induced fluorescence would cease (13).

5. Sheets of paper left inside the tank were found written on (e.g., "Freedom, Love, Faith").

A member of the group, Dr. A. Richards, in particular, attracted raps. But they seemed to come from the floor, just in front of his feet. This work, which is ongoing, has been succinctly described by James McClelland (13a), who confirms the rapport effect in his own work.

This work impresses most who know it. However, some professional parapsychologists demean the work. One such is Tony Cornell (13b), who has worked in parapsychology at the University of Cambridge, UK, and whose work is often descriptive of phenomena which the author admits have no known explanation.

Cornell spent some weeks on station examining the happenings in Rolla, Missouri and gives a downbeat description of them. He found no fraud. In a general way, his criticisms add up to a disbelief on the grounds: "All this is absolutely impossible," a paranormal phenomena are by definition impossible within the present paradigm. Cornell is particularly critical of the claim that some letters, addressed and placed within the sealed tank, have been delivered to the addressee. Here, he criticizes the evidence as insubstantial and confused.

The SORRAT phenomena shows strong evidence of spontaneous psychokinesis. However, reports on the activities of a group called SCOLE in Norfolk, UK, offer compelling direct evidence of similar phenomena, though here discarnate entities, manifest through mediums, are sometimes involved.

The following phenomena were observed repeatedly in a darkened room: lights, tape recordings, pictures on film in cameras placed in the room. The material on the tapes consisted of poems and brief messages in several European languages.

The SCOLE group, among whom are two mediums, has demonstrated (13c) similar physical phenomena on their visits to various countries. The physical phenomena demonstrated largely between 1998 and 2002 represent results similar to many reported under séance conditions in earlier years. In comparison with the SORRAT phenomena, those of the SCOLE group are enhanced by their range and repeatability at will. However, they need near-darkness, a condition SORRAT avoids.

9.2 ANOMALOUS HEALING

9.2.1 Introduction

Accounts of people who have the ability to cure others suddenly abound in the literature - as far back as written accounts go. Jesus Christ was evidently a great healer and an archetype because most of the accounts of healing by unconventional means are associated with a claim by the healer to be a channel of power from a discarnate source.

There are many accounts of immediate healing (as were all of Jesus Christ's reported healings).³ This immediacy (as well as the absence of a normal explanation) are the two main characteristics for which bodies appointed to investigate alleged miracles look.

¹ The apparition calling herself the Virgin Mary (15) gives rise to a massive number of healings, of a miraculous type. Anomalous healing may not involve a "miracle" in the sense stated. It sometimes occurs slowly and needs several treatments. Frequently, too, the healer's power waxes and wanes.

In recent years, care has been taken by experimenters (e.g., double blind conditions, etc.) to adhere to "scientific" protocols; there are about 19 accounts of such experiments in the literature (cf.. D. Benor 14). All anomalous healing is remarkable but when the healing occurs over a large distance, it raises even more puzzling questions.

Shrines exist to which people go, where there are accounts of past miraculous healings. Prayer may sometimes appear to invoke anomalous healing. There are also a few instances of controlled experiments on the effects of prayer involving groups of hospitalized people, which exist (14).

A deep skepticism exists towards reports of anomalous healing,⁴ particularly among those who have been trained to treat illness as malfunctions of the body as seen as a machine. However, and surprisingly, in the UK and in Holland, psychic healers are accepted by the governments as part of the available medical arsenal and paid for by government health insurance! Perusal of the facts related in this section may lead to wider acceptance of a practice not yet accepted in most Western countries.

9.2.2 The Development of a Modern Healer

Miracles of the Mind is the title of a book published in 1999 and authored by the former laser physicist, Russell Targ, and a healer who is the daughter of two scientists, Jane Katra (16). Several chapters of the book are devoted to Jane Katra's accounts of how she became a healer; all the material in this section has originated from that account.

Katra emphasizes as background that her family had given her no religious knowledge. In her adolescence she had had a short period in which she attended Sunday Church for a time with the objective of finding boys. In 1974 she was on a visit to the Philippines with the objective of observing the work of the so-called "psychic surgeons", who work there. She intended to describe what she saw in a piece sent back to a Seattle newspaper for which she was a reporter. Her initial attitude was that the so-called operations must be done by slight of hand, using chicken entrails to fool patients that something had been withdrawn from the body.

Having arrived in Manilla, Katra was struck down by an intensive migraine headache. On the third day of excruciating pain, she decided to do what she had never done before: pray. After the prayer asking for help, Katra experienced a vivid dream:

The dream I had after praying gave me instructions about how I myself would do healing with my own hands. This information came to me from an extremely bright light that communicated with me in a dream that I did not want, and patiently debated with me when I declined to believe or accept the instructions. The voice in the light conveyed compassion when I began to sob out of fear that I was cracking up. The

⁴ It is common among scientists and medical doctors to cast the accounts away as "the results of suggestion". Of course, it is always possible that hypnotic and suggestive effects exist, and one of the first tasks of investigators is to examine the degree to which such an explanation may play some part. However, if such an effect is established, it of course, raises questions rather than provides an explanation for there is at present no mechanism known whereby suggestion can be physiologically effective.

dream greatly frightened me, because when I tried to escape the instructions and the light by waking up, I was unable to awaken myself.

The details of what seemed to be an interminably long tutorial are not important. I received advance information about people I would meet, and events that would happen to affect my development as a healer. I repeatedly argued with the light in my head: "Stop! Wait! Clearly, there's been a mistake! You have the wrong person! It's not me you mean to be talking to! I don't believe in God! I don't go to church! I swear! And I covet — I'm sure you've mistaken me for someone else!"

I awoke to find myself standing in the middle of the room. I knew it was no longer night by the light coming through the windows. My right arm was outstretched above me. My nightgown was sopping, and clung to my wet body as tears rolled down my face. I felt absolutely energized. Completely alert. Blissfully radiant. Ecstatic. Not at all like a person who had been tormented by unrelenting pain for days. Not at all like someone who hadn't been sleeping well, or hadn't eaten anything in recent memory. All the pain I'd felt the previous night was gone.

The first time Katra experienced the effect of her healing power (16) involved a chance meeting with a woman who was lying and groaning on a couch in a corridor along which she walked. The woman also complained of a devastating migraine and Katra decided to try to massage the back of her neck. She positioned herself to do this, her hands passing near the woman's head, whereupon she who had been groaning in pain exclaimed: "Oh! Thank you. Thank you, the pain has gone." "But, I haven't touched you," said Katra

Katra describes, referring to her subsequent experiences of many successes in treatments, that when she heals she feels energy flowing into her arms and hands-vibrations and what she calls a mind to mind attunement which accompanies the flow of energy.

Between the beginning of her finding that she had healing power (1974) and the writing of the book in 1999, Katra has continued healing as her work. She took some relevant courses and read articles and books. However, intuition was the faculty which helped her with respect to "laying on of hands," the therapeutic touch of many healers. Katra found bringing her hands near the affected part, - not touching was effective for her. She usually needs 10 minutes with each patient "to acclimatize". Then, strength flows into her arm and she can begin to work (cf. the statement of Thomaz Morton, Section (9.3.4)..

Katra describes many healings, meaning cessation of pain and reduction of swelling, etc. She does not say to what extent this symptom removal cured the underlying diseases. Nevertheless, she reports that she has treated people with chronic conditions and removed at least their symptoms in one or two visits. One of her cancer patients has been in remission for more than 5 years.

She gradually learned the range of her healing power. Thus, an emergency call made to her home asked for immediate healing, - and she was able to give it to the patient who was in great pain over the telephone, she spoke directly to the sufferer.

This showed her that near touch or actual knowledge of the patient was not always necessary. But she found her concentration and attention were vital. On one occasion in the hospital room, she became tired and wanted to take a break. However, directly she let the patient go from her mind, the patient's pain returned.

Some kind of power, the nature of which is outside the present paradigm, is evidently available to healers. Of course, it needs more study without preconceived notions of what is possible. There is also much follow-up work to be done on healers' patients to distinguish symptom-removal from cure.

9.2.3 Scientifically Controlled Studies of Anomalous Healing (14)

Among the more prevalent methods of anomalous healing are the following:

- (i) Prayer
- (ii) Use of hands (17). Some variation on the use of healer's hands is the most frequently mentioned method used to carry out anomalous healing. The therapist may actually touch or stroke the affected part (laying on of hands; therapeutic touch). Or, the therapist may approach her hands near (1-2 inches) from the affected part and keep them there for times which vary from (usually) minutes to (infrequently) hours. Often, only one treatment is necessary (at least to remove symptoms).

In "psychic surgery", the surgeon appears to make an incision in the body, a red liquid (not always blood!) flows, and something seems to be removed from the body and is declared to be the offending entity (17).

In Qi Gong healing, the healer appears to work entirely by "will power", i.e., by the projection of some influence from the "master" to the person to be affected who may be many miles distant.

Now, all these methods and removal of symptoms as a result of their use, have been described over the millenia. What is new is that they are now being studied scientifically. We owe a debt of gratitude to Dr. Dan Benor and his book *Spiritual Healing* (14), which gives a broad description of anomalous healing, from reports written millenia ago to studies of the last few years. His is a very critical study and he has a high standard of what he accepts as "properly done, scientific work."

His book includes a critical analysis of 191 studies of positive changes in the medical state of the patient, brought about by one of the methods mentioned above. Of these, about two thirds gave results which are statistically convincing (i.e., at least a 10:1 ratio that the results cannot have been obtained by chance).

Benor quotes extensively from the recent literature. Thus, for example, the lowering of human hypertension has been achieved by Miller 1982 (18) and Quinn, 1989 (19). A heightening of the activity of the immune system was achieved by Gerrard (20) in 1996 and Olson and Sneed (21) in 1997. Anxiety was successfully reduced by Ferguson (22) in 1986 and Dixon (23) in 1997; and reduction of pain by Buckholz (24) in 1996 (cf. Katra's achievements).

There have also been a number of scientifically conducted animal studies (26). Such studies have an advantage because animals (presumably) are not subject to the placebo effect (27). Thus, it has been shown that it is possible to control bacterial growth (28) by

psychic means (25) (Leskow, 1981). Enzyme action has been modified (29) (Muchsam, 1994) and DNA influenced (30) (Rein and McCraty 1995).

All this is good as a starter study of anomalous healing with scientific controls. But it may be criticized somewhat in the way the carefully controlled psychokinesis studies (micro-psi) can be criticized. The results may be secure but they are meager. It is welcome that healers can remove pain, stop headaches, and affect the immune systems. But just as there are many accounts of uncontrolled macro-psychokinesis, there are many reports of healing (spontaneous remissions of cancer;⁵ and even revival from apparent death). The point is that it is very difficult to catch and observe such events - if they occur, - and examine them under scientific control. It has not been possible as yet to assess their reproducibility.

9.2.4 Healing at a Distance

Jahn, Dunn and Nelson (38) have found that the electronic Random Event Generator, which is affected to a small degree by the concentrated intention of operatives, shows results which are the same whether the distance involved is a few feet or thousands of miles. This hints that healing effects may occur over substantial distances, as indicated in some of the reports of Katra. Benor quotes support for this proposition from work by 1982; Radin (34), 1995; Worth and Cram (35), 1993; and Walker (36), 1997.

It is significant that a meta-analysis of these studies was accepted and published in the *Annals of Internal Medicine*, June 6, 2000. The point is that the *Annals* is an establishment journal and the acceptance there of a paper establishing to some degree (see below) the reality of effects entirely beyond explanation in the present paradigm of science, indicates what one might describe as a "crack in the ice".

The meta-analysis cites literature to 1999, - one hundred studies. Twenty-three studies met the inclusion criteria; thirteen demonstrated positive treatment effects; nine showed no effects, and one showed a negative effect.

Does this confirm the reality of spiritual healing at a distance? The answer is that it proves at a scientific level that healing at a distance does occur and, within the history of science, this is a monumental result. Nevertheless, only thirteen out of twenty-three studies show success within the criteria set up. We are far from understanding these matters, - we don't know how they occur or what change in the scientific paradigm will be needed to accommodate them. We don't know whether it is all a matter of the healer's power; of the healer's faith; or even of the effect of something in the environment (geomagnetic activity?) which enhances or diminishes the effects. It follows that the meta-analysis of healing at a distance provides an encouraging result for the parapsychologist, - and for the philosopher of science. But it would be premature to conclude that healing at a distance is as yet a method ready for listing as a technique to which patients can look with confidence, though perhaps some already accept it with hope.

Looking ahead, say 25 years, one could see an acceptance by the medical profession of non-local effects in healing and the development of some information on what

⁵ There is a remarkable collection of spontaneous remission with full medical detail (37).

After a pause, on December 15, 1982, a similar apparition appeared to a girl called Jelena and asked her for prayer and penance. She appeared up to three times a day during one week. Marijana also saw the Lady in this period. The visits were preceded by a white cloud which disappeared when she came. The apparition spoke of her love for the girls and the parish. On certain occasions the Lady asked people to touch her and some people did. Those who stepped on her "veil" caused the apparition to disappear. The appearances are to the seers in trance and the healings continued sporadically until 1987.

9.2.6 Effect of Prayer (43, 45)

The question of the effectiveness of prayers to a Judeo-Christian God⁶, thought to be concerned with the desires of individuals, is one of practical importance. Thus, at 2003, 76% of Americans aver a belief in this God; and 39% of scientists also admit to such belief.

At first glance, the overall picture does not seem to be positive. For example, in India, the wish for male heirs is universal. Thus, the age at which most men expect to stop working (45-55) is lower than in the West and, - because there is no social security, financial support of parents in retirement depends upon the sons. A son works, on average, in agriculture and earns with the strength of his arms. He will support his parents. A daughter just produces more mouths to feed. And yet, the number of male and female births remains stubbornly equal. Correspondingly, the welfare of popes, kings, bishops, etc., are regularly prayed for by millions of people, but there is no evidence that the health of these leading persons is affected by these prayers.⁷

Only a few scientific studies of the effect of prayer on humans are available. One has to be cautious. Thus, sometimes the intention of a distant person on the health of another person (or an animal or even bacteria) can be established. The animal studies (14, 41) are not directly relevant to the question of the effect of prayer, because what most people mean by that subject is an intercession of a human to a personal God (43, 44).

The first scientific study of the effect of prayer in this sense was carried out by R. C. Byrd, M.D. and published in the *Southern Medical Journal* for 1988 (32). The patients were those in a Coronary Care unit. They were 393 in number: 192 were prayed for and 201 were in a control group. The intercessors were Christians, active in the practice of their religion. They were given only the first names of the patients and the diagnosis of their illnesses. The prayers continued for 10 months.

⁶However, those in the eastern countries have belief in deities different only in detail. In 1969, I met and discussed with the Director of the Indian Institute of Science's major laboratory in Bangalore. He told me that, in spite of knowledge associated with his profession as an aeronautical engineer, he took serious notice of astrological signs and prayed for success in all his activities.

⁷Anecdotal evidence for the knowledge of sensitivities concerning the health of patients exists. Thus, C. N. Shealy, M.D. and Caroline Myers have written a book, *The Creation of Health* (45). It tells of the Missouri doctors' collaboration with the woman journalist, who lived in New Hampshire, 1200 miles away. At the beginning of a diagnosis, Dr. Shealy would telephone Caroline Myers, giving her the name and birthdate of his patient. What were her impressions? What did she see if she traveled through the patient's body? Were there any abnormalities? Myers scored about 93% correct as judged by the results of x-rays and other normal medical means used to establish a diagnosis later.

The prayed-for patients improved in certain categories, compared with those in the control groups. For example, they needed less antibiotics ($p < 0.005$). Cardiac arrests occurred less ($p < 0.002$); pneumonia was less ($p < 0.03$); diuretics were needed less ($p < 0.05$).

In spite of a number of improvements resulting from the effects of being prayed for, the time in hospital needed for the treatment of their cardiac ailments remained the same between prayed for and not prayed-for groups.

S. O'Laorie, a priest who was also a practicing psychologist, undertook a scientific investigation of the effect of prayer in patients suffering from anxiety and depression (S. O'Laorie, 46). It was a randomized double blind test with 496 volunteers of whom 90 were the intercessors and 406 suffered from one of the ailments mentioned. The intercessors were given the names of the patients and a photograph of each. Prayer was for 15 minutes per day and lasted until each subject had been prayed-for by three intercessors.

There was some success: the people for whom prayers were offered improved significantly as shown by 10 measures. There was a correlation between the amount of prayer and improvement in five tests. No discussion was given of alternative interpretations of the results (e.g., direct intercessor-patient interaction).

A large scale test was organized by W. J. Harris, M.D. (47), involving nine medical doctors. The patients were in the coronary care unit at St Luke's Hospital in Kansas City. There were 990 patients, 466 in the group prayed for, and 524 in a control group. The intercessors were recruited from various religious disciplines but to take part in the experiments each intercessor was asked if he/she would sign a declaration of belief in a personal God who was concerned with individual lives and responsive to requests for healing.

The intercessors (75) were broken up into 15 teams, 5 members each. The results were judged by a complex scheme in which points were awarded for improvement in each phase of the patient's illness. The mean age of the patients was 66 years. Overall, 10-11% improvement was found for the group prayed for ($p < 0.04$). The length of stay in hospital was four days for each group. Fifty percent of the patients said they were being prayed-for anyway, so that the effects measured were those of extra prayer on top of any possible effects from uncontrolled prayer.

Some criticisms have been raised of this study and particularly by D. A. Sandelweiss, an expert in internal medicine (48). The nub of his criticism is that an effect of prayer is inconsistent with the present paradigm of Science⁸ and therefore must arise from mis-measurement.

Although the scope and magnitude of the results on the effect of prayer are modest from a practical point of view, they ask for further study. There is much to be done, in particular to devise experiments which would distinguish between a direct effect on the patient of the intercessors or influence by an alleged higher power. Moreover, no results as yet exist which would show up specific effects of the degree of religious consciousness

⁸Brian Josephson and F. Podkera-Vivas (49) have discussed the biological utilization of non-locality. They discuss the results of prayer in terms of quantum non-locality.

of the patient and whether such patients among those prayed-for are favored, compared with patients in the same group who are unconscious of a spiritual life.

9.2.7 Are There Explanations of Anomalous Healing, Particularly That Observed in the Philippines?

The first thing to understand when facing accounts given of healing in the Philippines is that "Instant Miraculous Healing" takes place with about one patient in 50 (50). At first this sounds disappointing, but when compared with the much lesser frequency of instant miraculous healing at shrines, - in particular Lourdes, - it is remarkably good. Then, there are in the Philippines 10% who receive no benefits from the visit but the rest, - 88%, - who are helped to varying degrees in times between one and six months. The second thing to understand about healers in the Philippines is that they are always conventionally ignorant people, with training in neither medicine nor hygiene.

A number of healers similar to those in the Philippines may also be found in Brazil. They belong to a break off group from the Catholic Church called the "Spiritostas." One might call them "Catholic Spiritualists". They are historically related to a priest, Allen Kardec, who worked in Brazil in the late 19th century and who stressed, - with the disapproval of the Church, - direct contact with Spirits. In fact, Kardec is the author of a book (51) in which are recorded rather mundane conversations which he alleges he had with spirits.

Spirits come indirectly into most of the work of the healers (e.g., religious pictures on walls, signs emphasizing that the healing is not accomplished by, - but only through, - the human healer). But in some cases, the presence of a discarnate's voice is alleged. The most famous of these does not work in the Philippines but in Brazil. This was Arigo, a trade union leader and church warden, who, - after working hours, - would "treat" up to 300 patients in one day (about one per minute). He said that "Dr. Fritz" told him the disease and what to recommend, as soon as the patient came into the room. Arigo is credited with more than 80% success (52).

Slight of hand and other pretenses have often been detected in the work of the Philippine healers (54). They use such methods (e.g., producing chicken flesh to simulate material allegedly taken from the body), particularly with Philippine natives who are credulous, but less frequently with Westerners (they observe that Westerners training in materialistic science makes them more difficult to cure). The aim of the deception is to bring into play belief and the placebo forces, which, - in Western scientific work, - have been shown (55) to be some 75% of the strength of Western "biochemical" healing.

However, there is also evidence for purely paranormal phenomena in Philippine healing. Several experts: Krippner (58); Notoyama (56); and Leutemann (50) have attested to observations from distances of 1-2 feet - and seen the exuding of blood from flesh untouched by the Healers; the very thin incisions made at a distance, and the appearance of objects from the body which were certainly not present earlier. Notoyama (56) has spent most of his career examining paranormal healing. Although it is generally difficult to get such healers to be effective away from home, Notoyama has managed to bring a healer to his laboratory and examine his work under controlled conditions; and made plenty of close-up investigations of operations in the towns near to Luzon where many of the healers operate. Notoyama underplays deception and maintains that, if it occurs it plays a minor

role. A good clear example of the paranormal comes from an account (50) of the practice of the famous healer, Tony Agpoa, who at the start of the day lines patients up and passes in front of each, making a gesture with his fingers as though to inject each one from a distance of a few feet. However, that this is not a play to stimulate placebo effects was proved by Watson (57), a Western observer who lined up with the rest. He found a hole in his shirt and a tiny incision like a pin prick, - after he had been subject to Agpoa's "magic wand" gesture.

How do the Philippine healers know what is wrong with a patient? Josefine Sisons is a healer who says that she found she had the gift of healing when she was a teenager. She says that, in many cases, she "knows" what is wrong when she approaches the patient. If not, she says she feels her hands are being directed to the part of the body where healing is needed. Finally, if all fails, she resorts to automatic writing and this tells her what to do.

Most healers use their hands - not all actually touch. Sometimes distinction between left and right hands is made. There are authors (53) who refer in analogy to the N and S poles of magnets. Discussion of magnetic healing (a technique available in some offices of mainstream physicians in Canada and Mexico) are sometimes brought in during discussions as to how the healers do their work. The final answer is that no one knows how the healers cure. What they do is impossible in Western medicine and they themselves can only say - at the most - that they are "led".

Payment? It is part of the system that there is no payment. Of course, one presumes there are plenty of thankful Westerners, who would be eager to produce monetary gifts. It is a private matter whether the gifts are accepted. Tradition says that acceptance of money will destroy the healing power.

Lastly, although nature healers exist in all primitive societies, a description of the special characteristics of those in the Philippines (the laser-like cut made at a distance, etc.) rural Philippinos long before.

9.3 ABNORMAL PHYSIOLOGICAL PERFORMANCE

9.3.1 Introduction

In recorded history there have been accounts of extraordinary feats, abnormal physiological abilities, most often associated with Yogis, Shamans, and Christian monks and nuns (58). An excellent example from 19th Century India has quality, not only for its remarkable content, but also because its origin supports credibility.

Thus, the account was recorded by Sir Claude Wade, British Resident to Maharaja Rajeet Singh, and was published in a book by James Braid, *On Trance or Human Hibernation* (59). The Resident was himself present when a Yogi, Harridas, was buried for six weeks. When the grave was opened and Harridas examined, he showed no sign of life except for a certain warmth about the head. His servant gradually brought him back to life, principally by pouring warm water on him, and unstopping the cavities of his body which had been sealed up. After one hour, he could talk normally. He was rewarded by the Maharajah with munificent gifts.

The burial of Harridas was repeated and this time the Maharajah had flowers grown on the grave and 24 hours a day guards around it. He also had Harridas dug up twice during the six weeks. The result was as in the first test.

Six weeks in suspended animation is indeed a severe test, but believably recorded. Many other feats, - charisms as they are called in the Christian tradition, sidhis in Indian ones, - are recorded (60). Among them is the repeated levitation by the English medium Home. In one feat, Home lay horizontal and floated in and out of a window. A number of notables of the time (1860's) and scientists signed a document describing what they had seen (61).⁹

The *New Catholic Encyclopaedia* (62) gives many accounts of telepathy and some of (a) exudation of heat sufficient to scorch clothing; (b) Bilocation¹⁰; (c) Levitation; (d) Inedia¹¹; (e) Incorruptibility of the body after burial.

9.3.2 Scientific Observations on Yogis

A number of such studies have by now been recorded (58). The ones done in the West (63) are disappointing in comparison with the results sometimes ascribed to Indian Yogis, because few Western students experience samahdi with the intense cortical stimulation which EEG measurements show accompanies that state.

A number of studies exist of modified EEG patterns among yogis (65). Satyanara Yanamurthi and Shastri (66) have written a paper on a Yogi who was able to lower the intensity of his pulse until it could not be felt and the heart not heard in the stethoscope for 30 sec.

Burial experiments with EKG recorded in a distant laboratory have been reported (68). For example, Kothari et al., buried a Yogi for 8 days (cf. 42 with Harridas) and recorded the EKG. The Yogi's heart beat reached 250 beats per minute but after 29 hours, the heart registered a flat line. However, one-half hour before the scheduled disinterment, a normal configuration appeared on the EKG with fast heart rate. The Yogi was found not to have moved, and recovered.

9.3.3 Miracles

9.3.3.1 General

Accounts of unusual physical performances following many years of ascetic practice (fasting, sleep deprivation) are fairly common. However, there are occasional descriptions of people whose abilities genuinely justify the description "miracle worker".

⁹ What of mass hypnosis? It may be a possible explanation of some "impossible" feats, e.g., the Indian rope trick (63). But a camera cannot be hypnotized. As for witness ship such as that of Home,¹⁴ people were present at the performance of the feat mentioned. People vary in the ease with which they can be hypnotized and it seems likely that at least one of the strong minded gentlemen present would have remained awake. Besides this levitation, Home was overtaken by the abnormal happenings which he reported were not under his control (61). He made his living exhibiting his psychic ability both in England and Europe.

¹⁰ The observation of a material body in two distant places at the same time.

¹¹ Going for months and even years without food (the case of Theresa Neumann has been subject to detailed observation and measurement of ingo (communion wafer) and outgo, by nurses for two weeks (67).

How many such people exist is unknown. The several described here have, for the most part, been observed in modern times aided by witnesses, recording, and photography. Moreover, neither of the principal individuals has been an ascetic and one (Thomaz Morton) seems to live largely for his own pleasure he is not religious and likes to drink alcohol liberally.

9.3.3.2 Sai Baba: Work of Erlendur Haraldsson

Erlendur Haraldsson, an associate professor of psychology at the University of Iceland, is a well known parapsychologist, who has made a detailed study of the very remarkable Sai Baba. Haraldsson made six trips to India in the course of this study and in one of them he was accompanied by the eminent parapsychologist, Karlis Osis. His work is the basis of this account.

9.3.3.3 Acts of Creation

The first "miracle" witnessed by Haraldsson was performed when Baba and Haraldsson were discussing science. Baba expressed the view that the present science would never explain miraculous phenomena, they were outside science. Daily life and spiritual life should be grown together like a double rudraksha. Haraldsson did not know what this was. He asked Baba to explain it, but with a sign of impatience Baba closed his fist and waved the hand for a second or two. As he opened it, he turned to Haraldsson and said "This is it." Haraldsson could observe an acorn-like object about three cm at the widest point, with a fine texture like an apricot stone. This was two rudraksha grown together like a twin orange or a twin apple.

A moment later, Baba took it back and said that he would like to give Haraldsson a present. He enclosed the rudraksha in both hands, blew upon it, and opened his hand towards Haraldsson. In the palm one could be seen a beautiful piece, the double rudraksha was now covered on the top and on the bottom by two tiny oval shaped golden shields. They were held together around the rudraksha by a short golden chain on each side. On the top of the upper shield was a golden cross with a small ruby attached to it and behind it a tiny opening so it could hang on a chain and be worn around the neck. When Sai Baba was asked how he could do it, he said that "we are all like matches, but my match is on fire."

9.3.3.4 Purity in Everyday Life

Baba always stressed the purity of daily life, devotion and meditation. He came out of his house every day for the waiting crowd to see him.

Baba's opinion is that science is concerned with physical realities whereas the spiritual approach deals with the higher reaches of Consciousness. Control of the mind is essential in the spiritual approach, since the mind can potentially create anything.

Baba explained why he did not want to subject himself to scientific tests. He said that the Prime Minister of a country has great powers, and in some circumstances he can order the arrest of people, but he cannot do that just to demonstrate his power. It is the same with him, Baba, he cannot use his power for demonstrations. "Divine power can only be used for the good and protection of devotees."

Haraldsson again asked Baba how he did the remarkable acts of materialization, forming complex objects out of nothing. He said that the ability comes from the super-

consciousness. He imagines the object he wants to create and there it is. Baba frequently talks about the necessity of worship, devotion, duty. He asserted, that he would live until the age of 94, i.e., die in 2020.

9.3.3.5 Birth and Awakening

Sathya Sai Baba, - as he is now known, - was born on 25th November, 1926, in the village of Puttaparti, as the son of a poor farmer and his wife, who have a different name from that which Baba took. When Baba was 14, he one day gave a shreak, and leapt into the air grasping his right toe. The suspicion was that he had been bitten by a snake. He fell unconscious and became stiff. He remained unconscious throughout the night. The next morning he began intermittently to burst into song and poetry. Sometimes he would expound the philosophy of the Vedas. He called his family together and said he was an earlier Sai Baba reborn. The new Sai Baba's father poked a stick at him and said "are you God or a fraud?" Baba replied, "I am Sai Baba: Come and worship Me."

The earlier Sai Baba, Sirdi Sai Baba, was a famous Holy Man who trained his devotees to seek God through devotion to the Guru.

9.3.3.6 Materialization

Sai Baba could produce a watch or ring and a statue up to 8 inches tall. Sweets excellent to eat were produced on demand and sometimes he produced hot meals, which he would take out of his clothing, off handedly. He allegedly cured many sick people. As an example, a son was presented to him who was pigeon chested. Baba said that the boy was suffering and he would get better if he would accept a gift from a swami. He then created a golden locket out of the air and gave it to the boy's mother and asked her to put it around the boy's neck. From this day onwards the boy recovered and became normal.

Baba created food to feed crowds. Odors, delightful and heavenly, were created. Even more curious phenomena were also seen, such as smoke coming from Baba's hair. On trips it was not necessary to bring food but only open vessels and then Baba would create the food inside the vessels. He touched them and then there was food, curries and other types of Indian foods.

A striking account pertains to the local raja. He was in England when he lost his passport and this caused him much distress. Baba knew about this by telepathy and told the family that "your father has lost his passport." Baba told the family that he would replace the passport and all would be well. The raja found it later in a bag which had been earlier thoroughly searched.

9.3.3.7 Variation of Weight and other Wonders

Sai Baba could vary his weight. He used to ask Haraldsson jokingly "Lift me". Haraldsson did not feel that he was carrying a human body. Baba became so easy to lift. Haraldsson said it was like a paper bundle.

Of the things Baba materializes, the holy powder Vibuti is seen most frequently. He applied it over the part of a body which needed healing, for example, from eczema.

In his early days there were even more "miracles" than there were later. He would give people to eat if they were hungry. He would materialize things, change them, sometimes let them disappear again and so on. He used to drive from Bangalore to the

village in which he lives, Puttaparti. He would sometimes drive the car normally, but on other occasions he sat in the driver's seat, took his hands off the wheel, cross legged his feet, but the car drove, changed gear, etc., without his touching it and drove up the curvy road. On occasion, the car ran out of petrol. Baba asked only for water to be poured in the tank and the car ran normally.

Sometimes Baba would fall into a trance, but then would appear in some distant place. Baba was asked on one occasion what is the difference between you and other modern Indian sages such as Ramana Maharshi. His answer was like this: these people have with their penance and meditation gone from the ordinary person's level to the godhead, but I have come from God to redeem mankind, and do not need to make penance or do meditation.

There are many other accounts of Sai Baba collected by Haraldsson. For example, on the grounds of the local Rajah's palace, there was an iron beam which nobody could lift and there were no machines to do so. Sai Baba told the people to go and tie a ribbon around it. "Lift it," he said and it went up easily as though it were a piece of cork.

The Swami could produce from the sand all kinds of images, chains, necklaces, jewels. He gave to visitors a number of them. They came from the sand but there was never any sign of sand upon them. The largest object he has produced was 10 inches high.

9.3.3.8 Dematerialization and Illumination

Baba could suddenly disappear. He would snap his fingers and ask those around him to do the same. Then he would vanish and would be seen, e.g., on a hill top, in some cases brilliantly illuminated.

Baba gave rise to the feeling that "God is watching you" because he always knew what people were thinking and often answered their unspoken questions.

9.3.3.9 Failings and Criticisms of Sai Baba

Sai Baba did not always succeed in his cures. On one occasion he claimed to have removed a devotee's diseased tonsils, but later on the person went to a Western doctor and found that the tonsils were still in his throat.

Baba demands absolute adherence to him and him alone and is certainly both boastful and arrogant. Some Westerners, on visits to his Ashram, have reported that Baba approached them for homosexual acts. Some say that Baba's predictions of the future are also unreliable. Devotees who left Baba did so particularly because he demanded that people give up their whole personality to him. A devotee who left Baba said: "Christ gave me back myself. He did not take it away as other gurus do."

Baba has enemies, particularly people educated in the West. When Baba is told about them, he has a good Indian proverb: "Nothing happens to the sky if a dog barks." The usual criticism made of Baba concerns his refusal to submit to a scientific examination. But, for many people Baba is simply God. He has merged into the divine.

9.3.3.10 Haraldsson's Inventory of Miraculous Acts

Dr. Haraldsson took 29 people who had known Baba for several years and asked them the frequency with which they had seen various phenomena with Baba. The results are shown in the following table.

Table 9.1
Some Noteworthy Numbers (69)

Never	Once	2-5	6-10	11-50	Over 50 times
Vibuti					29
Rings		3	1	6	19
Locketts		1	2	6	25
Sweets		3		2	24
Fruits	7	4	4	1	3
Publishers Hastings, House, New York 1987 - Publisher extinct					

Some comparison with accounts of the life of Jesus Christ is inevitable. Christ allegedly created food for 5000 people, he was said to raise people from the dead and cure the sick. He performed exorcisms. He could also make himself light to walk on water and underwent illuminations and transfiguration. He did not specialize in materializations, although his appearance after his death by crucifixion may be seen as a kind of materialization. The "body" in which he then was said to have appeared contained the wounds of the crucifixion and exhibited one of the key properties found by apparitions and also people in the OBE state - he could go through walls.

Of course, the main difference between Christ and Baba is that the former gave rise to the most populated religion of the world and the teaching of peace and love. Baba remains in Pulrapari, a remarkable phenomenon, who has made himself observable to (but not to be examined by) Western psychiatrists.

9.3.4 THOMAZ GREEN MORTON: WORK OF PULOS AND RICHMAN (70)

9.3.4.1 Origin of Information

Much of the material given here concerning Thomaz Morton, has been gathered from a study of records kept by Lee Pulos, a Vancouver psychiatrist, and Gary Richman, a journalist. Both visited Brazil several times in the 1980's to observe, photograph, and record extraordinary happenings associated with a Brazilian pharmacist, Thomaz Green Morton. Some anomalous events were witnessed by Pulos and Richman, but an incident was described only if support could be found from at least five independent witnesses. Some of what the Canadian investigators saw and heard about is available in a book (70). Apart from the eyewitness reports by the psychiatrist, Pulos, many of Morton's actions have been observed and recorded by a group from the Institute for the Study of Paranormal Events in Rio de Janeiro. Mostly the following account is based on observations made and recorded by Pulos and Richman.

9.3.4.2 Awakening

Thomaz is the son of a pharmacist and was just another boy until the age of 12, when he went fishing in a lake. We have only his own word as a basis for the account of the approach of a dark cloud, a stroke of lightning splitting a nearby bamboo pole, and sending Thomaz several feet into the air. He tells that he heard a voice intoning that he was to be "our antenna" - to help others and to enact "strange phenomena".

After the incident by the lake, Thomaz felt he was not the same, but no psychic activity was manifest until, several years later, working in his father's pharmacy, he found

that when he gave injections, they were painless. However, his paranormal abilities were not awakened until he saw a demonstration of spoon-bending by Geller. He felt challenged to do the same and was easily able to make spoons bend, not only those he held in his hands or stroked, but also spoons nearby (including those of the unfortunate hostesses with whom he stayed).

From the time of Geller's visit and the spoon bending (1981), Morton became the focus of a large number of witnessed anomalous events. He has made clear that, - normally, he does not feel he has "power" to bring them about. To provoke his psychic powers, it is necessary to bring him into an atmosphere of relaxation, of jollity, of good conversation, - a glass of wine, perhaps two. Then, - sometimes, - Thomaz will tell his listeners that "the power is coming on, it is in my arms." The anomalous happening is then usually preceded by signs of great concentration. Thomaz stares at the object in question and sometimes hyperventilates. He says that he "tries to get inside it." The details of his preparation for a happening vary, but are always accompanied by a moment at which he feels he has accomplished the intended goal and then he shouts: "Ra!" The following are a few examples, from the work of Pulos and Richman, here described in abbreviated form.

9.3.4.3 Transmutations

More often this would be done with currency notes, changed from lower to higher denomination while held in the hands of a witness. Brazilian to US currency is often done. A silver dollar was transformed into a medallion with two porpoises engraved therein (the astrological sign of the possessor of the dollar had been Pisces-the fish). A woman's cotton belt is transformed to a metal necklace.

Earlier, these changes happened hidden in a hand holding the original object. Later, Thomaz showed the transmutational changes happening to any onlooker.

9.3.4.4 Making Ornaments

An incident is described in which a ball of paper was transformed in minutes into a small bust of the crucified Christ.

9.3.4.5 Transteleportation

Thomaz was seen to enter a shop. He was with a group, motoring to a house some miles away. He cannot be found in the shop, but appears next seated on the veranda of the house to be visited. He found himself there - confused - about the time he entered the shop. He has no consciousness of his transfer.

9.3.4.6 Materialization and Dematerialization

On several occasions, Thomaz has been observed to disappear in front of witnesses and reappear a few minutes later. Such happenings remind one of the disappearance in front of cabin crew and passengers of the ghost of the dead captain of the airplane which he had been piloting when it crashed into the Everglades (71). Reports on Sai Baba are similar.

9.3.4.7 Creation of Life

Two accounts have been given (Pulos and Richman, 70) of the creation of life by Thomaz. In one he asks a witness to hold a piece of raw beef in his hand. After the

paraphernalia of the concentration and the shout, the witness finds she is holding a live cricket. On another occasion, he is photographed during concentration, stroking and finally hatching live chicks from unfertilized eggs.

These witnessed events provide a greater attack on normal concepts than, for example, the account by the British Resident of the six weeks burial of the Yogi, Harridas. Further, the accounts of Morton are modern and by a psychiatrist. Were the witnesses all hypnotized? But it would be difficult to hypnotize a movie camera. Fraud? Thousands have witnessed Thomaz's exploits.

For those who think they might catch a flight to Rio, motor on to see Thomaz and snap a few "miracles", the task is not so easy (I tried in 1998). Firstly, Thomaz charges extremely large fees for contacts which may lead to the exhibition of interesting happenings. He is also reputed to be a poor keeper of appointments. As to the relatively small sums needed to bring him to the USA, whether he would come is problematical and as his abilities are so much affected by a favorable, friendly, uncritical atmosphere, it might be a wasted investment.

9.3.5 Other Persons Able to Bring about Anomalous Events

The number of persons in the world who can perform acts which defy reason within the present paradigm is certainly not limited to the few described here. Thus, Pulos (70) found that a visit to northern Italy in 1982 brought him into contact with five such persons (see below). However, Italy is a modern state at a level of technology roughly equal to that of the USA. It is thought by some that intellectual activity tends to reduce a manifestation of psychic activity (because it makes it unacceptable for a "well educated" person to admit to any), it might be expected that countries in the developing and third world contain a greater fraction (say, five times more) of persons with anomalous abilities discussed above and below. Simple ratios of populations with this assumption could project the number of living magicians of his sort to be several thousands. Brazil is a country where the possessors of such gifts are less likely to receive unfavorable publicity. Primitive (particular shamanic) societies may hide many such people.

9.3.6 Gustav Rol (70)

In 1982 this aristocratic, wealthy gentleman was in his seventies. On Pulos' visit, Rol glanced at his head and either side thereof and then began reciting details of Pulos' health history known only to Pulos. Pulos had brought with him two new decks of cards which he duly shuffled. He selected a card and placed it at the center of the deck. After 30 sec of concentration, Rol asked Pulos to turn over the top card: it was the one Pulos had placed at the center of the deck. Pulos relates much more about Rol's powerful psychokinetic ability, including an ability to cause objects buried far away to appear in the room.

9.3.7 Paolo Pais (70)

This psychologist was 39 in 1982. Strange things happen in his presence. Thus, at the visit of Pulos a woman guest described the delights of her vacation in the S. Pacific - whereupon a fresh water turtle appeared and walked across the table. Pais is further described in causing psychokinetic effects with cards, similar to those of Rol.

In a history similar to that of the younger Sai Baba and to Morton, Pais experienced a severe electric shock at the age of eleven.

9.3.8 Claudio Cabianca (70)

This man was running a pizza parlor in 1982. He was also cast down by an electric shock at the age of 12. Cabianca has caused the teleportation of a wooden shoe 30 yards into a locked car. Most of his demonstrations show psychokinesis with cards and have been carried out in cooperation with physics Professor Urbani Camillo. He told Pulos he had used a psychic technique to cure a brain embolism; and disintegrated tumors.

9.3.9 Luciano Muti (70)

Muti also received a shock, but this was when he was twenty and it occurred in connection with a motorcycle accident. This gave rise to poltergeist activity in his presence. He worked (in 1982) with the physician Milan Zanatto and one experiment involved a woman sitting on a chair. Although unconnected to the chair, Matti was able to move it, carrying the woman in it, across the room. He diagnoses illness by looking at the patient. He says he can "see" the tumor and its molecules and dissolve it.

A feature among some of these unusual persons is some kind of shock in early life. However, this would be expected to cause some physiological rearrangement in the body and it is difficult to see the powers described above having an origin in new biomechanisms arising from such a destructive impact.

9.4 ACAUSALITY

It may be helpful in approaching a discussion of the nature of consciousness, to be reminded about the existence of a-causal phenomena, i.e., the occurrence of events which seem to have no cause, - "coincidences", etc. It is, of course, pointless to "explain" an a-causal event by saying that it is "just a coincidence", although that is the remark most citizens make, perhaps to quieten disturbing questions to which these events give rise. A good example is that of dog bites. Some dog bites are sufficiently bad to be reported to the police. In New York City (72), 75 (± 2) people are severely bitten by dogs per year. Do the dogs have a signalling system which keep them on schedule for their biting? A similar constancy is noted in the number of people per year who die from the kick of a horse.

Coincidences strike every life. I am giving some class lectures at the University and the wish comes to me at the end of one lecture, that I would like to have a projector on the bench to show some slides. Then, when I go into the class next time, one is standing there (although I am certain I have not mentioned my wish to anyone).

Or, I am thinking about the cost of pure hydrogen and know the formula for the electricity to create a certain quantity is 2.29 Ec . Then, I am thinking about the economic inflation situation between 1982 and 2002. This is 20 years and if one takes the inflation during this time as averaging 5% and make the calculation, the cost of things would become $2.29 \times 1.05^{20} = 2.29 \times 7.04 = 16.1 \text{ Ec}$.

A good example concerns the names of the horses which won on the day on which Prince Charles married Lady Diana. A quarter of the races were won by horses with names such as Tender King, Favorite Lady, Wedded Bliss. Correspondingly, I am in Rome

airport, making out a form. The man making out a form next to me is the manager to whom I report when I consult for Exxon in their research labs in New Jersey.

The archetypal example comes from Jung and is very famous. A young woman patient is relating a dream in which she was given a golden scarab beetle. As she tells the dream, a gentle tapping can be heard at the window. Investigating the noise, Jung (73) noticed a beetle related to the rare golden scarab species described by the patient.

Closely related to these strange events are omens (Shallis, 72). A woman experiences the death of two relatives. Before each, she has noticed that a number of birds gathered outside a window in her house. She continues her life, shrugging off the birds as coincidences. The birds gather a third time, - and her husband dies a few hours later.

A wild suggestion was made by the Austrian Biologist, Kammerer (74). It is ad hoc but has the compensating advantage of radical simplicity. Thus, all of us go on with our lives without being disturbed by something totally inexplicable, entirely outside the science of our time. However, sometimes, always suddenly, there occurs a strange acausal event. Kammerer's suggestion was that there are two "sides" to life, one enormous in influence compared with the other. Our norms and our Science are all with the enormous one - but, just sometimes, - the other side wins through, we experience it, - and then it is gone. Indeed, this is how paranormal events such as telepathy and precognition, come into the lives of most of us. The occurrence is so seldom, the duration of the impression so transient, it is easy to shrug it off: until it happens again. Jung wrote a book about events which anomalously occur together. He called the phenomenon Synchronicity.

9.4.1 Astrology

The claims of Astrology refer quintessentially to acausal phenomena, entirely outside concepts of present science. In fact, no scientist employed in a corporate, military or University organization in the USA would dare to suggest that there might be something more than superstition to astrology.¹² But let it be clear at once that there is pop-astrology and academic (or "real") astrology. The pop-astrology of predictions published in newspapers of the fortunes of people born under various zodiacal signs, are not our concern here. Academic astrology is a serious (if entirely aberrant) subject with its own empirical rules which strung together might make up some kind of theory (Nias, 75). A training in Astrology takes several years. Attempts to test the abilities of real astrologers have continued for many years (West and Toonder (76)) and have mixed results. The possibility must not be excluded that an ability in precognition may contribute to the successes scored by some astrologers.¹³

¹² The attitude of scientists to Astrology is an example of scientism: phenomena are to be accepted as real only if they fit the theories of present Science. Phenomena which do not fit it are to be declared not real, are not there, must be illusions.

¹³ Grounded for a day in New Delhi, India, by a denied reservation, and overnighting in a leading hotel, I decided to try a reading by the resident astrologer (\$20). He examined the palm of my hand and asked for the place, date and time of my birth. He appeared to be lost in thought for about three minutes during which he wrote numerical figures on a pad. After that, he calmly and quietly made five statements about me, which included three true personal things about my body (e.g., a specific internal

In spite of his generous pronouncement that scientists should not investigate things patently absurd (i.e., which go against faith in the concept of present science), one well known scientist, H. J. Eysenck,¹⁴ an eminent British psychologist, felt secure enough to walk through the ban and write a substantial examination of Astrology, published in a 1982 book (Eysenck and Nias, 1982) (75).

About three quarters of the account describes the theoretical ideas of astrology and some of the tests made of astrologers' abilities to tell of character from birthdate (76). On the whole this part of the book is more or less what one would have expected, - objective is concerned with the work of a French statistician, Michael Gauquelin (77), and here the balance tends to sway - and enters, for some aspects of the work described, into positive quadrants.

Gauquelin was annoyed, - as are most scientists, - by the position given to astrology in newspapers. Being well versed in statistics, he decided to make his own (and a very scientific) examination of astrology, with the aim of finally pushing the wooden stake Astrology by examining the birth data of outstanding sports champions. According to the standard scientific view, there would be no correlation between the birth date of sportsmen in particular and the position of the planets at that time. Such a connection would be entirely irrational. To examine this, Gauquelin plotted the frequency of births of sports champions at different positions of Mars (Fig. 9. 3). The figures show that there is indeed, a correlation between the frequency of birth dates of highly acclaimed sportsmen and the position of the planet Mars at that time.

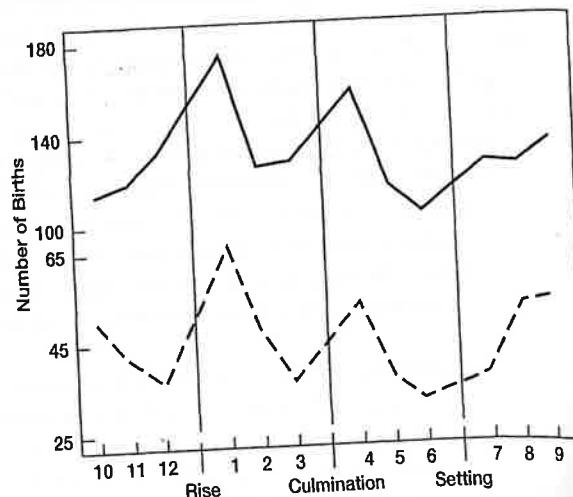
The effect can be quantitatively stated with reference to a chance expectation of the zones (See Fig. 9.3).

scar tissue from a 30-year-old operation). He then almost stated the name of my wife, saying it was Takina, whereas it was Halina. After that he said he regretted that he had to tell me that someone close to me would shortly have to leave this Earth. My first wife died unexpectedly at the age of 58, six weeks later.

Finally, with a change in tone of voice, he told me I would fall seriously ill and probably die at age A but, - if I survived, - I would (and here he made gestures which I took to indicate great vigor), - live to the age of 92! The near fatal illnesses did come but not until A + 2 years. Shall I die at 94?

¹⁴ In 1982, H. J. Eysenck was Professor of Psychology at the Maudsley Clinic, London University. Eysenck was famous for his iconoclastic views on a number of issues in his field and outside it. He was an early critic of Freudian Psychology and held to ideas, - then advanced, - concerning the importance of the gene structure in influencing character. He maintained that the media's emphasis in reporting on violence and aberrant sex, decreased the quality of the population.

Fig. 9.3. The two curves show the frequency of births of sports champions at different positions of Mars. The upper curve is Gauquelin's sample of 1,553; the lower curve is the independent sample of 535 studied by the Committee Para. Reprinted from H. J. Eysenck and D. K. Nias, *Astrology: Science or Superstition?*, Maurice Temple Smith, Ltd., Gloucester Mansions, Cambridge Circus, London WC2 England (1982). Publisher extinct



This is the "Mars effect". Astonished by his own unexpected results (mortified, one suspects) Gauquelin extended his work (which he called "cosmobiology") in two directions. He made an examination of the Mars effect on sportsmen in several European countries; he tried out correlations between birth date and some planet's zodiacal characteristics - and found them, - respectively, for outstanding scientists, artists, military leaders, etc.

A somewhat comic interaction occurred between Gauquelin and a French organization for investigating claims of the paranormal. They kept Gauquelin's results for 15 years and then returned them with a non-acceptance note, based on their doubt as to the validity of the accuracy of 16.7% chance base, a difficulty shown to be trivial by Eysenck and Nias (75).

The situation during the last 20 years has seen attacks launched upon Gauquelin's findings by Kurtz et al. But their criticisms have been strongly met by Ertel and Irving (75b) who have produced highly significant Mars data, using the data of Kurtz et al.

Another attack has been published against Gauquelin and it is by Domangelet of the Belgium skeptics organization(75a). The attack involves a "model" to interpret Gauquelin's data but Ertel again shows up this model as misconstrued: he concludes that Gauquelin's own defense against these criticisms is justified.

How may one conclude this brief account of the investigation of a momentous question? It seems safe to say that, at 2004, there does seem to be some evidence for a correlation between the profession chosen and some planetary position at the date of birth. Of course, astrologers claim much more (a relation of planetary positions to general character of those born under them, also some ability to predict outstanding future events in a given life, - cf.. my own stunning experience). There is as yet insufficient statistically proven data, for a scientific judgment of the further claims to be made. In the face of the refusal of scientists to investigate fields which do not fit their present theories and the dependence of most fundamental scientific research upon financial support from government

funds allotted by people sticking fervently to belief in the present theories, there is little hope for progress in evolving an explanation of the correlations noted.¹⁵

The "Mars effect" has been examined by CSICOP (Center for the Scientific Investigation of the Claims of the Paranormal) and they did find a "Mars effect" (i.e., eminent athletes had their astrological birth periods more in sectors involving the appearance of Mars than would be expected by chance. However, they then added less eminent athletes verified by two other skeptic organizations, a Belgian and a French one. The Belgium one appears in *Nouvelles Bre'ves* (77b). The French one is still not published, but analyzing the data used by them has come out due to the diligence of Sutibor Ertel (75d). It is positive,

about whom so much controversy has swirled, - were the only cases examined by Gauquelin. This worker found correlations between various professions and the astrological properties of members of the profession. The works of Gauquelin are described in 75f, 75g, 75h.

Recent work by McGillion (75i) has thrown light upon possible rational explanations of certain astrological effects. The center of McGillion's argument is the production of melatonin by the pineal gland. The biosynthesis of melatonin (15-methoxy, N-acetyl tryptamine) depends on enzymes which are sensitive to light and other radiations. Such enzymes are also sensitive to the strength of the Earth's magnetic field. The degree to which a newborn child is exposed to these influences can alter the level of pineal melatonin and hence affect later development.

Hence, there would be expected to be an association between the precise time of birth, in which hemisphere the birth occurs, and the degree of geomagnetic activity.

The precise mechanism of such effects is still poorly explored. However, it is known that magnetite occurs in pineal and other biological tissues and may transduce magnetic field effects. There may thus be a future science of proto-cosmo-biology.

There are other interesting correlations between behaviors on earth and the positions of the planets. One is the behavior of metal ions in solution. There have been several publications describing effects of planetary disposition (on ionic properties 77c, 77d, 77e, 77f, 77g, 77h, 77i, 77j).

9.5 THE BIOFIELD

Concepts of a "special" field associated with living creatures was founded by William James who wrote about "the field of Consciousness". It was called the Biofield by Bischof (78). There are basic long term problems in biology to which there has been hitherto no solution, e.g., under what forces do the appropriate forms of organs grow in various species (morphogenesis). Do such questions await tangible proof of the existence of a Biofield?

The trend of modern biology is towards classical (mechanistic) Physics. On the other hand, post-Aspect quantum physics indicates non-locality. Aspects' result has encouraged some physicists to think of material reality as an unbroken whole and it is

¹⁵During more than 50 years as a university researcher and teacher, I had a number of Indian graduate students. All confessed to having had their horoscopes taken as young children. All claimed the predictions made for them had proved substantially true. All were happy at the choice of their mates, - made by their parents largely by matching horoscopes.

correspondingly no longer consistent to think of biological entities as composed simply of individual atoms joined by fields based on Coulomb's Law. Biology must become holistic.

To understand living systems it is helpful to consider the full meaning of Schroedinger's equation, i.e., to consider the "potentia", the states of the uncollapsed state vector before observation. Does Consciousness control the biological organism through an interaction of its field with such potential states (Bischof, 78)?

A signal event in this area was the publication in 1970 of a translation of Pressman's book (79) on Soviet work on magnetic effects and their effects on living organisms. It has been shown recently by Adey (80) that there are extraordinary sensitivities of biological organisms to extremely low frequency (ELF) fields (Table 9.2).

One has to ask whether such minute electric field effects should be accounted for in the interpretation of biological phenomena. Correspondingly, living creatures emit electromagnetic radiation in the microwave range and there is also evidence of biophotonic radiation (Popp (81)).

Systematic work which implicitly asks questions concerning a Biofield is going on in the Princeton Engineering Anomalies Research Laboratory where work is done on the measurement of human-machine interaction (Jahn and Dunne (82)). Thus, if concentration upon a machine can change its operation, it suggests that an as yet unknown field must be emitted from the human, who concentrates. The same is required in psychokinetic phenomena. In Section (9.3), some abilities of several rare individuals having extraordinary abilities are briefly described, - and some of the activities which they demonstrate might be interpretable if they are able to project a biofield.¹⁶

TABLE 9.2
Bioelectric Sensitivities to ELF Fields

	Function	Tissue Gradient	Imposed Field
Sharks and rays	Navigation and predation	10^{-8} V/cm	dc to 10 Hz
Birds	Navigation	10^{-7} V/cm	0.3G
Birds	Circadian rhythms	10^{-7} V/cm	10 Hz, 2.5 V/m
Monkeys	Subjective time estimations	10^{-7} V/cm	7 Hz, 10 V/m
Man	Circadian rhythms	10^{-7} V/cm	10 Hz, 2.5 V/m
Comparison with intrinsic, cell and tissue neuroelectric gradients			
	Membrane potential	10^5 V/cm	
	Synaptic potential	10^3 V/cm	
	Electroencephalogram	10^{-1} V/cm	

by M.J. Allen "Charge and Field Effects in Biosystems," published by Kluwer Academic/Plenum Publishers, New York, 1989. Reprinted with permission.

¹⁶ Qi Gong masters are authors of extraordinary feats witnessed in the 1990's. For example, Michael Lerner (83), describes an experience in which a Qi Gong master demonstrates a potential difference of 200 v between his hands, and lights a normal household lamp with electricity derived from his hands.

One is writing here of an emerging concept. However, much points to the existence of force available to some humans¹⁷ which is not yet recognized in Quantum Biophysics.

9.6 PHYSIOLOGICAL CORRELATES WITH PSYCHIC EXPERIENCE

Neanderthals (who lived c. 100,000 years ago) were the first proto-humans to show some kind of interest in immortality, for they buried their dead in specific positions and left with them weapons and ornaments (R. Joseph, 85). The Cro-Magnon (30,000 years ago) were a superior race compared with the Neanderthals. There is no evidence on the origin of these finelooking people, 6-7 feet tall in the male, with slender hips and broad shoulders (R. Joseph, 86). The spiritual activity of the Cro-Magnon was greater than that of the Neanderthals - as exemplified by the number and detail of drawings, their location often deep in caves (for ceremonials?) and by the sophistication of their treatments of the dead. The brain size among the Cro-Magnon's was about one third greater than the average of modern humans.

It was Penfield and Perot, 1963 (88) who first suggested that religious and spiritual activities were connected with the limbic system, of the brain (See Fig. 9.4). d'Aguilia and Newberg (87) specifically pointed to the amygdala (Fig. 9.4).

Persinger (89) has developed the concept of the limbic system and in particular the right temporal lobe and associated lobe structures as the center of spiritual activity. The earlier experiments (W. Penfield, 90) in activating various parts of the brain of epileptics were carried out by applying electrodes to the exposed brain. Persinger, however, has devised a method whereby small currents can be applied to the skull (i.e., no exposed brain) and activation of specific areas of the brain can still be made to occur. His thesis is that he has developed a materialistic theory of religious activity. Thus, low electric currents to the right temporal lobe produces feelings, some of which correspond to those of heightened religious experience. Correspondingly, experiences similar to those in Near Death come to some epileptics (Morse and Perry, 91). Thus, right temporal lobe seizures can produce feelings of contentment, of "having all knowledge" (Morgan (92)). Correspondingly, Marie and Castello (93) have pointed out that some scenes of glorious landscapes, etc., reported by LSD imbibers are similar to some of the content found in reports from NDE's.

¹⁷ The extraordinary abilities of Baba and Morton to effect and modify bodies at substantial distances from them are rare indeed. However, the Princeton Group has detected (small) effects (e.g., on the frequency of oscillation of a pendulum) (84) using operatives other than sensitives.

The Limbic System

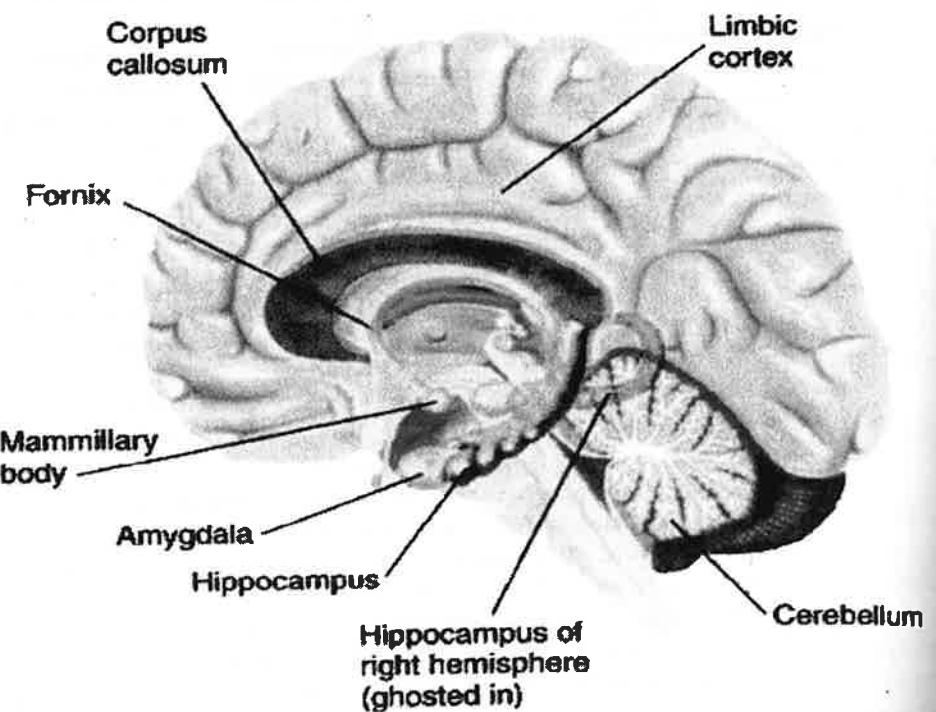


Fig. 9.4 The limbic system, a group of interconnected structures within the cerebrum, is associated with emotional and motivational aspects of behavior. The structures include the hippocampus, amygdala, and fornix, and correspond to the forebrain of primitive vertebrates. Reprinted with permission from the website of Jacob L. Driesen, Ph.D., at http://www/driesen.com/brain_view_7.htm.

It was Hameroff (94) and also in the same year (1998) Morse (95) who turned the hypothesis of a reductionistic mechanism of religious experience on its head. Thus, ESP (telepathy, far viewing and precognition) are confirmed phenomena. (Chapter 5). The effects rare healers on changes in the bodies of targeted patients is known.. Experiments following those of Aspect (97) seems to have established non-locality (cf. Stapp, 98). Thus, there may be a Reality which is made conscious in NDE's, etc., and which is identical with that which seems to be contacted if the brain is stimulated electrically in a certain way. This is also the attitude developed in detail by Joseph (86) and described by Dossey (99).

Considerations of this type can be generalized, and overlap with the following discussions of Consciousness. Thus, the brain as a computer is certainly involved in

Consciousness,¹⁸ and must thus be involved in all experience including those of paranoia phenomena. However, as developed in detail first by Penfield (90), then by Popper & Eccles (100), and most recently by Chalmers (101), there is evidently an immaterial entity ("the programmer") outside the brain which is the origin of awareness, of Consciousness. Such a viewpoint is inconsistent with Newtonian materialism and present Science but is accord with modern theories of Consciousness (see Searle (102), McGinn (103), Rakoff and Koruga (104)).

9.7 CONSCIOUSNESS

9.7.1 Introduction

The simplest way quickly to start to comprehend studies of Consciousness is to assume it means awareness. If I have a toothache, I am aware of it, this feeling is mine alone. If I am at a restaurant on the banks of the River Nile, near Cairo, Egypt, with giant shrimp on my plate, the falukas sailing in the background and a large moon shining across the Nile, it is an awareness, part of my Consciousness. However, Consciousness means more than that awareness, it involves intent, volition, "the will". It is intensely I.

Scientists did not like Consciousness for a long time - they tried to side-line it. It did not fit a materialistic viewpoint at all and the best that could be done until the 1980's was to have Consciousness as something which evaporated when you really looked at it. It was an epiphenomenon, a subsidiary thing, an impression one thought one had because there were very many electrical circuits in the brain and altogether they felt something, i.e., Consciousness.

But the time has changed and Consciousness has become an active field of study (105), somewhere between brain science, psychology, and philosophy. There are various kinds of theories of Consciousness and here we shall present several, - the reader will have to pick - taking into account evidence from the reality of the abilities of rare adepts. In order to outline the field at a practical length in this book, accounts of each type of theory can only be given briefly, - but enough to understand the essence of the ideas.

9.7.2 Electrical Probing of the Exposed Brain

Using electrodes to probe, and elicit responses from exposed brains was begun by Sherrington (Sherrington, 106), but the extensive use of such a technique (See Fig. 5), together with the first of such work from which such conclusions were made as to Consciousness was carried out by Wilder Penfield, who performed neurosurgery research at McGill University in Montreal from 1934 to c. 1973. During this time, Penfield published several papers relating his surgical work with electrodes to Consciousness (Penfield, 107; Penfield and Mathieson, 108; and Penfield and Perot, 88).

Penfield summarized the implication of his work in a book of 1975, entitled *The Mystery of the Mind* (96). The author's surgical work enabled him to become familiar with the exposed brain and with the painless manipulation thereof, in patients who remained conscious and who could respond to questions as to their feelings when he moved a current

¹⁸ Much of the TV set and its intricate electronics is necessary for me to be able to comprehend a reality created in quite another place, by entities disconnected with the TV set.

carrying electrode from a certain position in the brain to another (See Fig. 9.5). He found that he could elicit from a patient recreations of passed scenes. Thus, for example, under the influence of probing electrodes a patient responded:

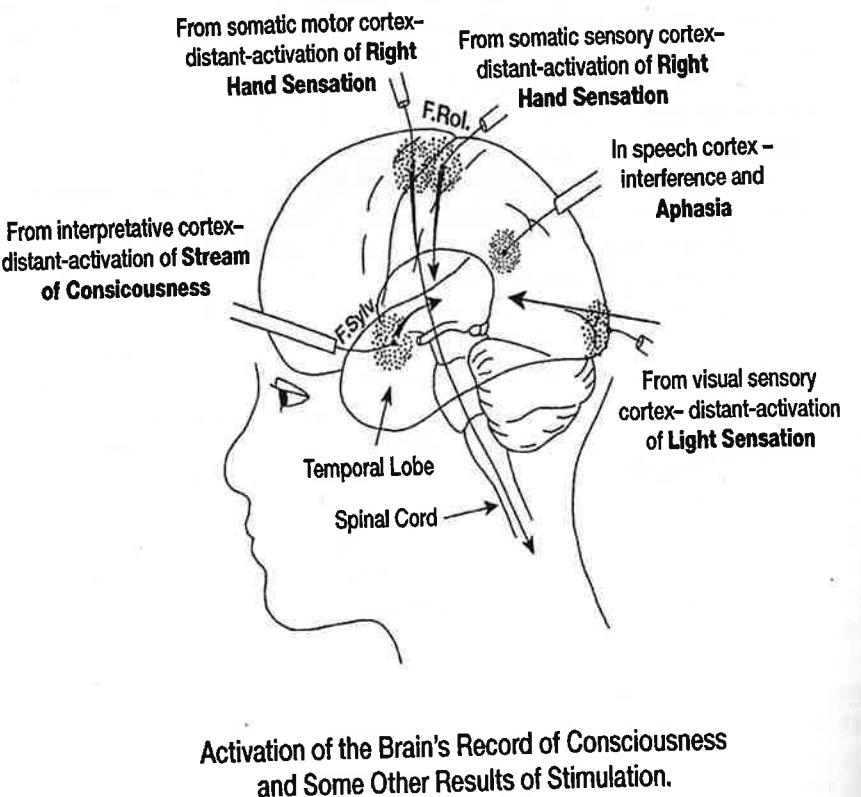


Fig. 9.5 Activation of the brain's record of consciousness and some other results of stimulation. Reprinted with permission from Wilder Penfield, *The Mystery of the Mind*, Princeton University Press, 41 William Street, Princeton, NJ 08540-5237 (1975). Reprinted with permission Princeton University Press.

Yes, I heard voices down along the river somewhere - a man's voice and a woman's voice calling ..."

Or:

"Just a tiny flash of a feeling of familiarity and a feeling that I knew everything that was going to happen in the near future."

Penfield quotes a South African patient, lying awake on the operating table, saying, when he realized what was happening, that it was astonishing that he was laughing with his

cousins in a farm in South Africa, while he was fully conscious of being in an operating theater in Montreal.

Penfield concluded that although the content of consciousness depends on neuronal activity, awareness itself is not completely explained in terms of brain activity. The mind of the South African patient was as independent of the reflex action caused in the brain by means of electrical stimulation as was the mind of the surgeon, who listened and tried to understand. Penfield was impressed by the replies patients gave when he stimulated them with an electrode, e.g., to raise the hand. They would say: "You did that, doc, didn't."

Penfield's (109) conclusions, made as early as 1975, are unambiguously expressed in his book. "Our being consists of two fundamental elements. It is impossible to explain the mind on the basis of neuronal action within the brain."¹⁹ Penfield then reminds the reader that Aristotle had said: "The mind is attached to the body" (111).

9.7.3 The Self And Its Brain

The title of this subsection is also the title of a well known book by Popper and Eccles (100). Both authors are eminent and known to be leaders in the field of philosophy and biophysics, respectively. Karl Popper is considered to have been the leading philosopher of Science in the second half of the 20th century and J. C. Eccles received the Nobel Prize for his work on brain physiology.

Thus (See Fig. 9.6), Popper and Eccles divide all experience into three "worlds". World 1 consists of physical objects and states, for example, matter and energy, biology, sense, etc. World 2 includes, e.g., subjective knowledge, perceptions, emotions, etc. World 3 includes the creation of New Ideas, - particularly those which could have had no evolutionary advantage, - could not have been "invented" by a computer. Certain mathematical theorems are a good example.

Thus, there is a theorem in Euclid for the maximum number of prime numbers. Here, Euclid reasons out the answer: infinity. A computer, set to answer this question would go on finding more and more prime numbers - and would never stop. It would never "see the point". As shown in Fig. (9.6), World 3 includes matters of cultural heritage, Philosophy, Science, Technology.

Fig. 9.6 Reprinted with permission from Springer-Verlag, and Karl R. Popper and John C. Eccles, *The Self and Its Brain*, Springer-Verlag New York, Inc., 175 Fifth Avenue, New York, NY 10010 (1977).

WORLD 1	WORLD 2	WORLD 3
Physical Objects and States	States of Consciousness	Knowledge in Objective Sense
1. Inorganic Matter and energy of cosmos	Subjective knowledge	Cultural heritage coded on material substrates
2. Biology Structure and actions of all living beings	Experience of	* philosophical * theological * scientific * historical * literary * artistic * technological
* human brains	* perception * thinking * emotions * dispositional intentions * memories * dreams * creative imagination	
3. Artefacts Material substrates		
* of human creativity		
* of culture		
* of machines		
* of books		
* of works of art		
* of music		

Tabular representation of the three worlds that comprise all existents and all experiences as defined by Popper (100).

"Here one recalls the lightning calculators (110). It is as though their mental processes were conducted electronically along wires, not ionically along pathways involving axons and ionic movements. (The former pathway conducts electricity at ~ 10⁷ times faster than the latter.)

Popper's and Eccles' book amounts to an extended argument for a Consciousness separated from the brain. The essence of the contention can be exemplified by the nature of works of art. Eccles refers to the pictures on the ceiling of the dome of St. Peters in Rome, painted by Michael Angelo. He asks if the concepts there portrayed could have originated by means of a computer? How could a digital system express a concept such as, e.g., Truth?

The type of theory which Popper and Eccles (100) are suggesting can be called pansychism, and we shall find reference to it below, because it has recently been redeveloped by the philosopher David Chalmers (101). Needless to say, pansychism theories have been criticized by, e.g., Searle (116), who has been the source of a number of books on Consciousness. The essence of Searle's criticism is that the present paradigm is entirely materialistic, no nonmaterial entities are recognized, and on this ground he claims the Popper Eccles theory of an immaterial self that programs a computer-like brain cannot be accepted.²⁰

On the other hand, Chapters 5, 6, 7 and 8 of this book describe developments of the last 35 years, such as non-locality, distant healing, and the numerous paranormal phenomena which are inconsistent with a mechanistic physics.

9.7.4 Computer Oriented Theories of Consciousness

A number of theories have been published in the last decade which involve a detailed development of the concept of the brain as a computer (112). In these theories, attempts are made to explain Consciousness within a materialistic framework, i.e., without the immaterial essence of a Self utilized by Popper and Eccles.

These computer-based theories are popular. Indeed, most nonexperts in the field of Consciousness have a basic concept thereof similar to those developed in detail by specialists: consciousness must come from certain mechanisms in the brain. There can be, - within the present paradigm, - no other type of explanation of Consciousness.²¹ It is an epiphenomenon unnecessary in the comprehension of the functioning of humans.

All theories of consciousness which involve the pan-computer viewpoint bear a strong family resemblance. They spend much effort in attempting to explain Consciousness in terms of neuronal connections in the brain. However, they are all confronted with a Major Problem: how is it that the myriad electrical impulses, which would be necessary to experience the scene earlier referred to with the moon, the falukas, the Nile River and the gigantic shrimps, all can be integrated into a realized picture, a scene of the whole? How can the internally displayed pictures be recognized for what they are and by whom? Although the authors of the pan-computer theories struggle to overcome this principal

²⁰ Searle is giving, here, unconsciously, an excellent example of the present paradigm in which the fundamental concepts are fixed: one may not think freely, think new, rethink the old in terms of the new facts.

²¹ Daniel Dennet (114) is a modern philosopher who attempts to eliminate Consciousness as a figment of the imagination.

difficulty, they do not get very far. One of the problems is the immense complexity of the interconnections with which they are faced.²²

One of the most able authors in the struggle to make the computer model work is Gerald Edelman who has published a summary of his thoughts on consciousness in his book, *Bright Air and Brilliant Fire* (113). Edelman tries to meet the major problem of focusing the numerous inputs to the brain onto sheets of neurons, each containing about a million neurons, and representing one element of the picture, e.g., the Nile River. Somehow (but how?), the various sheets - each showing one element of a picture get put together to form the whole. In spite of the detail which Edelman provides in his picture of the movement of electric currents in the brain, there is still a problem when it comes to integration and recognition of the message.

The Astonishing Hypothesis, the Scientific Search for the Soul is the title of a book by Francis Crick (115). That title is surprising because what he says in great detail is the sort of thing most scientists think when they think about Consciousness and is therefore not astonishing at all.

Crick begins by showing diagrams of how the messages obtained from the sense organs cross over so that the left eye feeds into the right brain, and so forth. He details the synaptic knobs and the complex dendrites which spread out from axons through which the currents pass. There is feedback among the various items in these complex arrangements. However, when it comes to the integration and recognition of all these complex inputs to paint a picture distinguishing a cat from a dog, etc., - there is avoidance of this main point. As Searle comments (102): "How does the brain get over the hump from electrochemistry to feeling?" Crick seems to stride past this mighty difficulty, smiling confidently.

Searle has a theory (116), and it differs in an essential way from those of Crick and of Edelman. He stresses that his theory involves the electrochemistry of the brain and that, - as is decreed by all discussers of this field, - the brain is an important part of Consciousness. The essential difference in Searle's theory is that instead of trying to pump a reluctant theory of Consciousness out of the great complexity of the brain's electrical connections, he states outright that Consciousness is an irreducible add on to the mechanisms of the brain (basically joining Aristotle, Penfield, Popper and Eccles). However, there is no statement in Searle about an immaterial ghost. It is implied (though not described) that the irreducible add on of consciousness is somehow material.

9.7.5 Chalmers

David Chalmers has attracted attention by the publication of the Conscious Mind (101). In describing the work of David Chalmers, one has to recall two terms in philosophy. One is dualism and the other is monism. At present, most of the people writing in the field of consciousness are monists. They try to describe Consciousness in terms of the electrochemical circuits in the brain (Edelmann, Crick, Dennet). On the other hand are the dualists. They think that there is a material machine (the brain as a computer) but that, in

²² When one tries to evolve away from computers in theories discussing consciousness, one meets with an emotional resistance in the scientific community, which sometimes makes a quiet and open-minded discussion of the evidence, difficult to have.

order to explain Consciousness, there is another kind of "stuff" (I won't call it "thing") out of which Consciousness - somehow - comes (Eccles).

Another term which needs explaining in approaching Chalmers' work is functionalism. In this, the essence of a system is in what it does. For example, a thermostat has a function which maintains the temperature of a system constant. Each system does something, e.g., a clock tells the time, etc.

David Chalmers (101) accepts functionalism as a useful concept. But when some authors (e.g., Searle) want to tack on Consciousness, they see this tack on as "something acting in the brain". Chalmers thinks that the tacked on part - the mind - is not part of the brain. There is functionalism, but the tacked-on part is not a functional state. Thus, functional organizations do not of themselves involve Consciousness. There could be a being (a zombie) made up of silicon chips and other electronic impediments, which would function in most ways like a human being. But it would not be conscious. When one damaged a part of it, it would not contain an entity which felt pain (for it has no Consciousness).

What is new, or characteristic of this view is that Chalmers wants to extend Consciousness outside living things he implies that all things which have a function have some degree of Consciousness. Thus, not only plants, insects and animals are conscious, but also the thermostat, rocks, the Milky Way ("Panpsychism").

This view has enthusiastic followers at this time (Searle), but of course it is extremely counter intuitive. In favor of Chalmers' view is some evidence (Schröder ()) that biomolecules in the development of the foetus "know what to do", the ability to make up extremely complex circuit approaches concepts such as the Biofield, and the morphogenic field, etc.

On the weaker side, Chalmers' concepts as to the add-on never say what it is (122). However, the same limitation applies to Eccles' psychons (Section) and indeed to Searle's ideas, too, for although in his case there is less mystery, the add-on being part of the brain - one still asks: what is it? It is the nature of the mysterious add-on, its non-corporeality (in Eccles, McGinn and Chalmers) which makes it difficult to bring into focus.

9.7.6 Penrose

The Oxford mathematician, Roger Penrose, has contributed three books which are not directly about Consciousness, but which have considerable relevance in judging the theories thereof. The books are called *The Emperor's New Clothes* (117), *Shadows of the Mind* (118), and *The Large, The Small and the Human Mind* (119). The most basic aspect of them is the argument by Penrose that it is not possible to interpret available data in terms of the mind as a computer.

Penrose's arguments are an elaboration of the kind of argument given by Eccles when he refers to Euclid's theorem about prime numbers. Human understanding "realizes" conclusions to problems in a way which cannot be achieved by a computer. The way of thinking of humans is intrinsically different from the computer digital, linear way of thinking by means of which it is hoped to produce artificial intelligence.

Penrose refers to the argument of the Austrian-American mathematician, Kurt Gödel. Gödel's theorem (120) leads to the conclusion that there are questions within any given system of logic which are not possible to answer in terms of that theory of logic.

Reduced from the terminology of mathematical logic to everyday life, one might consider the sentence "The Barber of Seville will shave any man who cannot shave himself. Does the barber shave?" There is no logical answer to this apparently simple question from the information given.

The human brain deals with matters which are not computable and therefore are beyond the reach of a computer type approach to intelligence.²³ Thus, if one accepts the arguments in Penrose, then the computer oriented theories of Edelman and Crick, must be rejected.

9.7.7 Quantum Aspects of Consciousness

Zohar (123) in her book, *The Quantum Self*, has made a suggestion whereby quantum properties could enter into brain mechanisms. Thus, the problem is that quantum effects involve only small numbers of particles. On this basis, for example, Penrose (118) has suggested that microtubules within neurons, the diameter of which is less than 100 Å, may be small enough to allow quantum mechanical behavior and hence Quantum Indeterminism. (If the system is big enough, the particles show decoherence and the weirdness of their individual properties disappears (127)). Ms. Zohar makes the original speculation that there are areas in the brain which have the properties of the Böse-Einstein systems. (In such organizations, there is more than one particle per state. The idea has been exemplified by application to gases at high pressures.)

If Zohar's speculation about areas in the brain which have Böse-Einstein properties is correct, then there would be a case for coherence in such areas and thus the extension of quantum properties in the brain to areas within the brain larger than those hitherto considered as, e.g., the microtubules view. The theory would allow a brain-based theory of Consciousness to include non-locality and perhaps gives the beginning of an insight into, for example, far viewing. However, the advantages which this might give avoids addressing the difficulty of integrating the various inputs into the brain into a coherent whole.

The author, who has tried to make the most of alleged quantum effects in the brain, applied to a discussion of consciousness, is Goswami (124). He begins with a discussion of the philosophy of idealism, the essence of this, - accepted in the East, much less in the West, - is that the external world is an invention of the observer. This philosophy introduces the well known concept of Maya, i.e., that the solid outer world of appearances is an illusion. There is some overlap here with the Copenhagen view of quantum mechanics because, in it, particles in the submicroscopic region have a certain unknown (multistated) reality before measurement, after which the particle shows up in a single state, but not as itself, only part of itself, the single state. The *measured* particle is not what Kant would have called the thing itself. Some workers, and particularly Wigner (125), have regarded this final state, that which can actually be measured (i.e., *observed*) is the choice of the consciousness of the observer, i.e., the external world would be an outcome of the observer's consciousness,²⁴

²³ See F. J. R. Searle (116), page 89 (Gödel's proof and computers), but also see J. R. Lucas (121).

²⁴ An extension of these concepts to macrosystems has also been pursued by the Copenhagen School of Quantum Mechanical interpretation

and, in a sense, not Reality (all the states), because these are destroyed on measurement, i.e., we cannot become conscious of the "real" outside world but only of Maya.

Goswami realizes that the consensus among observers of the outside world as to the nature of the products found there means that he has to give up the basic concepts of the pure idealism, but he suggests that the nature of external reality is some kind of mix between a materialistic computer-oriented picture (that, say, of Crick (115)) and the effect of areas of the brain which are coherent and which allow quantum properties, which contribute to the net picture. Thus, if there are such quantum properties, then there would be the possibility of nonlocal behavior, and one has, perhaps, a glimpse of distance-independent telepathy, etc.

Goswami's contribution is involved, as is shown, by the fact that he includes "tangled hierarchies" in his discussion. He suggests that consciousness involves a non-local unity, which combines, in coherent areas of the brain, to reduce the quantum object with its "in potentia" state to one actualized state. This reduction would be unconsciously chosen by the observer, who therefore would determine the reality realized by him.

9.7.8 How the Self Controls the Brain (126)

According to Nobel laureate Eccles, an immaterial consciousness operates on the brain. He hypothesizes that the underlying operator contains units which (somewhat mechanistically) he calls psychons. These psychons connect up to the dendrites, bunches of (material) neurons which form dendrites in the structure of the brain. Eccles' work is strong in diagrams of the neural structure of the brain and one of these which can be quoted is Fig. 9.7 which shows these neurons and their synaptic connections.

A basic idea in Eccles is exocytosis. This is the name given to a process by which chemicals stored in vessels called organelles are released from the cell and spilled into the extracellular fluid. In a paper with Beck (128) the exocytosis process is quantum mechanically described. The authors refer to a "quasi particle of energy", which controls exocytosis. In Fig. 9.8, there is a picture of the synaptic vesicles before transfer, i.e., before exocytosis. Thus, for Eccles, mental events, - the mind, Consciousness, - occur through the immaterial psychons and each of these has a matching material dendron. There are some 40 million psychon-dendron connections in the brain.

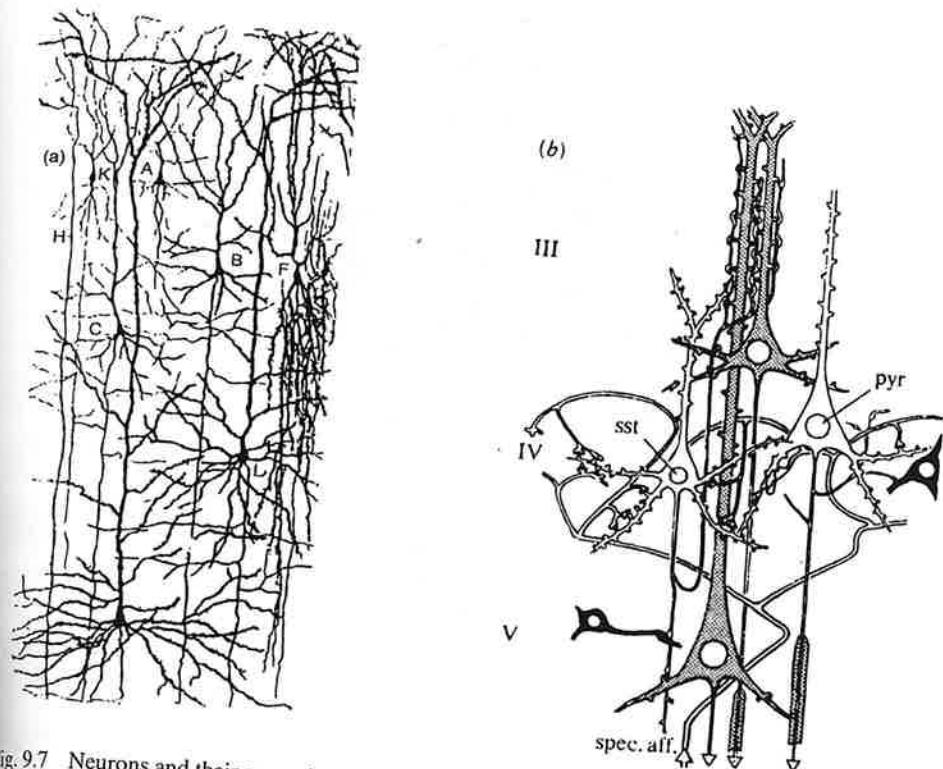
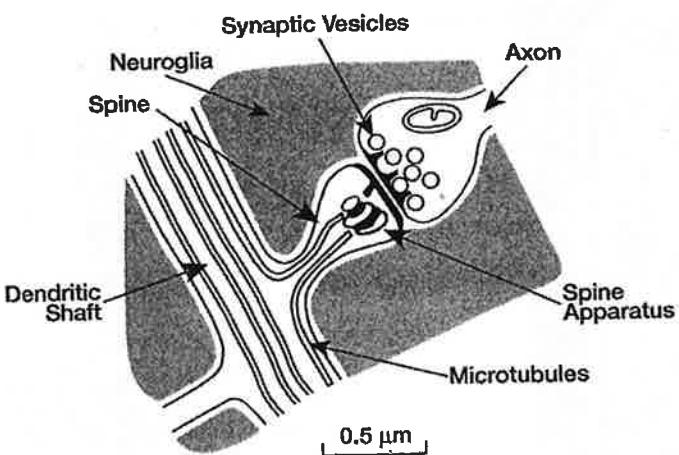


Fig. 9.7 Neurons and their synaptic connections. (a) Eight neurons from Golgi preparations of the three superficial layers of frontal cortex from a month-old child. Small (B, C) and medium (D, E) pyramidal cells are shown with their profuse dendrites covered with spines. Also shown are three other cells (A, F, K), which are in the general category of Golgi type II with their localized axonal distributions (Ramón y Cajal 1911). (b) The direct excitatory neuron circuit of the specific (sensory) lamina III and IV pyramidal cells (stippled) with ascending main axon and apical dendrites of both spiny stellate (sst) and pyramidal (pyr) cells. Both spiny stellate (sst) with ascending main axon and apical dendrites of both lamina III and IV pyramidal cells (stippled) are probably the main targets. (Szentágothai 1979). Reprinted with permission from Springer-Verlag and John C. Eccles, *How the Self Controls Its Brain*, Springer-Verlag New York, Inc., 175 Fifth Avenue, New York, NY 10010 (1994).

The weakness of this theory is the absence of a rationalization of the identity of the psychons. However, research on OBE's, NDE's, reincarnation and ghosts suggests the existence of non-corporeal entities that behave with intention. Eccles' theory clearly that branches out and is an attempt to introduce the suggested non-corporeal entity into physiology and, by inference, to form a basis of World III and, for example its mathematical dimension. However, it seems to fail at the vital point, the psychons. For we know what the dendrites are in the brain, but the psychons are ad hoc, an add-on, a hypothesis. They



A drawing of a synapse on a dendritic spine. The Bouton contains synaptic vesicles and dense projections on the presynaptic membrane (Gray 1982)

Fig. 9.8 Reprinted with permission from Springer-Verlag and John C. Eccles, *How the Self Controls Its Brain*, Springer-Verlag New York, Inc., 175 Fifth Avenue, New York, NY 10010 (1994).

should not be rejected because they are as yet a concept only. We knew nothing of microtubules until the 1990's (or of fractals until the 1960's) and there are many concepts underlying acupuncture (a demonstrated reality) which we cannot yet fully recognize in Western physiology. Psychons are needed. Perhaps, soon, they will be rationalized.²⁵

9.8 A VIEW FROM EASTERN PHILOSOPHY

There are several ways whereby eastern views about Consciousness may be described. In this depiction we shall be following the lucid way in which Consciousness is described by Peter Russell (130).

Thus, Russell is gradual and cautious in his definition of Consciousness and at once one finds a development deeper than that which one has been discussing in computer models of Consciousness or even in developments such as those of Popper and Eccles or Goswami. He begins by suggesting that Consciousness is connected with capacity for inner experience.

A helpful analogy is made in the Russell presentation. Thus, in observing a movie, we are looking at the result of a beam of light, portrayed upon the screen, which has been interrupted at the level of the projector by a myriad of stationary pictures, which are the analog of sense data which we see in the normal world around us. They are the contents of

²⁵The basic problem in all attempts to introduce a quantum aspect into the theory of consciousness is how to introduce coherence and Goswami quotes researchers on meditative states who have studied brain waves from different parts of the brain (129). The deeper the meditation, the greater is the indication of areas of coherence in the meditator's brain.

our Consciousness. Thus, in watching a movie, one is caught up in the relation between the projected images and the story which it tells. There is no awareness of the light, itself which makes the experience possible. Thus, in the normal course of the day, we are not conscious of Consciousness. To become aware of Consciousness, it is necessary to hold still the dancing images of normal life, our sense data. This is what is done in meditation, more fully developed in Eastern practice than in the Western.

In the mind arrested from wandering by the practice of meditation, Russell sees what is called Samahdi, a word which means "still mind". Pure consciousness, then, is awareness with no object of that awareness. The mind has obtained emptiness, serenity, and in this state, - and our experience of it, - one is able to make progress in understanding of what is the I which we so normally take as the center of our lives. This "I" is the entity which programs the brain, which makes the content of Consciousness.

Like time, it is easy to say that one understands what this "I" is, - but when one tries to explain to another what one means, - one finds it difficult. Again, Russell comes up with the analogy of a beam of light. Suppose that one is looking into a dark room with a torch light, and as one shines it round the room, one sees the various impediments there. But it would be useless to try to find the "I" by carrying out such a procedure. For it is the torch light itself which is the "I".

9.9 CONSCIOUSNESS SO FAR

In Western theories of Consciousness, there is always the background of machines and the images we use to describe Consciousness are influenced by this mechanistic background, particularly, by the computer. This is the origin of the radical difference between the Eastern and Western ways of discussing Consciousness. In the Western case, it seems that presentation put forward in the early 1980's by Popper and Eccles (and spreading from Aristotle and Penfield) is above the detailed pan-computer views, which collides with the difficulty of explaining integration and realization. The theory which most resembles Popper and Eccles is that of Chalmers, and this goes even further in hypothesizing a consciousness attached to all objects which have a designated function.

Quantum theory is much quoted in modern theories of consciousness, but the need for it and what happens if one is able to persuade the reader that one has rationalized a quantum participation in the brain, is not always clear. Certainly a degree of quantum weirdness into mental mechanisms might get us further towards understanding non-locality and perhaps some paranormal phenomena. The quantum mechanical contributions towards Consciousness are at first encouraging and make us expectant, but do they throw much light on Consciousness? Even Popper and Eccles, and in spite of the physiological detail with which (through Eccles' work) they present their ideas, end up with an irreducible nonmaterial entity, which is their final contribution to the riddle of consciousness. In this respect, there is, finally, not so much difference between Popper and Eccles on the one hand, and Searle, on the other.

Is the Eastern view both a deeper view and a more understandable one? It is untrammeled by the need to introduce computers or quantum mechanics, it has existed unchanged for several thousand years. These Eastern concepts even embrace some paranormal phenomena as siddhi's, a normal experience on the way toward Samahdi. Of course, a person steeped in Western science, will regard the Eastern view as irrelevant

because it will be said that it explains nothing. Where is a discussion of the connections of the inflowing electrical impulses and their integration within the brain? Where is a discussion of how this integration creates informative pictures? However, we already know at least one example of a totally different viewpoint and its help to us in science. It is thermodynamics which is, to a degree, the analog of the Eastern view of Consciousness. Thus, thermodynamics does not involve any discussion of mechanism, or particles and their actual behavior. However, it enables us to have insights into the model behavior of systems, and has the advantage over the atomic-molecular picture in that it is not open to doubt, development, and change. The same advantage might be seen in the Eastern approach to Consciousness.

9.10 MUCH MORE ON CONSCIOUSNESS

9.10.1 Preliminary

We have seen, so far, something of what the literature of recent times gives us for the concept of Consciousness. Among most scientists, there is an attempt to explain Consciousness entirely in terms of the operation of electrical circuits in the brain (115). A few scientists and a number of philosophers see "something more," though are unable to be lucid in any explanation of what it is (116).

In the following, we shall continue to discuss Consciousness but in a more general, - more advanced, - fashion. At the beginning we shall tackle the main problem which the subject has: its definition, i.e., what is Consciousness supposed to mean? We shall explore broadly what the concept may mean, including some scientific evidence from the study of paranormal phenomena (131).

9.10.2 What Is Consciousness?

The first thing one does in meeting such a question is to go to the dictionary. Webster's *New Collegiate Dictionary* for 1977 says that Consciousness is Awareness, Emotion, Volition and Thought. It is, of course, reasonable to ask what this dictionary gives for Mind. It says that Mind is an element which feels, thinks, wills and reasons.

Lastly, - and without controversy, - Webster's defines the brain as that part of the vertebrate central nervous system which is the origin of thought and a neural coordinator receiving stimuli from the central organs, interpreting them and formulating the motor impulses.

It is better to leave these definitions standing but keep them in mind in what follows.

9.10.3 Scientific Concepts: Paradigm Bound

Before going deeper into the substance of this section, it is relevant to remind the reader that the concepts which make up Science at a given time are bound to the general paradigm of that time. At the beginning of the 21st century, the reigning paradigm is science in the version of Newtonian Materialism. Thus, until the outburst of the beginning of New Thoughts associated with the names of Copernicus, Galileo, Bacon, Kepler, and Newton, - the Medieval world, described in Chapter 1, - was seen as filled with discarnate entities and these, - not the bacterial germs of Science, - were supposed to determine illness or health. Further, in Europe at least, the Church was not only alive and well but strongly

determinative in the kind of life one lived, for it was clearly in the mind of all that there was an After Life to be spent forever in Heaven or in Hell, the state in the after-life determined by how a person had spent his life.

When Newton explained Kepler's laws of motion of the planets, using the one assumption, the existence of the attractive force of gravity, and the mathematical application of his laws of motion, it was the beginning of a long and steady retreat for things of the spirit and a slow and eventually dominating rise for concepts in terms of things, - Materialism.

This trend developed into science and engineering as we know them and to all the triumphant multitude of inventions that have transformed the world. This Materialism gave from the Greeks.²⁶

It is thus that Science became the religion of Western peoples - and everything that was to be acceptable became, - and by and large is, - subject to a question: Is it consistent with Science? However, translating this a little, the test with which concepts have to pass at present is: Does it fit in with Newtonian Materialism? It is true that those who work in the furthest reaches of the quantum theory would put up a caveat at the above statement, but the Quantum Theory at present is in a period of stasis, and most physicists who use it would admit that they would rather not go into what it means.

So, we are in a period now, a regrettable period, where a newly discovered fact, even if verified by a hundred laboratories in all the technologically active countries, if it is inconsistent with the present scientific views, is not accepted, does not exist (sic), and must be put away as the result of bad measurements (or even fraud) (132). Scientists who give rise to new paradigm-threatening ideas are rejected by their institutions (133).

Thus, at present one is more or less barred from the study of Will Power, Inventivity, and Purposefulness, because these are concepts which cannot be fitted into the present model in Biology.

Nevertheless, there are flashing warning lights on the horizon. Thus, in the 60's and 70's, the effects of the use of psychedelic drugs became known. For the most part, the image which this use projected was a negative one, because uncontrolled partaking of, e.g., lysergic acid, LSD, often gave rise to ruined minds and people no longer able to hold a job. It is their tragedies which reach the media. What is not generally known is that scientific, controlled, work (134) on the effects of carefully measured doses of LSD (or alternatively, electrical stimulation of parts of the brain (135)), give rise to reports which suggest that there are higher states of awareness available to people, and attainable by the use of chemical or electrochemical stimulation, or by long-lasting ascetic practice.

Within Western writers, it is Maslow (136) who has led the idea that there are higher states of Consciousness, a break-out which may, in due time, allow Consciousness to be introduced into accepted Science, and eventually lead to a change in the paradigm.

²⁶ Via the Scholastic Philosophers of the 13th century (above all through Aquinas), - but the Western scholastics received knowledge of the Greek philosophers from Islamic scholars of the time.

9.10.4 Can the Brain Be the Seat of Consciousness (131)?

The answer to this is in the negative. Thus, the cardiac surgeon, Sabom, describes (137) an operation which was carried out on a woman with an aneurysm in the brain. The chief surgeon lowered the temperature of her body, stopped blood flow, and brought about a condition of no pulse, and a flat EEG. He could then operate on the aneurysm, and was thereafter able to restart the heart and bring the woman back to life.

By all measure, this woman was dead during the operation. However, she reported an Experience during this time. In it she described in detail the happenings in the operating theater, the appearance of the many doctors there, only two of whom she knew, and some of the instruments used, one of which was particularly specialized and which she could not have seen elsewhere. That the woman retained Consciousness while her brain and normal senses could not function is a seminal finding of the first rank. It would be difficult to find a more anti-paradigmatic experimental result.

Thus, it may be that, in normal waking life, the brain does indeed act in a way similar to that of a TV set. Such a device portrays happenings, which are occurring elsewhere and which are transferred electromagnetically to the set. Thus, the TV set is essential to our realization of happenings but these happenings, - as with Consciousness and the Brain, - do not originate there (116).

Such a view would be consistent with other phenomena, e.g., those in which, under LSD, some patients are able to recall details of what they allege to be past lives. Some of what is claimed in these reports has been substantially verified (138).

9.10.5 Can Consciousness Be an Epiphenomenon of the Brain?

This question has implicitly been answered in the last section, - Consciousness cannot be created in the brain, because persons appear to be able to remain conscious when the organs of their bodies (including the brain) are inoperative.

A more experiment consistent model of Consciousness is to regard it as a Primary of Existence. It is desirable, - and the center of material for the New Paradigm, - for it to be realized that there is a Consciousness. Perhaps (as Schrödinger was the first Western scientist to suggest), - there is only one Consciousness (139). This is essentially the view in Buddhist philosophy.

9.10.6 Materialism Is Not Consistent with Paranormal Phenomena

Materialism cannot be brought into line with the facts of the existence of Apparitions, both of living and dead persons (Chapter 6). Out of the Body Experiences are now widely reported and a few experiments under scientifically controlled conditions have been done which are consistent with the exit from the body of a non-material entity, containing the body's senses and memory and its corresponding return, with information gathered on its journey (Chapter 7). Near Death Experiences imply the existence of a discarnate entity, containing the personality of the dying person, accounts of that entity's observation of its body and specific details of its surroundings are numerous, and consistent with the implication of the title of the Popper and Eccles book: *The Self and Its Brain* (Chapter 7). Correspondingly, there are many reports, made with scientific caution, concerning young persons who tell of an earlier life and in some cases go and meet (and are

recognized by) their earlier parents (140). Interpretation of these accounts within the present paradigm, are very difficult (Chapter 9).

In fact, none of these facts corresponds to what would be expected on the present paradigm of Science. They pertain to very large fields of knowledge that are being ignored by present Science.

An analogy may be helpful. From the time of Newton's Principia (1687), until the time of Faraday (1791-1867), Maxwell and Hertz (1888), Physics existed on ideas in which the only known intermolecular force was gravitation. But later from the time of Faraday, electrical forces were discovered and the ideas of electromagnetic electrical and magnetic fields were advanced, transforming physics and allowing transmission of information all over the planet in a fraction of a second.

Materialism and its interpretation are analogous to physics based only on a Newtonian perspective. That perspective underwent a fundamental advance as a consequence of the discovery of electromagnetism. Thus, our materialistic concepts have done well as the basis for much of our experience, but the knowledge we have now from the paranormal phenomena suggest the need for yet another radical extension and modification of our concepts to include the acceptance and function of immaterial entities.

The New Paradigm must lead to a reinterpretation of much in present Science, particularly in Biology and Psychology.

9.10.7 Are Spiritual Experiences Indicative of Pathology (134)?

There are many (141) who, over reported history, maintained that they have experienced temporary interludes of a higher life, some of them seeming to involve contact with discarnate beings. In Eastern countries, experiences involving religious figures are frequently reported. Typically, a person is suddenly overcome by a strange feeling of cold, often entering at the feet and up through the body. During the time of heightened awareness, he has a "cosmic consciousness," can see past and future, becomes calmly certain of extended knowledge, e.g., sees that there will be a major war, and who will survive it, etc. Such phenomena and many others suggest the existence of higher mental states, were first described by R. Bucke (142). More recently, they have made the basis of a branch of psychology, transpersonal psychology (Maslow (136)) and developed and used in the philosophy of wholism (143).

In conventional psychiatry, the interpretation of such experiences is made in terms of the workings of a disturbed mind. But many of the experiences involve paranormal phenomena (e.g., clairvoyant episodes) and the existence of such phenomena is well verified (Chapter 5). Further, people in modern times who experience periods of religious ecstasy prove, upon examination, to be fully normal (144).

It seems desirable that the downplaying of spiritual experiences as due to bouts of insanity should be altered in the light of the growing knowledge of the paranormal and transpersonal psychology. Thus, it is difficult to teach spiritual growth and to increase religious education when elevated experiences are described in terms of pathology. How often does one hear of persons who - perhaps after a lecture on a piece of psychical research, some forward to tell of a spiritual experience, saying that this is the first time it has been spoken because "people might say I am crazy."

The change to a New Paradigm, which includes acknowledgment of valid experiences of higher mental states, appears urgent. It is important that the present paradigm be encouraged to outgrow a purely Materialistic stance, in which there is no teaching of youth to have goals other than having pleasure, getting more things, etc.

9.10.8 Complementary Medicine Involves Phenomena Which Cannot Be Fitted into the Present Science

Marilyn Schlitz and Willis Harman (145) have pointed out that many phenomena at the edge of the mainstream of medical science, - being increasingly used in alternative medicine, - are inconsistent with present biochemistry and molecular biology.

Homeopathy was introduced by Hahnemann in 1796 (146, 147). It experienced a declining reputation during the last half of the 20th century, but recently, several trials (149) have re-established the fact that it comprises a valid method of healing. The mechanism remains murky (148), for the solutions ingested have been diluted to an extent that a dose no longer contains the molecules from which cure is expected.

Healing at a distance is clearly as antiparadigmatic as the experiences of the woman with no pulse and flat EEG, who was yet conscious of what went on in her operation. However, the evidence that there are some who can make distant healing work is strong (ct. Braud(31)).

The placebo effect (150) is recognized, even by conventional physicians. It competes with the effects of allopathic medical treatments but, how does it work? "It works by suggestion." But is such an answer satisfactory even within the present paradigm of Biology?

An answer to a similar question is consistently given by the so-called psychic surgeons who appear to use slight of hand but nevertheless, effect many attested cures (Section 8.3.2). With one voice, they disclaim any powers and say that they are simply channels for divine power.

Similar statements are made by other so-called "miracle healers", e.g., Arigo, a Brazilian trade union organizer who was responsible for many hundreds of cures and who said that Dr. Fritz (allegedly a German surgeon from the early 20th century) told him what to say and do (151).

Far outside the Western purview of medical anomalies are the Qi Gong masters who have had papers published about them from the Chinese Academy of Science describing their ability to influence chemicals and nuclear reactions at great distances of separation (152).

All these matters are inconsistent with the present paradigm and press for its development to one consistent with facts, some of which have been available more than a century.

9.10.9 Reincarnation and Regression Are Inconsistent with Present Biology

A brief description of the extensive and meticulous work of Ian Stevenson on children claiming memories of past lives (and Wambach's work on regression to many earlier lives) has been given in Chapter (8). The Readers may find it difficult to believe and will doubt the facts reported. They may seek an explanation other than that of reincarnation. However, Stevenson has records of interviews with a person who, purporting to describe

an earlier life, - broke out into the language of her alleged former country with the right accent for the time and place.

9.10.10 Scientific Knowledge and Knowledge

In the present paradigm, the only knowledge regarded as valid is knowledge gained by the so-called scientific method. This is a method in which sense data are rationalized within the paradigm of the time, diagnostic experiments being designed to confirm or deny the hypotheses made. The method has brought the vast changes documented in Chapter 1. There may be wonder why there should be any move to change it. Indeed, it does very well as the stimulus and basis for all engineering which has led to so many pleasing (and nonrenewable resource exhausting) technologies.

However, the cornucopia which Science has brought us, has concentrated our attention almost exclusively on a brightly colored *outer* world. It has anesthetized our attention to the *inner* world. But our knowledge of what lies outside depends on our interpretation of the symbols our senses bring us, and upon our mechanism of comprehension, both of which are *inner* worldly matters. In concentrating on what seems to be this brightly colored *outer* world, we have lessened our ability to investigate and appreciate reality, to see part of its picture, but we leave out important parts of it.

In an Eastern philosophical view of Consciousness (Section 9.8), the analogy was made that our situation is like being in a dark room. But we can shine a torch on parts of it and this may show up chairs and a desk. It is these chairs and desk we study by present Science: the torch beam is our Consciousness. Studying it cannot be done by looking at the things it illuminates.

As to knowledge, it can come to us by several paths: some comes to us telepathically, repressed memories turn up which appear to come from the race into which we are born; from the feelings and urges which arise on reading certain poems and listening to music, e.g., of Wagner, Beethoven, or Grieg. Some knowledge is usually available to us by intuition; from glimpses of remote viewing (Chapter 5) and - from experiences which one suddenly feels entirely sure are true.

These other parts of knowledge are not intellectual and may not at all times seem rational. But what is "rational"? Does it not mean "consistent with the science of the day"? Thus, today's irrational thought may turn out to be, tomorrow, a rational one. And of the other parts of knowledge: Are not some of them what tends to inspire us, to raise us, to see far and act right? Those types of knowledge, strictly speaking, are not intellectual and they are not in the pipeline of present science.

9.10.11 The Need to Change the Basic Viewpoint in Science

Most scientists would say that changes happens all the time in Science. They claim that science is always being adjusted to the knowledge of the new which comes from the results of research. However, that turns out to be the case only if the new facts do not seem to undermine the basic paradigm of materialistic science: Atoms and molecules and the electromagnetic forces between them do everything (Chapter 4). There is no design no direction or no intention. Everything happens by chance (Monod, 154).

This book has outlined and reviewed material that may help the reader re-assess that viewpoint. It gathers work done by others over the last hundred years, much of it over

the last twenty, and shows that some of the discoveries made cannot be fitted into a Newtonian Materialistic world view. Clearly, it is of no use going on the same way when that way is inconsistent with much in nature. Apart from the difficulty of trying to tune a view of nature into a number of facts which deny that view, the present paradigm and its accompanying public philosophy, has led us pretty near to the brink. Our great stress upon the importance in evaluating a man on his pecuniary compensation pits man against man. The stress on possession of goods, - does it lead to more informed people, people more in touch with the whole of Reality? Or does it mean that the torch shines only on what things are just ahead (153).

Our fascination with technology, and the dismaying fact that a huge government research expenditure is spent on the development of devices for killing, stands as an indictment of our culture. Along with this goes our lack of care for our poor, for our environment, in particular our wild and irresponsible using up of our remaining fast dwindling natural resources.

What would the elders of an American Indian culture think of us?

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CHAPTER 10

THE NEW PARADIGM

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10.1 CONCLUSIONS FROM THE PREVIOUS CHAPTERS

In setting down some principal results of the preceding nine chapters of this book, the author asks one thing, - not necessarily something very easy to attain, - that his readers should eschew rigid past thinking, and react to new facts without being anchored immovably in present convictions. Some of the conclusions communicated here are antiparadigmatic; they are inconsistent with the mechanistic science paradigm built up over the last 350 years. They ask from the reader a Major Change in the understanding of his world. Some of the new sources of information may be outside those obtained from the five senses and they include experimental results coming through rare persons; just as the present intellectual population eagerly accepts what is told to them of the implications of results of experiments made with esoteric, complex apparatus which is understood and operable by only a dozen or so highly trained people in the world.

10.1.1 Chapter 1

This was a sketch of the development of the present paradigms in the West from the pre-Greek world to our own modern scientific ideas, originating in the 17th century with the heliocentric revolution (Copernicus and his followers) and continued with Newton's mathematical theory of the elliptical planetary orbits discovered by Kepler. This has led about third of the world's population to a standard of material living higher than any earlier seen. Some see the year 2000 and the widespread yet early stage in the uses of computers as a kind of pinnacle; although others argue that the computer's effect upon the living standard of Western nations has been less than the introduction of such inventions as the automobile and the telephone.

10.1.2 Chapter 2

This chapter examined the cost of the advance in living standards that have been achieved by applying the discoveries of science through engineering, all this based on the relatively new idea of scientific investigation. They have been built on the use up of non-renewable materials, at the beginning of the period seen as plentiful. They have produced an increasing amount of atmospheric and water pollution. The main source of energy behind the "advances", - oil, - will maximize its supply rate worldwide around 2010 (1). Thereafter, the rate of supply will decline rapidly while the world's energy demands continue to climb. The most basic difficulty is overpopulation. Because of the several decades long lead time and the great expense of building a renewable energy system,¹ it may be now too late to begin its building just as the oil begins to exhaust. The difficulty of using coal in the interim, - even if it could be done by means of the removal of C from the CH₄ formed from coal by steam reforming, - involves questions of what to do with massive amounts of the

¹Solar, hydro, wind, gravitation (tidal), geothermal, with hydrogen as the medium, storage and transfer of substance..

resulting carbon. However, this difficulty is less than that of opening sufficient new coal mines in time to meet the fall of oil (1a).

The continued confidence projected from Western governments, and their hiding from the populace these difficulties² of the next generation and even planning new wars, reminds one of Humpty Dumpty and what happened to him. However, there is one potential scientific advance which might provide us with cheap, clean energy. This is the idea of some physicists that electrical energy might be extracted from the vacuum of space. What first looks like a piece of science fiction, the idea is actually taken seriously by responsible physicists who have studied its basis (1b).

10.1.3 Chapter 3

The Shaking Pillars, the title of this chapter, refers to the fact that some of the principal components of the present scientific world view seem to be regarded with increasing doubt by a vanguard of heretics.

10.1.3.1 Darwinian Evolution

Perhaps the most influential in the construction of a materialistic science was Darwin's theory of Evolution. It is an indisputable fact that with increase of time, the species populating the earth have greatly increased in sophistication. Darwin suggested that this happened as a result of the struggle for survival. Somehow there entered occasionally an accidental modification of a species which gave it an advantage; - this new modification would proliferate more and eventually displace the less-well equipped species from among which the "advanced" version was born. Until the discovery of DNA and the concept of the genes therein being associated with characteristics of the organism, it was murky guessing how these chance changes might arise even in principle. With the New Biology (molecular biology), it seemed at first much clearer. Some external stimulus ("cosmic rays?") would knock out a gene, or at least change the DNA of which genes consist. Although most such changes would simply damage the organism, a tiny fraction might give it an advantage. However, this apparent interpretation of Darwinism is now seen to lead to the end of the theory of chance changes being the origin of evolution. Thus, it is now understood that, e.g., to develop a wing from a fin needs a large number of correlated changes (and the availability of enzymes in the right places to support them). Thus, until the whole change is accomplished the individual chance changes give no survival advantage to the organism. Hence, to believe in the theory, one would have to accept that many chance affects are all correlated toward in the development of the final advantage, which was to lead to the more dominant species. The probability of the many chance changes being thus correlated in purposefulness is infinitesimally small. So, how do new species evolve?

² Although energy and resource exhaustion, pollution, and overpopulation are the most pressing difficulties arising from our exponential growth rate, we are beset by many others, e.g., electronic pollution, overload of information, and a breakdown of family life leading to a reduction in quality of the population.

10.1.3.2 Relativity (Chpt. 3.8)

For nearly a century, what is called "Einstein's theory of special relativity" has been regarded as a crown jewel of Science although most of it had been already suggested earlier by Lorenz (2) and by Poincaré (3). However, the jewel sparkles much less now, for it is widely realized that the changes which the theory wrought on Newtonian Physics are so tiny as not to be of practical importance in nature outside particle accelerators, or at the supposed "edge" of the known universe.

"General Relativity" is a theory of Relativity taking into account acceleration, but its most important conclusion, which made Einstein famous, concerns one of the deductions from the theory, i.e., that the force exerted by a large mass (e.g., a star's mass) on photons. From this thought (suggested earlier (4)) spread the idea of curved light and from this "curved space", and what is really meant is that light deviates from its normal straight path near a large mass. At the time at which the first paper on General Relativity was written (5), the furthest detectable reaches of the universe were thought to be populated with large galaxies, uniformly arranged, so the light which reaches us from them would have been bent Einstein was a creative physicist but his huge fame is based more on the fact that few scientists have taken the time to understand his original papers and have accepted the claim that revolutionary effects which some say have arisen from his contributions to Science. Indeed, more recent measurements of the velocity of light in various directions (6) suggest that the basis of the Special Theory has substantially weakened, - and made its pillar shake with it.

10.1.3.3 Quantum Theory (Chpt 3.9)

Although always described as "a fantastically successful theory," in truth most physicists use the equations of the quantum theory to carry out numerical calculations while admitting they do not understand the real physical significance of what they are doing. Bohr's mystical interpretation of the quantum theory is mournfully accepted in a shoulder shrugging way by physicists because, - if they can be tempted to talk about the physical meaning of it at all, - they agree that it is controversial at best and disconnected from observable reality at worst.

Thus, consider a playground of 100 children at recess. They rush around, form small groups, dissociate, get mixed up, etc. This is how things are for the system. But when the bell goes (a measurement is made), they all line up, the tallest boy on the left until number 100 is a tiny girl on the right. A photo is taken and shows this particular - artificial - state of things, the state which is being photographed. This single state of a system is what a measurement finds in the quantum region. The real thing (Das Ding an sich of Kant), - cannot be measured, because any attempt to do so changes the system. So the quantum theory exists with the sophisticated equations but they concern a hypothetical (multi-stated) system and do not represent the reality of a measurement. Therefore, the measurement does not determine reality and we are left with a universe that is, in a fundamental sense, unreal.

10.1.3.4 Big Bang (Chpt.3.10.2)

Hubble found that as he examined the spectra emitted by the various galaxies, the ones which were furthest had the most red-shifted spectral lines. Assuming the red shift was

a Doppler effect, Hubble could calculate the recessional velocities of the galaxies, those furthest away apparently moving the fastest. These observations gave rise to the idea of an expanding universe, the "edge" of its visibility being formed by the fastest allegedly receding galaxies. It became then an obvious question as to the time the universe has had in which to expand to its present size. Then the suggestion was made by a Jesuit priest (7) that it must have begun - from a single small sphere of compressed matter - in a mighty explosion of some kind.

However, this theory is not in good health anymore. The theory predicts that the outermost galaxies are travelling near to the speed of light. Galactic clusters exist in space and would have taken far longer to form than the age of the universe calculated from the Big Bang model. Some galaxies appear to be associated with quasars. Each body has a different red shift, but, being together, must be traveling at the same speed (8). So, there must be another theory for the red shift. But if that is so, no expanding universe and no Big Bang.

10.1.3.5 Origin of Life (Chpt. 3.12)

The bottom line here is that, - because of the difficulty of finding an acceptable mechanism for the first formation of DNA or RNA, - no idea looks likely. The theory that the first living organisms got here from space just pushes the problem back a few eons. The latent difficulty is that reductionism and chance lie at the basis of the paradigm and any teleological interpretation is warded off.

10.1.4 Chapter 4

Here we cited examples of phenomena, which while not controversial as to their existence but cannot yet be explained in terms of present science. An example where an explanation may one day be forthcoming in the present paradigm is ball lightning. However, there are phenomena such as precognition, which our present physics will certainly not be able to accommodate.

We have seen that there are also prominent cases in which scientists who have suggested paradigm changing ideas have been persecuted. A recent example is Dean Radin, who was director of the Consciousness Research Division in the University of Las Vegas. He published a book (9) *The Conscious Universe* in 1997. It presents strong scientific evidence for the validity of ESP. Radin was fired from his university position shortly after its publication. The alleged ground for his termination was that his subject was not financially viable, although he had gathered some \$100,000 per year in research funding.

10.1.5 Chapter 5

Herein we gave an account of scientific work that establishes the reality of telepathy, remote viewing, and precognition. The effects are greatly dependent on the particular persons who take part in the experiments. Meta-analysis established the reality of the phenomena in the three fields.

10.1.6 Chapter 6

We provided an account of the present state of knowledge of apparitions, ghosts, haunting, and possession. The first three claimed phenomena are rare and sporadic, the fourth more frequently observed. Although the nature of the phenomena do not permit on-

demand laboratory experiments, some critical "laws" of behavior can be deduced. For example, alleged ghosts of dead people are sometimes seen by more than one person at the same time. Furthermore, animals react to their presence.

10.1.7 Chapter 7

We reviewed claims of Out-of-the-Body and Near Death Experiences. The OBE phenomenon has been subject to some laboratory work with those rare persons who seem to be able to "leave" their bodies at will. Some have passed tests which were set to ascertain whether anything detectable leaves and returns to the body.

Near Death Experiences have been reported increasingly since 1975. Several books reporting the accounts of these experiences have been, in fact, authored by physicians and psychiatrists. The content of the accounts of happenings around and even *after* apparent death is similar whether it comes from children, blind people, Christians, or atheists. About one-third of the experiences involve memories of meeting a luminous figure who asks "What have you done with your life?"

10.1.8 Chapter 8

Survival of Consciousness through Death first became a subject of scientific investigation with the founding of the Society for Psychical Research, organized in London in 1882 by academics of Cambridge University, U.K. (10). There are five main lines of evidence: Out of the Body Experiences; Observation of ghosts; Near Death Experiences; Accounts of persons who give scientifically established evidence of previous lives; and The Cross Correspondence (Section 8.4.5).

Major changes in the basis of physics, - and of biology, - need be made to accommodate the evidence set forth. In particular, one has to accommodate the existence of an irreducible Consciousness associated usually with a body of a living creature (and containing the memories during its lifetime), but which is yet mobile, and survives it at death in some cases at least, reincarnating itself into a new body.

10.1.9 Chapter 9

Credible accounts of inexplicable actions at a distance of the influence of minds on large objects are available (11). Scientifically-controlled laboratory experiments show small effects, the reality of which is attested by good statistics and meta-analysis. Some Healers can give rise to anomalous cures of illnesses, some of them over large distances.

With these phenomena as background, the idea of a Consciousness separate from but a "programmer" to the brain may be developed. Its acceptance along with the idea of a Biofield would make more credible the observations of apparitions, OBE's, NDE's, some accounts of mediums, and accounts of earlier lives given by children.

10.1.10 Chapter 10

We are attempting to suggest some of the pathways that might lead toward a new Science wherein the effects of consciousness must be basic. A New Physics must be developed that will include feeling, purposefulness, and intent. The existence of discarnate beings seems evidenced. The acceptance of the evidence for a universal connectedness may promote changes in behavior among humans, involving an increase in love and compassion.

and a decrease in hate and isolationism. An acceptance of evidence for survival of one's Consciousness after death would necessarily have an effect upon lives lived while still in a body.

10.2 ARE WE LIVING IN A DARK AGE?

10.2.1 Changes

Socrates had a poor opinion of the youth of his day. Nevertheless it is of interest to consider whether at the beginning of the third Millennium we are not also in a situation of declining public values. Support for this view comes from contrasting the aspects of earlier (~ 1900) and later (~ 2000) eras. See Table (10.1).

Among the changes noted, the lessened degree of introspection probably arises from the fact that modern life engenders a feeling of danger, of always being challenged. "If you don't look out, things may go mighty wrong for you." For most of the city-dwellers, there is too much anxiety for there to be time left for sitting, relaxedly and quietly, allowing to come of Consciousness awareness of what is not in the outside (dangerous) world.

The diminution of a sense of sin and of the experience of love are two of the more important changes. Sin now is degraded from being a concept of the Telos. If you do anything illegal, you'd better see a psychiatrist, or end up in jail. (At 2003 in the USA, 2% of the population is in the correctional system.³) As to love, the influence of Freud can be felt. The popular summary of his theory of the instincts is that love is always basically for the parent of the opposite sex. It flourishes when sex with the love object is not available. The diminution in sexual inhibitions in the post 1960's has meant that a couple remain together without sexual expression for a lesser time than earlier: the time for bonding is hence shorter; the bonding and family weaker.

Of interest, indeed, is the lessened "aims" of the younger folk. Australia is a country with a more liberal social security system than that of the US. It is legally possible there for a student finishing high school to go straight "on the dole" (whereupon he or she receives a liberal pension) and remain thereon through "retirement". As part of what is called in the USA "Commencement," a finishing High School class in a small Australian town was asked (1997) to write one page on what they would do now. The boys did not need a page. One of the teachers told me that the average response was equivalent to: "Get a car, get a girl, live at home." Modes of living in which 3-4 young (unmarried) couples rent a large house facing the beach, are common. One of the six alternates to clean house and cook. The rest, play, on social security.

³ This means in jail, or on probation, etc. The figure exceeds by c. 10 times the fraction in any other population, except that of Apartheid South Africa.

Table 10.1
Some Qualities of Life in the West and Their Tendency of Change over One Century

~ 1900	Relative steadfastness.	~ 2000	Bubbling excitement stimulated by the preoccupation of the media with sensational content.
	Entertainment largely in the home. Introspection a normal part of life. Lively conversation and discussion in the home.		Entertainment largely outside the home. Introspection generally a rare part of life. Little conversation and discussion in the home (TV preoccupied, 7 hrs/day).
	"Sin" a concept for all.		"Sin" no longer a troubling concept for many.
	Acceptance of an Afterlife which involves punishment and reward.		Afterlife much less considered - but hopefully expected to be largely blissful (Kubler-Ross (12)).
	Love is one of the main aspects of life.		Love little considered - no longer a topic in popular songs: Good Sex?
	Some values are absolute.		All values are relative, situation dependent.
	Each person must have an aim to be attained in this life.		The aim in life is maximum personal pleasure.
	One must help others.		If one has spare cash, one might sometimes want to give to a charity.
	Mom at home all day, does dishes, cleans, kids nurtured. Values instilled.		Mom at work all day, warms TV dinner in microwave, time for kids is shorter and quality poorer. Values?
	Single mom a family disgrace, girl booted out.		Single mom's ok, maybe. It's her lifestyle, isn't it?
	People less stressed, exchanged feelings with family members.		People more stressed. Working all day decreases family time. Men constantly threatened with unemployment, corresponding down turn of family.
	Truth, Beauty and Goodness!		Truth, Beauty and Goodness?
	The better ones will spend a life of striving.		Striving? Hm. The main thing is to get for one's self and retire early.
	The numinous a known concept.		Numinous no longer a word in shorter dictionaries.**

The elimination of religious education in state schools in the USA has been a most important event (because religious practice is correlated, e.g., with good health, good grades, successful careers (13), etc.)

A teacher in San Francisco primary schools recently (2003) told me that "teachers are instructed not to tell the students what is right or wrong (as these concepts depend on the culture)." The teacher is allowed to indicate what the student may find socially acceptable in the present culture. In mathematics, grading of problems in Math, right or wrong, is also discouraged. Being told that her solution is "wrong" might discourage the student. Math is considered to be a challenge and students must "explore" the answer.⁴

10.2.2 Changes in History Leading to a Dark Age?

About 200 years ago an important change in public philosophy occurred: an objective, clear morality, handed down from the Greeks, began to be replaced by Expediency and by the teaching that "what I like is right" (Alistair MacIntyre, 14).

Thus, in the 17th and 18th centuries, the growth of Science had already decreased the authority of the Greek derived view, - inherited by Aquinas from Islamic scholars and welded by him into Christianity, - that there was a teleology, a rule from the top, *everything is a part of the whole*. But present Science considers the world, - individually - atom by atom. This is equivalent to trying to find the message in a manuscript by carefully examining the print of which the letters within each word are made.

The most powerful and destructive philosopher affecting the breakdown of the Greek philosophy accepted in the West from the 13th Century was Nietzsche (15). He ruthlessly swept away those parts of Aristotle (384-322) and Aquinas (1225-1274), which up until about 1900 had withstood the influence of Science and maintained that changes in culture resulted from the expression of the Will to Power of outstanding Individuals.

One has to choose between philosophical positions parented by Aristotle or by Nietzsche (MacIntyre, 1981) (14). Aristotle the successor to Socrates and Plato, had been of great influence in Athens (16). Here, morality was measured by service to the community, to the city-state. Friendship, Courage, Wisdom, Justice - these were the moral qualities expected in the good citizen. An objective moral order originated with Socrates and Plato and was widely accepted.

The heart of this basic Greek philosophical viewpoint was the ability to make decisions free of emotional disturbance (MacIntyre, 1981) (14). Virtue was to be obtained by training of the mind to be emotion-free in its decision making (17). Thus, in Aristotle, virtue is a quality which leads towards the telos. Honesty and Integrity replace appearance and deception. Truth is practiced, not politics. Aristotle assumed a teleology.

The birth of Science led to a weakening of attention to the telos and was followed by that overwhelming product of applied science, the industrial revolution. The possession of capital, - impersonal - began to be a controlling factor. Acquisitiveness and individuality gained in strength. Teleology seemed pointless for it was now seen to be the here and now which mattered. Science led to looking into the minutia of how things happened - by means of Reductionism (seeing the writing, ignoring its message). Society became individualistic and chaotic. A Dark and Confused Age, directionless, has been the consequence (15) (See Table 10.1).

⁴US students, tested in math and science against students from other countries at High School level, generally score below 16th place (13).

10.3 UNEXPECTED RELATIONS BETWEEN CERTAIN NUMBERS AND THE STABILITY OF THE UNIVERSE

Let us engage a few arguments and observations with... the aim of reducing the influence of *scientism*, that shrunken form of Science which is reductionistic, dogmatic and dismissive of evidence which does not fit the present views of members at the Academy of Science (B. Haisch, 18). It is thus necessary to stress phenomena which are antiparadigmatic. One of the more interesting bodies of evidence (cf. Chapter 3, Section 4) indicates that the universe was not formed by the workings of *chance* upon the evolution of a mysterious explosion- the Big Bang. It is relevant now to draw attention to a number of coincidences among basic numbers in the properties of atoms, without which our present cosmic system would not exist.

Thus, an obscurely titled note in *Nature* of 1961 (R. Dicke, 19) brought attention to a number of "coincidences" among numerical results obtained in cosmological investigations. In 1973, there was a meeting in Poland to celebrate the 500th anniversary of Copernicus and at this meeting, Brandon Carter, of the University of Cambridge presented a paper (22) entitled "Large Number Coincidences and the Anthropic Principle".⁵

Examples of the coincidences referred to by Carter selected by Glynn (20) are as follows:

(1) The nuclear strong force is delicately balanced in its magnitude. If it were weaker by 5%, there would have been no stars. If it were stronger by 2%, there would have been no protons, and hence, no atoms.

(2) The neutron is heavier than the proton by about two times the mass of an electron. Were this ratio to deviate by less than 1% from the value stated, then all neutrons would have become protons.

There are other conditions of a similarly exacting type all of which would have been necessary to lead to a life-bearing universe. An extreme numerical condition, calculated by Penrose (23), is the fractional volume in the total phase space which the creator would have had to identify. From a probability derived by Penrose, it would have had to have been the minute number 10^{-121} .

The examples mentioned have been obtained by means of specialized work by cosmologists. However, others lie before us. For example:

(i) The oxygen/nitrogen ratio in air is just right for life. A little less nitrogen and the planet would go up in flames initiated by lightning strokes. A little more nitrogen and much of life would not have enough oxygen to function.

(ii) Evolution would have continued in the sea more easily than on land. Yet land animals began to find stability on land at the same time an ozone layer formed, making life on land bearable.

(iii) The temperature scale begins at 0°K (absolute cold) and goes up to temperatures of many millions of degrees in the interiors of stars. Human life can exist in a window from about -5°C to +50°C, say a range of about 50°C. Thus, the temperature

⁵There are various forms of this Principle (See Barrow and Tipler, (21)), and the least demanding one is that the laws of physics were designed with the aim of creating a planet with an environment which allows the existence of conscious life. Stronger versions refer to the time of existence and place in the Universe of this planet.

band for life is a tiny window, c. 5×10^{-4} % of the whole known range, yet this exacting condition has existed on earth for many millions of years. How is such delicate stability achieved?

Similar remarks apply to the constancy of the air pressure.

(iv) The properties of water turn out to be just right for the maintenance of life on this Earth.

(a)

The substance is liquid over a temperature range of 0-100°C, which overlaps the range in which most life occurs. The three forms (ice, liquid, and vapor), are all useful in the support of life on Earth (see below).

(b)

Surprising, indeed, is the variation of the density behavior of water with temperature. As with most other substances, water grows more dense as the temperature is decreased but, at 4°C it begins to grow less dense, i.e., lighter per unit volume, the resultant ice, formed at 0°C having a density less than that of the surrounding water. Hence, ice floats. Therefore, the Arctic region (all floating ice) exists and its high reflective power for sunlight provides a significant cooling influence in determining world temperature.

(c)

Water is able to show acid (proton-producing) and alkali (proton accepting) properties. This makes it able to form both acid and alkaline solutions and encourages dissolution of a wide range of solids, thereby facilitating geologic change.

(d)

Water (oxygen hydride) has an abnormally high boiling point and dielectric constant, when compared with other hydrides. The former property allows it to remain stable on Earth until temperatures well above those of the Earth's atmosphere and the latter enables substances to ionize easily in water and form electrically conducting aqueous solutions, in turn playing a role in many biological mechanisms.

These properties are all necessary for the existence of the present form of life on Earth. To believe they all exist here by chance challenges reason.⁶

10.4 A LESSENING OF MATERIALISM IN MODERN SCIENCE

10.4.1 $E = mc^2$

The equation $E = mc^2$ forms a bridge between materialism (the mass) and idealism (the energy). The equation, attributed to Einstein, was first derived by Hasenörl (25) from a more rudimentary treatment derived even earlier by J. J. Thompson (26).

A development of $E = mc^2$, due to Haisch, Rueda and Puthoff, 1994 (27) pushes the equation further away from its materialistic half. Thus, Haisch et al suggest that mass is

⁶ Everett (24) suggested that there are a very large number of universes. By chance, one of them would happen to have all these suitable properties.

not a primary but a consequence of interactions between electric fields from the whole cosmos, and the body concerned.

10.4.2 The Copenhagen Interpretation in Quantum Mechanics

The behavior of individual quantum particles does not follow classical laws. Bohr (28) suggested that nothing can be derived about the nature of such particles until a measurement is made upon them and that this measurement will show, not the condition of the free particle, but only the characteristics of one of its states frozen in measurement. Bohr's conclusion is sometimes overstated in the form that the particle does not exist before measurement, whereas, in fact, the situation is that its existence before measurement cannot be assessed by present known means, for any of these means will disturb it⁷. Thus, the basic difficulty is that an apparatus does not measure the real *wavicle* but only a special state of it as a particle. One can appreciate the lessened materiality of an entity, measurement of which is thus limited to one material aspect of it.

10.4.3 Non-Locality

When particles, e.g., electrons, are associated together in a system, - thus have properties in relation to one another which are defined, e.g., spin \downarrow and spin \uparrow , one can devise an experiment whereby the two associated quantum particles are shot off in diverging directions.

According to Quantum Mechanics, the two particles will always be related (e.g., as to spin) in a specific and simple way. If, now, one changes the spin of one of these particles by means of an instrument, the spin of the other must change correspondingly.

Now the point comes: how long does it take for the signal demanding change to pass from the one electron an instrument has affected to the other electron, which Quantum Mechanics claims must change. This kind of experiment has been done by several investigators (29) before the time it was carried out by Alain Aspect and colleagues at Orsay near Paris in 1982 (30). The result is of great significance, for it bears strongly on the question of idealism versus materialism in our perception of Reality. Measurements show that knowledge of the change passes between the two electrons at a speed greater than that of light. Such a phenomenon (superluminal velocity) does not prove that the velocity of a particle exceeds (a shiboleth of Relativity). It does imply that an immaterial entity passes between them.

10.4.4 "Healing" at a Distance

It is well known (and accepted as part of medical practice in the UK) that there exist "healers", people who, by the use of techniques such as a laying of the healer's hands near to the diseased part of the patient, promote reduction in the disease to be treated (L. Dossey (31)).

However, there is evidence that changes in physiology can be brought about at a distance. Braud and Schlitz (32) studied such a situation. They took 271 persons to be

⁷ That a quantum particle could be detected by ESP without interfering with it is a conjecture, about which a test experiment has been proposed by Ron Bryan (Texas A&M University).

"treated" and used 62 "treaters". The persons to be treated had no known disease, although in one group those to be treated were selected as having a neurotic disposition.

The "distance" aspect of the influencing was achieved by separating treaters and treatees in different rooms of the same building. The treatees were attached to instruments which measured the ability of the skin to conduct electricity, which reflects the activity of the autonomic nervous system.

The treaters used mental imagery to induce excitement or calming. After the treater felt she had achieved these changes in herself, she "willed" the changes onto the treated and the results were measured by the size of the deflections of the pen measuring skin conductivity: small for calmer, large for more excited.

Here are some conclusions from Braud and Schlitz's "Healing" at a distance study, as described by Dossey (31).

1. There was transference of the treaters' imagery onto the treated.
2. The effect carries over at least 20 meters, perhaps further.
3. Positive expectation and rapport, also "degree of spontaneity", are characteristics which influence the strength of the outcome.

About 140 studies exist of healing of disease at a distance - but most are on non-humans (cf.. D. J. Benor (33), quoted by Dossey, (31)). One of the reasons that the animal studies greatly exceed the human ones is that in humans the placebo effect often makes ambiguous the part played by the healer. It is assumed that animals do not realize that healing is being attempted on them and hence the clarity of working with them (and arranging the experiment) is greater.

Experiments on distant healing show that Consciousness can act over a distance and act on living matter. It is a piece of evidence in favor of the view that materialistic theories are incomplete.⁸

10.4.5 Effect of Meditation on a Target Population

Some material has already been described in this chapter which implies that the Consciousness associated with human beings is mobile and operates non-locally, - e.g., from one human to the body of another. The primacy of considerations of Consciousness is much greater in Eastern Philosophy than in the Western. Indeed, until the past 25 years, Consciousness in the West was regarded as a subsidiary property of the operation of the brain seen as a computer. Thus, in the West the Philosophy is even now that of Matter over Mind whereas in the Eastern philosophies it is Mind over Matter.

A considerable influence for change in this field, - change in favor of the Mind over Matter view, - has been brought about by the work of one man, namely Maharishi Mahesh Yogi, widely known for his work during the 1970's in the USA in his advocacy of the practice of Transcendental Meditation. However, Maharishi not only taught the practice of T. M. in the West but he also led the building of Vedic Universities in the USA and Europe. Thus, there is a Vedic University in Fairfield, Iowa.

⁸ In the Philippines and in Brazil can be found "surgeons" who perform miraculous operations on persons suffering, e.g., from cancer. There is supportive evidence for these studies (34). Such people say they are instruments being operated by a divine source (or by the Self, Greater Consciousness, etc.).

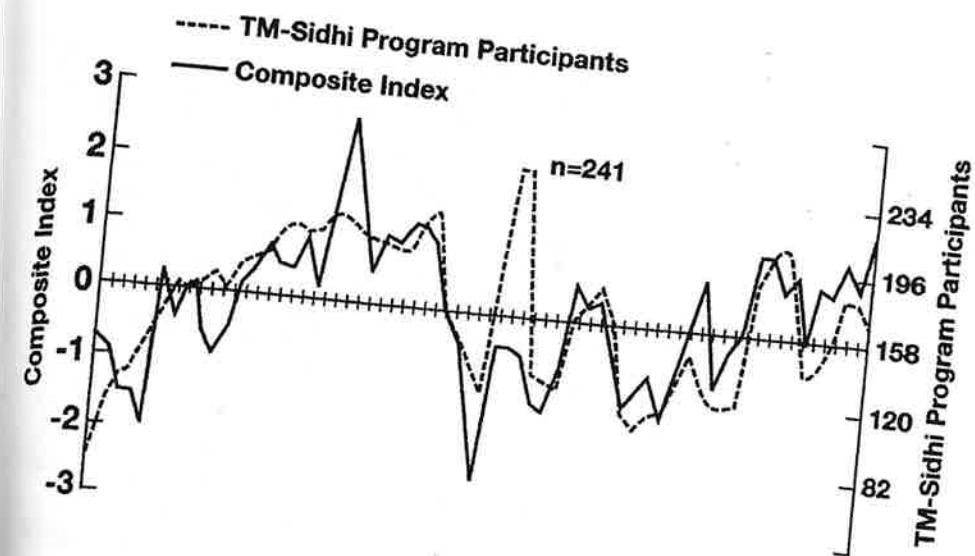


Fig. 10.1 Portrays the degree of conflict in Israel and Lebanon. The figure provided some basis for the conclusion that there is parallelism between the practice of a TM peace meditation program and a "composite index" for peace. The figure appeared in the Hagelin article quoted (35). The method has been applied largely to peace/war efforts, but its most obvious need is probably on crime in the inner cities of the USA. Maharishi Effect: Reduced Conflict in Lebanon and Improved Quality of Life in Israel. Reprinted with permission, figure courtesy of D. Orme-Johnson in personal communication with Dr. Bockris.

The adjective "Vedic" arises, because what is taught at such places is based upon the Vedas, the 4,000 year old philosophy which is the theory upon which Hinduism is based. However, in its modern form, and again under the influence of the Maharishi, the material taught is Vedic Science. There is a Vedic Physics and there are some (J. S. Haeglin, 1989 (35)), who consider that the restructuring of Western Physics according to the teaching of Vedic Physics, is a desirable course. Reading the quoted paper indicates a very high degree of mathematical rigor in discussions of the advocated restructuring, essentially the introduction of Consciousness as a primary into the interpretation of the surroundings.

One of the claims made by the groups associated with Maharishi is that the practice of transcendental meditation upon a certain theme by groups of people can bring about a change in the sociological properties of target populations. The needed number of meditators is $\sqrt{T\%}$ of the population to be influenced, as an example to avoid war and live peacefully. Thus, the number of meditators needed to influence a group of a million people is $\sqrt{10^6} = 10^3$ and $\sqrt{10^9} = 10^5$ meditators, a practical number.

Thus, the Consciousness involved in TM apparently involves a field effect ("Biofield") which is generated by TM practice. These findings are anomalous when compared with what would be expected from modern paradigm computer-based theories of a brain from which would spread no field and no evidence of purpose in transmission.

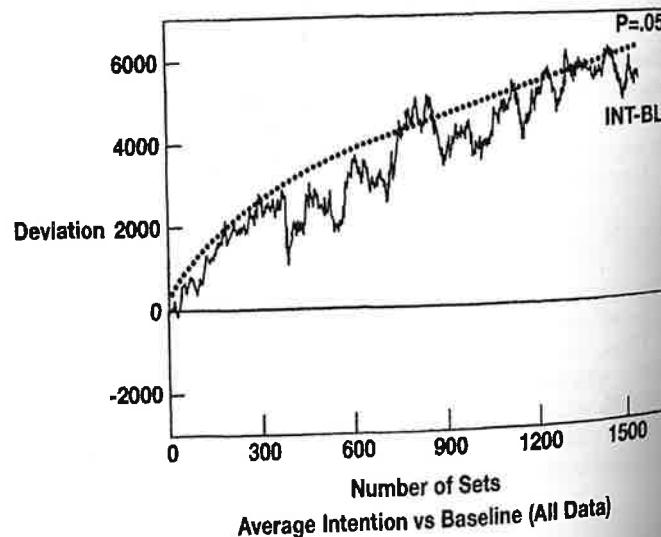
10.4.6 Interactions Between Consciousness and Machines

A study of the effects of Consciousness on machines has been a specialty of work carried out at the Princeton Engineering Anomalies Research Group (PEAR). The work extends over two decades and has been carried out in many directions. The director of this group is Robert Jahn, formerly Dean of the Department of Engineering at Princeton University and his long-term colleague and director of laboratory operations is Brenda Dunne. The group is characterized, above all, by a meticulous attitude towards the use of statistics in the evaluation of the significance of results. An example involves the Random Event Generator or REG (36). Such machines are programmed to give random numbers, but when subject to supposed fields of Consciousness ("Biofields") are expected to show a disturbance of the random character of the output. A typical example of the first kind of study is observations of an REG at the time of announcement of the verdict in the Simpson murder trial. (Also the Invasion of Iraq.)

Effects indicating a greater degree of coherence, i.e., limitation in randomness in the Consciousness of the target population, are seen and this (in an unknown way) communicates itself to the Random Event Generator, causing its behavior to be less random. Thus, at the time many tens of millions of minds were concentrated on the one theme. Consciousness in groups of US citizens was strongly focused. One may contrast this result with that expected from computer-oriented theories, e.g., of Crick (37) and of Dennett (38), where the computer-like, brain-contained version of Consciousness could not be affected by processes in the surrounding brains.

In a second example (39), the effects of the will of the operative upon the rate of oscillation of a pendulum was examined. The operative projected his intention upon the pendulum to go more slowly or to go faster. Clear effects were noted for two operatives out of five, the pendulum's response was coupled to the purpose willed by the operative, a direct example of the effects of Consciousness at a distance (Fig. 10.2).

Figure 10.2. Linear Pendulum Experiment.
Reprinted with permission of R. D. Nelson, "A Linear Pendulum Experiment: Effect of Operator Intention on Damping Rate," *JSE*, Vol 8, No 4, pp. 471-489, 1996.



10.4.7 Some Recently Acquired Knowledge Relevant to a New World View

At the beginning of the third millennium, the public philosophy is still Newtonian and mechanistic. Major advances in physics, particularly in the more esoteric aspects of the quantum theory, are not yet reflected in the public philosophy, doubtless because physicists themselves are neither clear nor in general agreement as to what they mean. But we do not have to wait for them. The following will lead to New Thinking.

1. The paranormal. Among those phenomena for which meta-analysis shows positive indications at a scientific level are telepathy, psychokinesis, remote viewing and precognition. A particularly important task in evolving a new paradigm is to evolve a theory of consciousness which is consistent with the facts of ESP. A physics which ignores the experimental findings of paranormal phenomena can no longer be taken as an experimentally consistent account of Reality.

2. Certain characteristics of very abnormal people. Evidence has been collected by scientists, e.g., Haraldsson (40) and Pulos (41) about the abilities of some persons to create anomalous events. These include the transmutation of one metal to another; the creation in times of seconds of complex ornaments with no known antecedent material; and the teleportation of objects. (Cf. Savva, *MISAHA Newsletter*, No. 32-36, 2003).

At present the number of people in the Western world who are known to be able to carry out acts such as the above and whose unusual abilities have been confirmed by scientists, is severely limited. However, in shamanic cultures, such abilities are accepted and not rejected as they are in our culture, because they are aberrant within the paradigm.

3. Examples of experimental results which are inconsistent with a materialistic interpretation are given by Savva in an article on the Hypothesis of the Biofield, *MISAHA*, 2003, 32, 36. Several of these, e.g., the effect of the concentration of Consciousness on the functioning of machines; on people in healing; and of the sociological behavior of large groups, are illustrated in this chapter.

10.5 EXAMPLES OF PURPOSE IN THE UNIVERSE

1. The creation of life is the most purposeful act to which one can point. As discussed in Chapter 3, numerous approaches have been made to understand how life could have begun, but they all stumble on the necessity for the prior development of DNA. The structures which DNA requires, even for the simplest organisms, are so information-containing that their formation by chance is not credible. (Ch. 3)

2. **Life.** When a living organism is formed, it gives rise to a negative entropy change within its own system whereas the same system in the same environment, when dead, will decay spontaneously according to the Second Law of Thermodynamics, i.e., show a positive entropy change. The entry of life into a system is equivalent to the stimulus of a directing influence upon the being. Moreover, the complex structures which life creates, even if one remains within simpler insect structures, are very purposeful. The conch shell, for example, is particularly complex and even has a toxic repelling device inside at the top.

3. **Evolution.** I have discussed (Section 3.7) the implausibility of Darwinian chance changes as the basis of evolution. The renowned paleontologist Stephen Jay Gould (42) wrote about the fact that the changes which give rise to evolution happen in sudden spurts: there is no continuing series of micro changes as supposed by Darwin, but in fact, many millions of years exist between short periods in which new species suddenly arise.

The fact that animals came on land at all is equivalent to a purposeful act, because the sea would be much easier for them in which to develop. Remarkably, at the same time, the plants began to create oxygen and an ozone layer formed to screen the living creatures, coming on land, from destructive uv light. Both these actions would not have been expected and their simultaneous occurrence seems to be a significant example of purposefulness and design.

4. Coincidences. There are many of these in the build up of the universe and some of them have been named in Section (10.3). Among some mentioned by Davies (43) are that a change of one in 10^{-40} of the strength of gravity would have meant that the galaxies would not have formed.

Again, the nuclear reaction in stars which forms carbon is represented by $\text{Be} + \text{He} \rightarrow \text{C}$ and we depend on this reaction for the carbon we have, therefore, life. However, there is another reaction which is $\text{He} + \text{C} \rightarrow \frac{1}{2}\text{O}_2$. This reaction, if it occurred, would have taken our carbon from us, i.e., there would be no life. The resonance energy of O controls this matter and is just half a percent less than that needed to give stable O_2 and therefore allows the carbon forming reaction to be preferred. Again, nature seems to have been designed in a very precise way, - with the objective of forming life as it is known here.

The concepts of the Big Bang have suffered from evidence from recent Hubble space telescope examinations (44), which show that there is a structure in the arrangement of galaxies in the universe. Such specific structures are not something one would expect from an explosion in space. It is teleological.

These coincidences and the occurrence of acts, which are specifically in the direction of forming this universe and this planet with its specific properties, and which form a bed for life's existence, has given rise to the idea of the Anthropic Principle (20). Creation has the purpose of making an environment suitable for the development of human beings.

10.6 PARANORMAL PHENOMENA IN THE SCIENCES AT 2000

10.6.1 Introduction

Most scientists do not feel that it is worthwhile to read the published evidence concerning paranormal phenomena. Very few know that there are journals maintaining refereed papers that report anomalous effects. On the other hand, there are parapsychologists, scientists who are professionally active in the investigation of paranormal phenomena. About the work of these people, one may make two statements without fear of contradiction from those who know the field:

(1) Being under the constant hostile gaze of colleagues outside the field (including a group dedicated to showing that *no* paranormal facts have ever been verified), parapsychologists might be described as bending over backwards in their attempts to manifest a high scientific standard in their work.

(2) Faced with experimental results which seem undeniable, the normal reaction of scientists is to modify and perhaps fundamentally change, the relevant theory until it fits the facts. Thus, when Planck was confronted with a plot of the intensity of black-body radiation as a function of wavelength, and could not fit it into the existing theories of Raleigh or of Wien, he put forward a new idea concerning the nature of energy, and thereby founded the quantum theory. Correspondingly, when Davidson and Germer (45) found that electrons (considered up to the time of their experiment to be particles) underwent the phenomenon

of diffraction, which is characteristic of waves, they did not try to push an interpretation of their results inside the theories of the time, but boldly came out in support of the wave particle parallelism.

Unfortunately, for the progress of Physics, - and our view of the world, - attitude towards the results of parapsychology among scientists outside the field, is to reject it. Thus, instead of looking at some of the established results e.g., psychokinesis, precognition and coming out with the conclusion that such phenomena demand a New Physics (and indeed even changes in philosophy), the trend has been to search for a way of fitting the awkward new facts back into the old paradigm, and, if that failed, admitting bafflement or crying fraud (46).

A parapsychologist who has published lucid renderings of the theories of the various subfields in parapsychology up to 1998 is H. J. Irwin, of the University of New England in Armidale, Australia. In the 3rd edition of *An Introduction to Parapsychology* (47), he attempts to rationalize the strange facts he records in terms of present Science. However, he is an honest author and when there seems to lack credibility in theory within the present paradigm, he is frank in saying so.

There is the work edited by Roberts and Groome (48), which uses a collection of UK authors to discuss some aspects of the field, the tilt here being more towards the psychological rather than the parapsychological side of the issues. The most recent presentation is a collection of articles by Cardena, Lynn, and Krippner (49), most of which lean on a conventional science background and interpret reports of anomalous phenomena as the results of abberations in the minds of the observer (a psychopathological perspective). However, there is a parapsychological perspective taken in the book in an article on psi-related experiences, by Targ, Schlitz and Irwin (49), on NDE's by Greyson, and in one on Anomalous Healing by Krippner and Achterberg (49).⁹

10.6.2 Esp (Telepathy, Clairvoyance, Far Viewing)

Telepathy is the most accepted of the paranormal phenomena, not only because of the large amount of research done on it (49), but because most people have had a glimpse of it in their own lives. Irwin (47) quotes the Pierce-Pratt telepathic experiments carried out at Duke University in the group directed by J. B. Rhine in 1957 as being apparently free from error (50), although it appears that Hansel, baffled by the apparent establishment of "impossible" facts, has written an accusation of collusion between the sender and recipient (Hansel, 1966). There has been much advanced work on telepathy, e.g., over long distances, carried out in Russia and China (51, 52).

One remaining reservation concerning the establishment of telepathy as factual relates to the lack of reproducibility of the results, a requirement of classical science. It turns out, however, upon investigation (D. Radin, (9)) that the situation with respect to reproducibility is one of the pot calling the kettle black. Thus, Radin has shown (53) that only 0.7% of research results in Biology have born the test of reproducibility. Beloff (54) has written about this: paranormal phenomena in general are mood and atmosphere-dependent. Those few persons who are able to manifest them cannot switch on their abilities

One may recall that these scientists are always under pressure to publish. They can only write what editors and referees find acceptable within the paradigm of the time.

at the demand of others, just as poets, - and all artists, - demand mood and nonthreatening surrounds before they can manifest ability.

The biggest difficulty in interpreting paranormal phenomena, - is that the facts do not fit the paradigms of science at 2000 (Churchland, 55). The most frequently, quoted theory of telepathy historically has been that it is a manifestation of "mental radio". This idea was suggested by Upton Sinclair (56), a well-known radio personality of the 1930's. Russian workers have respected this concept (I. N. Kogan 1966, (57)); Persinger (58) and Becker (59) have developed the concept of the brain transmitting information at extremely low frequencies (ELF). Persinger has made a correlation between telepathic ability and geomagnetic activity and sees this as favoring an electromagnetic theory of telepathic thought transfer.

However, although Persinger (58) and Becker (59) have published electromagnetic theories in the 1990's, there is evidence against the idea. Thus, the strength of telepathic thought transfer seems independent of distance, and this would not be likely in a radio transmission. Recipients inside screening Faraday cages still receive telepathically (Eisenbud, 60). ELF implies extra long wave lengths and demands an antenna far greater in size than a brain.

Less in reasonableness than ELF theories are those which imply an unknown particle, - or perhaps the hypothetical tachyons (61).

An idea developed by Irwin (62) (1979a) involves the concept of buried memories. Receiving a stimulus from the sender (how?), the recipient finds it resembles a buried memory which then becomes conscious. However, the theory seems to omit dealing with the essence of the problem, - how the message transfers from one person specifically to one other.

The Targ, Schlitz, and Irwin (63) article on ESP concludes conservatively that it is time to move away from a pathological perspective of the operative in evaluating the reports of anomalous communication, remote viewing, and precognition. This conclusion is reached on the basis of the work of Benor and Honorton (64) and Little (65) 1995. The part played by meta-analysis in this conclusion is stressed in quoting the work of Milton and Wiseman (66) (1999), supplementing the earlier work of Benor and Honorton (64). A Milton and Wiseman re-analysis of earlier meta-analysis showed 6 out of 30 studies with effects which could not be explained by chance (67).

The recent literature on scientifically oriented attempts to explain psi phenomena involves the concept that events do not occur by chance (68), but are given the chance to occur. Alternatively, some modern authors attribute psi phenomena to workers being more eager to see hits rather than misses (69). But this approach, - with its hint of psychopathology, - is inconsistent with, e.g., Krippner and Winkler, 1996 (70), who found no abnormality in thinking ability among those who report psi experiences (though there are certainly dysfunctional persons who report psi phenomena). It seems necessary to develop outside the bounds of present Science in order to interpret ESP. Thus, Denisov (cf. Savva, loc cit) has referred to "the information field" as a fundamental field of nature.

10.6.3 Precognition

This defies causation and is antiparadigmatic in asking for belief in a future, which according to the present paradigm, is not yet formed, the happenings to come being based on chance (no teleology) influenced only by known forces between particles.

Another difficulty in discussing precognition is the possibility of intervention. One dreams of one's death in the wreck of the flight you are to take tomorrow, - and you go to train. The plane does indeed go down, but you seem to have altered part of the future? (C. Beloff (71), Irwin 1977).

Is there an escape from the difficulties of interpreting precognition in the space-time concepts of the special and general theories of Relativity? One's consciousness is passing through a constant Reality, giving the impression of a flow of time. But the world of a future we shall pass through are always there in our "nows". Can it be that by an unknown mechanism parts of the "future" leaks back to us? Retrocognition would be similar; the past is also a "now" and occasionally leaks forward.

Another idea is that those who have genuine precognitive ability are indeed the creators of the future they see by means of psychokinesis (72). However, the sinking of the Titanic and the accident at Aberfan¹⁰ were both foreseen and written about extensively before the events (Braude, 72; Irwin, 62). It is difficult to see sufficient strength in psychokinesis for this to act as a cause of the movements which led to these accidents. At this time, there is no theory of precognition which can be understood in terms of present concepts (73). The phenomenon needs new scientific concepts in a New Paradigm.

10.6.4 Ghosts (74)

There are objective properties of ghosts: they are observed collectively and by animals; their appearance changes appropriately with the position of the observer; they cast shadows. However, there are aspects of ghosts which are not material. They pass through walls, disappear suddenly, and then some people see them, but some don't.

The obvious theory is that ghosts represent a manifestation of that which survives death. However, if ghosts were always diaphanous and semitransparent (some are), this might be a tenable view. The trouble is that ghosts turn up in clothing appropriate to their time in life, and the modern ones carry camcorders and pens sticking from their pockets, etc. It is all very well (K. Osis, I. Stevenson, Crookall (75)) to talk of an etheric double, but, then, what is that?

An older theory of ghosts sprang from Gurney et al. (1886) (76). The recipient gets a telepathic message from the sender and projects it, believing it to be real. Although for long supported and developed (Irwin (77)), the difficulty is that of collective observation and the fact that some observations report animals reacting to the ghost that humans see at the same time and place. Irwin admits that even those still supporting this older telepathic theory appear to involve some form of discarnate entity in their theories (78).

The Houron and Lange book (74) stresses a sociological perspective (seeking to explain how people could have believed in ghosts, etc.), but articles by D. Hufford (78), J.

¹⁰ At this mining village in Wales, a nearby mountain of excavated Earth moved down onto the village and buried the school and its students (October 21, 1966).

McClenon (79), D. Radin and T. Lawrence (80), all present a paranormal perspective. These authors do not consider it possible to rationalize observations of ghosts in terms of present physics.

10.6.5 OBE's

Blackmore (81) suggests that OBE's might be explained in a situation of confusion where the brain tries to make sense of confused "facts" by guessing at a new construction which relies on buried memories. Of course, this theory does not explain, e.g., the recovery of multidigit numbers by an entity which appears to be able to observe places not reachable by the body (82).

10.6.6 NDE's

Blackmore (83) suggests that, in dying brains, deprivation of oxygen-anoxia -is a characteristic. Because of insufficient oxygen, people might have illusions seeing a tunnel and a light. But why these particular repeated images? Then, Blackmore suggests endorphins may be produced in dying brains; they give a feeling of well-being. However, NDE's are experienced by people who are not anoxic, and there is no evidence that the production of endorphins accompanying near death states.

The anoxia theory has, nevertheless, been developed by Sabom and Kreutzinger (84). They say temporal lobe epilepsy sometimes causes a life review. The problem here is that memories in epilepsy tend to be random and not meaningful. NDE's give a connected and meaningful series of events, many of which are shared among NDEers. Is the NDE a hallucination? The majority of people who have had NDE's have not taken a hallucinogen (Grayson (85)).

An older explanation relates NDE's to memories of the birth experience: the seeing of a distant light at the end of a tunnel sounds at first fitting. However (16), newborns do not have the visual spatial capacity necessary for this explanation.

It has been suggested (Grayson (85)) that the people seen in NDEers are "visions", a part of delirium. However, this view is inconsistent with results from the work of Osis and Haraldsson (86), who examined reports of those near death and found they were of people already deceased, whereas in delirium the people seen are those living.

Persinger (82) is prominent in proposing the right hemisphere of the brain as the seat of mystical experience (87). However, in Persinger's experiments of passing mild currents through the brain, the recipients experienced tingling sensations which are not reported by NDEers. Further, participants who reported experiences stimulated by the electrical activity, could continue to talk with the experimenter, i.e., they remained awake and in mundane reality, whereas the experiences of NDEers are of a homogeneous whole and said by the experiencers to be quite other.

Savedra-Aguilar and Gomez-Jeria (88) proposed a theory of NDE's on the basis of temporal lobe dysfunction, hypoxia and neurotransmitter changes. Brain stress results in the release of neuropeptides, which produce feelings of detachment. Meanwhile, they propose that oxygen tension decreases in the brain. These two effects together may produce epileptic-type discharges in the hippocampus and amygdala and could produce hallucinations including a life review. One of the hallucinations, could be a brilliant light.

As with Blackmore's reliance on anoxia, this model fails to explain NDE's experienced by persons not under stress and for whom the hypothesis of the appearance of anoxia is unreasonable. Also, no experiences of the type reported in NDEs have surfaced in clinical studies of seizures, or of electrical stimulation of the brain (e.g., no feelings of bliss, peace and out of the body (89).

Other physiological models include that of Jourdain (90), which features blocking of the hippocampus reception by endopsychosines.

There is a general difficulty with the biochemical theories here described. Each of them focuses selectively on certain aspects of the experience which they know can be caused by the chemical chosen; and then they hypothesize that, perhaps, the other consequent connected effects of the NDE experience might follow. Further, although the biochemistry inferred is plausible for the one kind of experience, - no evidence has been offered that these biochemical events occur during NDEs.

10.6.7 Reincarnation

One possibility is that the new entity, which appears in a young person and speaks of another life, is a possessing entity (Irwin, 47). One of Stevenson's cases (Stevenson, 1986) which supports this involves a newly incarnated being from a person who died three years after the birth of the new person! Rogo (1985) suggests that the Buddhist "no soul" mechanism is relevant here. What reincarnates is what Buddhists refer to as a packet of "psychic elements", including memories.

Wambach's work (91) in which she has correlated the reported clothing, meals, occupations, etc., obtained from regression of patients to their alleged lives in the past, corresponds well with what is expected from historical studies of the time periods concerned, i.e., supports the reality of regressions and hence multiple lives of each soul.

10.6.8 Survival

One of the more impressive pieces of evidence for survival consists of evidence in which the dead person appears to speak (with his/her own voice and mannerisms) through a medium (Section 8.4.3). Moreover, the entity appears to possess intimate memories of the previous life. The main opposition to this, as direct proof of survival, is Super-ESP. Can the medium get into the minds of needed people anywhere and have access to the content of memories his friends would have, which might even give the informal name he had for his wife. Could the medium's power be not as a medium for communication with deceased people but a mode of super-telepathy.

It is difficult to disprove the super ESP model for many phenomena but not for the Cross Correspondence, and for evidence such as that obtained by Wambach (91). Poltergeists, NDE's, apparitions, and reincarnation do not seem to be open to a super ESP explanation.

An article by B. Grayson (92) in a book organized by the American Psychological Association and published in 2000 points to the ability of some NDE's to recount precise details of the operating room, nurse's attire, head decorations as seen looking down on them, doctor's conversation, etc. Ring (93) collected 31 cases of blind persons who could see in color during their NDE. Sabom (94) (1998) points out that children never report seeing their parents (in NDE's), but only deceased relatives, a clear distinction from dreaming.

Grayson (92) agrees that there are no explanations of the content of NDEs within present knowledge of psychology, physiology, or in cultural expectations. He concludes that NDE data available at 2000 suggests survival.

Irwin (95) refers to a possible test of survival. During his life, a person writes a passage in code to which he alone has the key. During his life people try to break it but cannot. The writer dies. If he confided the key after death to a medium and it proved able to break the code, it would be clear evidence for survival (Stevenson (96)). However, one would have to be patient for Myers did not manifest with the cross correspondence for more than 20 years after his death.

10.6.9 Conclusions

Most paranormal phenomena are radically inconsistent with what might be expected within the standard model of present physics. Some paranormal studies ask for an independent Consciousness Entity which operates the brain (Eccles and Popper, 97; Chalmers, 98; Fenwick and Lorimer, 99).

A number of newly established facts, and other reported phenomena, are available. There is no longer justification for scientists to insulate physics from them by ridicule and contempt. It would be more helpful for the progress of science, for propositions to be made as to how the Standard Model should be altered to be consistent with the newly established facts.

10.7 LEADS TOWARDS NEW SCIENCE

10.7.1 A Priesthood

There are some, e.g., Bergman (100), who would agree that a new Physics is needed. Thus, during the last 50 years, something of a priesthood has developed among physicists. It came about, post WWII, by the immense increase in prestige given by the public to the physicists whose work led to the realization of nuclear fission (Hahn, Strassman, and Meitner, 101) and of the engineering of nuclear weapons and heat-producing practical power sources (Fermi, 102). But a side effect of these achievements seems to have been the freezing of concept development in Physics to around that believed in around mid twentieth-century. The main lines of work in Physics funded by the government agencies have been mostly aimed at reinforcing of these older concepts. The priesthood, which is centered in the Academies of Science, appears to be there to allow NO CHANGE IN FUNDAMENTAL CONCEPTS. Novel experimental results e.g., for precognition, ask for the attendant changes in fundamental concepts which such recognition would demand, but these are rejected. If the results are inconsistent with the standard model of the 1950's, they are thought to be (a) fraud; (b) laughable; and (c) due to poor measurement. Publication in senior journals is then refused¹¹ and the younger innovators, who have always given rise to

¹¹ Thus, the achievement of nuclear reactions in the cold (Fleischmann and Pons, 103) has now given rise to more than 3000 publications (104) and results of substantial excess heat production and transmutation have been replicated in many countries (102). In spite of this and the availability of excellent reviews containing hundreds of references, papers in this field are steadfastly rejected by the senior journals of physics and chemistry in the USA and the UK (and patent claims rejected if "cold fusion" is mentioned). Scientists in the universities of these countries deny the existence of the

the new ideas, are forced out of the universities where they belong. In this section we will present a few leads towards thinking differently than in the Physics and Philosophy, of the last 50 years.

10.7.2 Bohm

Bohm (106) discovered that in 1860 Hamilton and Jacobi (107) had published a paper describing motion from a radically new perspective one that can now be seen to have been a forerunner of wave mechanics. Thus, in this very novel model of movement, particles themselves do not move as they seem to. What happens, according to Hamilton and Jacobi, is that, as the reality wave sweeps on, its maxima become visible, and are the observed reality. Thus, "Bits of Reality" pop up (although in fact consisting of different pieces of material) and simulate forward motion as though one "bit" was moving (Friedman, 108). Thus, "Reality" arising from such an approach is "a few bits sticking up and the rest made up by imagination." There is an analogy to the mechanism in motion picture projection in which a series of changing still photographs, appropriately projected, gives rise by means of imagination, to the impression that the scenes show moving objects.

Bohm compared relevant equations from the Hamilton-Jacobi approach with the Schrödinger equation and found that to bring the two approaches together, he had to add an extra term to the latter. Bohm made this term, having the dimensions of potential, the center of his version of Quantum Mechanics (106). He calls the new term "the Quantum Potential."

Bohm modelizes the new term as an information giver, and it bears some relation to the deBroglie, wave which was supposed to accompany and "steer" the behavior of particles. Thus, the behavior of electrons is regarded as being governed by the Quantum Potential. Bohm gives the analogy of the operation of a large ship by means of satellite derived information.

The most well known contribution made by Bohm to Physics is his concept of the explicate and implicate orders (106). Observed Reality is called the explicate order, but beneath that is pictured an implicate order from which the explicate order constantly unfolds. Moreover, there are not one but two, three, etc., implicate orders, the whole making up what Bohm terms the holomovement.

Bohm's theory is the most presented alternative perspective in New Quantum Physics. It avoids the weirdness of the behavior of particles in the quantum region arising from the Copenhagen interpretation of Quantum Mechanics, for Bohm's particles are always real, though guided by wave-delivered information.

Bohm's theory has had little effect upon professional physicists and there are two clear reasons for this:

- (i) Due to the lack of research support for new thinking, nearly all quantum physicists, - who can only exist if money is given to support their work, - are carrying out calculations called quantum mechanical: they do this by the use of a number of purchasable programs which allow them (as, e.g., in quantum calculations of the structure of simple chemical compounds)

phenomenon (105)!

to make computations giving results, helpful to real situations. Carrying out such calculations involves mainly the feeding of data from the literature or from new laboratory results into the program and waiting for the computer to follow the directions of the purchased program, whereupon perhaps in minutes or in hours, practical numerical results needed to satisfy the conditions of the research grant are given. The physicist's task is thus reduced to obtaining an appropriate program, introducing it into the computer and presenting the results obtained. Any deviation toward new concepts, inconsistent with those of the available programs, will give rise to protests: ("a waste of time") from the sponsor, if the support is from industry, and expressions of doubt and advocacy of attending to the Proposal for which funds were given, if the program manager is from a government agency.¹² A New Physics would spoil all this, and the jobs which go with it, and it is thus left to university workers, for example in Italy or Bulgaria, etc., where there are scientists free from these tight financial constraints, who may have "nothing to do" and therefore can wonder and, maybe, even think anew. Hence, Bohm's new concepts are disturbingly unwelcome to the present system.

(ii) There is an aspect of Bohm's theory, which may prove baffling even to that rare physicist whose circumstances allow him to ponder. This is the difficulty of conceptualizing the action of the quantum potential on an electron. Thus, nuclear physicists work in distances of the order of as little as 10^{-16} cm. The radius of an electron is not an exact quantity as is the measured radii of atoms, because the electron is a wavicle and its existence as a particle is only confirmed at the moment of its measurement (cf. CH Section). Nevertheless, a value of c. 10^{-16} cm for the radius of an electron is sometimes quoted (Bergman (109)).

Now one has to imagine that "inside" this particle there is some kind of "sensing mechanism" which can react to the demands of the quantum potential! However, one should not be knocked out by this apparently irrational requirement, for the alternative is Copenhagen - and there one can never learn anything about an electron in its natural state between measurements (Chapter 3, Section 3.9.6).

10.7.3 Perennial Philosophy

Huxley published a book under this title in 1944. The book was an attempt to distill out of the writings of mystics,¹³ West to East, a common content. Thus, the book concerns philosophy and not physics. Huxley's successor, and the leader in development

¹² My experience as a Principal Investigator receiving research grants from industry and government is that the grant-givers are pleased to receive lengthy tables of results obtained from computer print outs. They do not inquire about the algorithm which generates them.

¹³ A mystic is not a person who is immersed in mysterious doctrines, but one who is directly conscious (not only via his senses) of an Ultimate Reality.

of modern ideas under this heading is Ken Wilber (110), of the University of Nebraska. His work involves some deist language, which repels the physicist, who in his professional life is required to be agnostic or atheistic. Nevertheless, it is worthwhile to bring in Wilber because there is an interesting overlap of some of the ideas developed with those of the physics of Bohm (106) (see also those of Seth (111), Section).

Thus, Wilber pictures individuals as being on a journey, involving the various incarnations for which evidence has been gathered by Stevenson (112) and Wambach (113). The incarnating self passes through stages of Consciousness, climbing towards the goal of union with God. The overlap with Wilber with Bohm is in the idea of the "Spectrum of Consciousness". Thus, according to Wilber, Consciousness has a number of levels (or degrees), the higher one enfolding the lower, as in Bohm, where the explicative order is unfolded from a number of implicate orders which are hierarchical. In Wilber, higher levels of Consciousness ("more spiritual") enfold lower levels down to the physical, the analogue of the explicative order.

This is an appropriate point at which to compare "Holism" with the Perennial Philosophy. Thus, the latter, - Huxley and Wilber, - has its roots in the Upanishads and a history of development of several thousand years. It is the alternative to what develops from Bohm's work and that of others (114), which is called Holism. Every particle in existence may be affected by every other, and the rate of propagation of knowledge between them may be greater than the velocity of light and is sometimes referred to as "instantaneous" (115). Every particle in the universe is, in this way, "in contact", - this is a dramatic way to describe wholism.

This concept of wholism can be illustrated (Friedman (116)) by an analogy. Thus, in some parts of the world, geysers of hot aqueous solution shoot up from the ground. These geysers would at first seem to be separate entities, but thought allows one to realize that they could be part of the same underground water system. Another illustration is given by a fast flowing stream, which may tend to form temporary whirlpool sections. These might seem like separate entities, but that is Maya, - they are in reality all part of the same one stream.

10.7.4 Seth

An ontologically different witness compared with Bohm or Wilber is the discarnate entity Seth (111). Thus, many entities are supposed at this time to be sources in "channeling", an activity which involves a medium and her communication of information alleged to come from discarnate entities (117). Of course, particularly as the doings of some of the channelers are associated with financial rewards, one may be skeptical of the content of what is supposed to be information being passed on from, e.g., Jesus Christ. Does it arise (knowingly or unknowingly) from the mind of the channeler herself? When the factor of showmanship has been eliminated, however, there remain some criteria whereby one may judge the veridicality of a channeler. One of these comprises a comparison between the predictions made and reality which may sometimes be, e.g., the predicted date of a calamity only 5-10 years in the future. This criterion is a demanding one and the results of its application are not encouraging (Ring, 118).

Another criterion is the nature of the material channeled. This is often lengthy (in many volumes), but nevertheless subject to test (117). For example, a channel may be from an entity who claims to have died in Egypt in the 16th Century. The Chronicle claims that

TABLE 10.2
Brief Views of Authors. Summarized by author.

Jung	Wilber	Wheeler	Seth	Bohm
Collective Unconscious including influence from other cultures	Levels of Consciousness are separate but interpenetrating, all come from a radiating luminous Consciousness	Universe only exists after observation	Universe is being created at all points and at each moment	Universe is a ripple on a sea of cosmic energy, the holo-movement

The principal difficulty of views which suggest that Reality can only come with observation is that (if the "Observer" is restricted to humans), 99.99% of the universe occurred earlier than the time at which observers were present.¹⁴

Seth refers to the ultimate Ground of Being (God, Brahma, etc.) as ALL THAT IS. He says it surrounds us, all knowing. Each person is a manifestation of ALL THAT IS.¹⁵

In Bohm's terms, Science is knowledge of the explicate order.

10.7.5 Prigogine

The views of Jung were distilled from his psychiatric practice; of Bohm (106) and Wheeler (124) from Quantum Physics; Wilber (110) from Philosophy. Prigogine (Nobel Prize in Chemistry, 1977) has made an entry into new fundamental thinking from chemical thermodynamics (125) applied to open systems. Thus, one of the great laws of nature is the Second Law of Thermodynamics, according to which, (in closed systems) spontaneous changes always give rise to an increase in disorder (entropy). The operation of the law is a matter of everyday life. It is the law of decay. Lifeless systems gradually fall apart.

Prigogine was faced with the pessimism of this law and particularly with the consequences of its application to the universe in general (it must finally decay to cold hunks of dead matter). He removed firstly the condition of isolation (closed system) in the systems which he considered; and then thought about systems of increasing complexity. If the system is open, energy can flow in. Prigogine considered practical system far from equilibrium.

In doing this, he reached a radical suggestion (E. Stengers and I. Prigogine, 125). Under the two new conditions (open and far from equilibrium), as complexity increases, there is reached a point of branching ("the bifurcation point"). Before this point is reached, the system is chaotic, but at this point a fundamental change occurs, and several new choices

¹⁴This kind of difficulty has received comment in with respect to Idealism (Goswami, 123). However, there is no doubt that views like it, are being expressed at this time. Conversely, the quantum physicist Goswami admits the need to modify Idealism, Maya, etc. Yet, there is a hint of it in Kant (126) with his concept of the unobservability of *Das Ding an sich*.

¹⁵Of course, statements of this kind come easily.

his disease was associated with an odor and no such odor is now known from people suffering from the disease described. But then comes the historian specializing in the time - and announces that the odor was a well known accompaniment of the disease at that time.

Seth is put forward as a discarnate entity channeled by a Californian housewife, Jane Roberts. According to the account given by the medium (111) she finds her senses overcome by a voice not her own. Her husband takes notes in shorthand and asks questions.

At first, such claims would be subject to ribald comment by scientists. To attain a sense of skeptical and hesitating confidence as to some genuiness behind this writing, one needs to study a significant fraction of the voluminous output. Seth says that he has never been incarnated. What issues from Mrs. Roberts, in trance, as Seth, is curiously measured in tone. What impresses is the depth of the content in answers given to some questions. It is as though one is reading lectures given by an experienced, mature and confident Professor of Philosophy or Metaphysics from one of the older universities.

An example of Seth's statements may be quoted (111).

The 'outer ego' and the inner ego operate together, the one to enable you to manipulate in the world that you know, the other to bring you those delicate inner perceptions without which physical existence could not be maintained.

There is however a portion of you, the deeper identity who forms both the inner ego and the outer ego, who decided that you would be a physical being in this place and in this time. This is the core of your identity, the psychic seed from which you sprang, the multi-dimensional personality of which you are a part (Friedman (119), p. 117).

Our scope allows only a headline acquaintance with Seth. His view stresses Consciousness as the basis to Reality. Of the solutions to the collapse of the wave function in quantum mechanics, he chooses that originally authored by Wigner (120), - the Consciousness of the Observer makes the choice. Seth answers a question seldom asked: What happens to the collapsed states? He says they "emerge in another universe," but makes clear that he is not referring to Everett's many worlds theory (34). He seems to support the Copenhagen view that no event is "real" until observed.

The latter view is, of course, counter intuitive and it is worthwhile pausing a moment to look at it again before passing on. It has withstood ridicule from Einstein (Section 3.9.14). One thinks at first of the quantum realm of subatomic particles and not of the macro-world where the view would seem to be absurd. However, this may not be so in Biology, as indicated by the interest shown by Penrose (121) in microtubules; and by others (Zohar, 122 and Goswami, 123) where ideas are developed about segments of the brain where the events may show quantum properties. Could such views introduce the effects of quantum weirdness, - of non-locality, - into macro-life?

It is interesting to put Seth among some views of Human authors (Table 10.2).

in respect to the organization of the system emerge. In one of these, the system spontaneously reorganizes itself to a state of increased order.¹⁶ The necessary inflow of energy is equivalent to an increase in negative entropy ("entelechy") (i.e., order, disentropy).

That spontaneous disentropic changes occur in life processes is common experience. That spontaneous change can be disentropic in an inanimate system is the essential suggestion of Prigogine. Is there a creative principle at work in Nature? Do the trillions of molecules, which somehow manage to organize themselves, have some kind of Consciousness within them? Prigogine did not really provide any basis for the idea that order would suddenly arise from chaos, thus the award of his Nobel Prize has sometimes been criticized.

Thus, consistent with Prigogine's concept applied to cosmology, a remarkable degree of structure among the galaxies has been shown from results with the Hubble telescope, i.e., here, a tendency to increasing order seems to be a part of the developing cosmological system (a live universe?). Does this imply that there is Consciousness even in atoms of living systems, - that they know how to act in a coordinated way?¹⁷

Is there a relation of these concepts to those in Quantum Theory? One could perhaps see the choice of path made at the bifurcation point as being analogous to the choice of state in the collapse of the wave function upon measurement. Are both dependent upon a conscious observer?

As Friedman points out (108), Prigogine's concepts reduce the distance between live and inanimate systems and resonate with the theory of Consciousness developed by Chalmers (98) according to which all entities that have some function are conscious, although clearly to very different degrees.

10.7.6 Pribram

In the above, advances from Philosophy, Psychology, Physics, and Chemistry have been stated. However, Consciousness is regarded by some (Popper and Eccles (97); Chalmers (98)) in a pan-psychic way. The brain is a *medium* of Consciousness, connected to the senses and organs of the body.

These concepts had a challenge to meet from the experiments of Karl Lashley working at the Yerkes Laboratory for Primate Biology (126a). Lashley trained rats to run a maze. He began systematically to remove parts of the rat's brains with the aim of finding that part which, when removed, would erase the memory of the maze. He took apart the rat's brain section by section, - and the rats showed some effects of this on their motor functions, - but they always retained the memory of the maze. Thus, it is difficult to sustain the specific area for memory concept of Penfield, from his experiments on epileptics.

¹⁶Correspondence with the author seems to indicate that this order out of chaos is a pure *suggestion*. Of course, order is created spontaneously in living systems. But what we still have to wonder about is how?

¹⁷This is so in living systems. The proteins of which our bodies largely consist, and other parts of our bodies, even our bones, renew themselves several times in a lifetime - and the newly introduced molecules know what to do and where to go.

Corresponding work on children with hydrocephalous brains (brains in which the brain is absent and the space filled with aqueous fluid) was more surprising (J. Lorber's work is that the brain divides itself up into minute volumes, each of which contains the memory content of the whole brain. The indications are reminiscent of the body's DNA which is contained in each cell, instructions for the replication of the entire body.

An optical device of interest to this situation was invented by Dennis Gabor (127). At Imperial College, London, in 1960 (128). The field which the device introduced is called Holography and the principles of its mechanism seems at first fairly simple. Thus, suppose an object, the apple shown in Fig. 10.3, is illuminated in laser light of a specific frequency. As the figure shows, the laser's light is first split. One beam of the split light illuminates the apple and the other is directed by a series of mirrors to strike a film. However, some of the light which has struck the apple is reflected by a mirror onto the film and interacts with the light which has reached it via the mirror. Interference occurs and the interference pattern is recorded on the film.

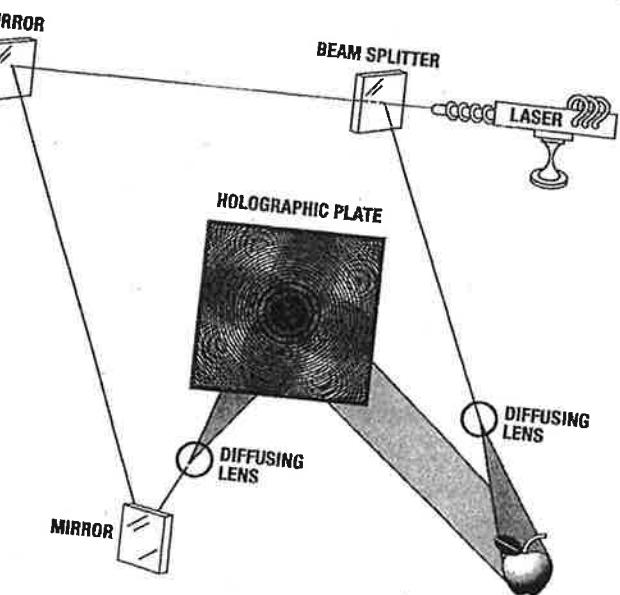


Figure 10.3. A hologram is produced when a single laser light is split into two separate beams. The first beam is bounced off the object to be photographed, in this case an apple. Then the second beam is allowed to collide with the reflected light of the first, and the resulting interference pattern is recorded on film. Reprinted with permission of Harper Collins Publishers, 10 East 53rd Street, New York, NY 10022 (1991) from Michael Talbot, *The Holographic Universe*,

The film is developed and laser light of the same frequency as that used for recording the interferogram on the film is then shone through the film. A three dimensional image of the apple is then produced in the air space on the exit side of the film. It is as though the second laser beam, which shone through the film containing the interferogram,

had "woken it up" and reproduced out of the interference pattern from the two beams incident upon the plate the image of the apple in the reflected beam, appearing in space some distance behind the film (cf. F. Sears, M. Zemansky and H. D. Young (129)).

However, the possible specific relevance of holography to the operation of the brain has yet to be set down. Thus, it is found that the interference pattern is reproduced throughout the film: wherever the two beams of light have struck it. What is shared in the film is not a single interferogram from collision of the two beams, but a great number of interferograms, so that, if the film is cut up into small pieces, one can still reproduce the original picture of the apple, though each piece of the film used is now very tiny.

Karl Pribram (130) understood that this property of holography might be applicable in principle, to an explanation of how it is that removal of much of the brain in mammals, - and in some children, - makes so little difference to the function of memory. To confirm his growing impression that the brain could be subject to disruption but still retain its function, he took the brain of a salamander, reversed it and replaced it (little effect); and then removed and replaced it upside down (the same).

Now, no parallel of the optical devices which make up holography can be found in the brain. There is no vital laser there to begin with and an actual holographic experiment can only be done under laboratory conditions of great stability (a wave length's "jogging" spoils the image). Hence, one cannot take Pribram's idea ("the brain creates a hologram") literally. What has been suggested is that a property of holography is what is needed to solve the substantial problem of the seeming storage of memory in all parts of the brain. We do not yet know how the brain does it. Nevertheless, there are some who have jumped upon the concept that the brain is a hologram and magnified it to an unwarranted degree. Thus, Talbot (131) writes: "Our brains mathematically construct objective reality by interpreting frequencies that are ultimately projections from another dimension, a deeper order of existence which is beyond space and time. The brain is a hologram enfolded in a holographic universe."

Thus, a concept has been injected into the understanding of brain mechanisms (though notably neglected in the recent discussions of brain physiology by Edelman and Crick). Perhaps the concept may help find a solution to a major problem in brain physiology, i.e., how the brain continues to function though much of it be removed, and thus give some help in understanding Consciousness.

10.7.7 Jahn

It is well known that at Princeton University in the Engineering Department (132) there exists a laboratory for the investigation of anomalous phenomena. The major objective of the work of the laboratory is to manifest Consciousness effects, and one of the paths taken is to involve electronic Random Event Generators which are then subject to the attention, and concentration, of a number of experimenters. Can the intent of these persons affect the randomness of the machine?

A review of this work by Jahn et al. (132) published in 2002 gives an account of 12 years of work.

The objective of the work is to quantify mind-machine interactions with great accuracy. About 100 different experiments have been carried out so far, numerous protocols being used. The effects found are small (10^{-4} of a bit deviation per bit processed), but the

very large number of results allows a rather firm positive answer to be given to the question: Can minds affect the functioning of machines? The accumulated positive composite effect exceeds seven standard deviations beyond a chance outcome.

There is an interesting difference in the effects brought about by males and females. Contrary to what tradition would make one expect ("Women are more often psychically active than men"), males exert greater effects than females.

Two other general results are clearly of seminal importance..

(1) The strength of the effect is independent of distance up to (at least) some thousands of kilometers.

(2) An intention may be made at one time and can have its effect manifest when the machine is operated later.

Thus, the Princeton work clearly demonstrates quantitatively under laboratory conditions that attention of humans on machines affect the operation of the latter. It is easy to appreciate the significance of the result.

10.7.8 Tiller

W. A. Tiller was well known in the 60's and 70's as a professor in materials science, but in his later years has turned to study matters which are at the heart of this book and future physics.

In a seeming climax to his contributions of Consciousness studies in this field, Tiller has joined with colleagues Dibble and Kohane to describe remarkable work, the aim of which is to manifest the effect of consciousness on inert materials such as water, on complex chemicals such as ADP and ATP, and on the rate at which larvae of the fruit fly develop (133).

The basic experiment, the results of which are liberally described in Tiller's book (99) involves a simple electronic oscillator device ("the machine"). Four persons, two men and two women, each an experienced meditator, choose a certain simple thought, such as "make pH bigger." They then concentrate this thought on the machine itself for about 20 minutes. The machine is thereby "charged" or "intentionalized" and placed in contact with various kinds of water (such as distilled; or water from a natural spring). A pH meter is introduced into the liquid phase where changes of the pH are measured.

Two effects are noted. In one, there is an oscillatory effect in which the pH varies over a small range of about 0.1 pH units with a frequency of the order of tens of minutes. Over times of the order of hours to days, there is a gradual change in pH increasing or decreasing according to the intention implanted. A 1 pH unit change takes several days. The machine remains "charged", i.e., it continues to be effective in transmitting an intention imprinted on it, for about 3 months.

Several other experimental effects have been observed. One is that the ADP/ATP ratio in bio-solutions can be affected by the specific intention implanted in the device. The effect is repeatable.

Another kind of effect has been observed: the conditioning of the laboratory. For example, if a mouse is laid to die in a certain place, a succeeding mouse, equally ill will die more quickly, i.e., "easier" in a place conditioned by the first death.

The general result - the transfer of an expression of Consciousness to a machine - and the machine's subsequent effect on the surroundings is revolutionary in its significance.

Professor Tiller and his colleagues introduce "deltrons", - coordinates expressing consciousness into mathematical equations. Their study is an original effort, but still at a primitive level, because of the absence of numerical results of the new equations, which have yet to be tested.

Tiller's work remains to be independently verified. Introduction of a metallic object into water will, of course, cause changes in pH and other properties and these changes have to be closely determined and subtracted from the total to find possible consciousness effects.

The work of Tiller, et al. (134), will no doubt be compared with the measurements on mind-machine interactions at the Princeton University Laboratory for the examination of anomalous phenomena. There one finds a great deal more caution and sophistication - at the same time a lesser scope than the pioneering work of Tiller, et al.

Thus, the effect of Tiller et al's, work offers direct proof of consciousness as an entity separate from, thought interacting with, the brain. It is a lead arrow in experimental work to exhibit the partaking of Consciousness in Life.

10.8 PARANORMAL IDEAS AND RELIGIOUS THOUGHT

One of the features of life in the West at 2000 is a contradiction between its basic philosophy, - that of science, - essentially materialistic, hedonistic, and without values, - and the belief in a deity, - with church attendance by more than 30% of the population. Materialistic science, attempts to obtain explanations of observations by chance interactions of material elements without involving a spiritual component, discarnate beings, teleology, etc.

Thus, adherence to present science as a philosophy (indeed a religion) of life admits one to the acceptance of the identity of a person with her body; that she is conscious only during this life; and therefore that her life course cannot affect her after death, for death will end her Consciousness (135).

The attitude in this book is that of a scientist, but science untrammeled by the straightjacket of scientism, i.e., science with the reductionist limitations, with a materialistic view, and with the characteristic that no new phenomena may be accepted as valid if its acceptance would disturb the fundamental concepts of the present Physics.

Following up the paranormal phenomena implies the need for a revision in basic scientific thinking. Some aspects of NDE's and reincarnation studies in particular are consistent, in a broad and general way, with conclusion associated with the philosophies of Hinduism, Buddhism, Judeo-Christianity, Muslims and other traditions (See Table 8.1). Thus:

1. Human bodies, are associated with a corresponding non-material entity (spirit or soul) (cf. OBE Chpt. 7); NDE (Chpt. 7); Apparitions (Chpt. 6) some mediumistic phenomena (Chpt. 8); Reincarnation (Chpt. 9).
2. A discarnate entity departs at death and eventually leads further, - and perhaps many, - existences in new bodies (cf. Reincarnation (Section 1)).
3. The type of life spent between bodies (between miserable and terrifying and happy and sublime) depends on the quality of the previous life.

Religious theories are often based upon statements of a founder (136). Is it possible that investigations of some of the topics described in this book will lead to a

scientific basis for religious knowledge? Should one not seek funding to carry out research into survival and give increasingly a scientific basis to knowledge of Consciousness and Spirituality? Would not such studies have a greater significance for the average person than the topics stressed in government research support, which (apart from that of NIH) seems to be biased towards defense-connected fields?

10.9 THE NEW PARADIGM

10.9.1 Introduction

Many phenomena difficult or impossible to interpret in terms of university Science at 2000, nevertheless exist. Present Science is incomplete, and able to retain its position largely by suppressing by ridicule fields of knowledge which are inconsistent with its fundamental concepts, often presented as though they were final, certain, and ubiquitous.

In this section, constituents of a New Paradigm, are gathered together. Two "master paradigms" have been encountered in Section (10.7): Holism and the Perennial Philosophy. The former (Bohm) is an expression of the idea that "all is connected." The latter (Huxley, Wilber), springs from the attempt to find common wisdoms among the writing of Mystics affiliated with the various traditions. There are indications that a "Higher Perception" is struggling to be born in the West in competition with a still vibrant old world, the world of materialism and Newtonian physics.

10.9.2 Consciousness as a Critical Concept

The emergence of Consciousness (Chpt. 9) as a cutting edge in philosophy and quantum physics is recent (post 1975). Thus, Consciousness was earlier a doubtful concept, perhaps unnecessary.¹⁸ However, the study of Consciousness has become mainstream, and there is much evidence (see e.g., work of John Lorber (127)) that Consciousness cannot be centered in the brain, because of the finding that persons who have suffered removal of large parts of the brain retain memory and are intellectually able.¹⁹

In Physics, Consciousness has been regarded by some (Wigner (120), Goswami (123), Zohar (122)) as determining the choice of the state vector in measurement. A similar suggestion, but in this case hinting implicitly at precognition among electrons, has been presented by David Lindley (139) in a discussion of the delayed choice experiment in single electron transitions through a two hole barrier experiment. Corresponding to this, is the behavior of some biomolecules which form spontaneously extremely complex connections as a part of the neurons, which make up the structure of the brain in its formation in the fetus.

A more direct example of a field associated with Consciousness and intention arises from the results of the experiments of Jahn, Dunn and Nelson at Princeton University, where

¹⁸ Daniel Dennett (140) still retains - and magnifies - such a view in modern times (Searle, 141).

¹⁹ A similar view must follow from the many reports from Near Death Experiences who attest to retaining the use of their senses during Out of the Body Experience. This is most remarkably so for those who were blind in life but, in the Near Death state, report being able to see in color (Ring, 137, and Rogo, 138).

it has been multiply shown (132) that the concentration of individuals can affect the operation of machines.

Then, there are the placebo effects in which the results of a medical procedure is affected by the confidence felt by the patient (142). Confident expectation of a cure is some 75% as effective as medicine, which, before 1940, was largely free of materials which could have had biochemically induced curative effects (143). Still more informative is the work of healers, i.e., a person's physiology may be affected by the intention of healers working at a distance from the patient (144).

The effect of the intention and concentration of Qi Gong Masters (145) has been shown (i) to change the $\frac{1}{2}$ life of reductive elements and (ii) to affect the rate of certain biochemical reactions. As with results of the experiments at Princeton, the Qi Gong effects were found to be unaffected by distance between the Master and the experimental object up to several thousand kilometers.

Schrödinger's views on Consciousness were stated succinctly in a short book which he published in 1958 called "Mind and Matter" (146). In it, Schrödinger, who was primarily a philosopher in addition to his work as a physicist, reveals himself as having been influenced by the vedanta. He expresses the view that Consciousness affects all life, that the direction of evolution is governed by Consciousness, but, - most importantly, — that there is only one Consciousness.

10.9.3 A "Spiritual" Component

It was normal in all cultures -except the present- to recognize a spiritual as well as a corporeal or material aspect of existence. However, in as much as the scientific method, exploited in Engineering, gave rise to so many increases in material well being in the West, the idea that living beings are associated with a non-corporeal, a spiritual, component, has faded (Nietzsche announced the death of God in 1882)(147). Today, in technologically advanced countries, it is no longer an acceptable concept among most intellectuals.

Evidence has been presented in (Section 10.4) for the breakdown of 20th century Materialism. There follows here examples of phenomena that are difficult to understand without assuming the existence of a spirit entity.

(1) **Out of the Body Experiences.** Until the rise of data reporting Near Death Experiences, scientific research was in progress on the nature of the OBE (145). What entity is it which leave the body, travels to an earlier-planned goal, collects information there, and returns to the body?

(2) **Near Death Experiences.** There is much to ponder here and until such experiences have been more widely studied in cultures outside those of the West, a final conclusion as to their significance should not be made. However, several accounts consistent with the co-existence of the material body and a spirit entity which leaves it near death, but returns to it if the death is postponed (or if the clinically dead person is revived) have been given. The spirit body carries with it senses equivalent to those of the body and is able to bring back information which appears to have veridicality.

(3) **Poltergeists.** These phenomena seem to require the presence of an active entity, able to move furniture, carry objects slowly across a room, drop weights almost²⁰ on the heads of some of those present, etc.

(4) **Apparitions and Ghosts, Possessing Entities.** Reports of the observation of ghosts by several persons at the same time decreases the likelihood that this observation is a projection made by one person on receipt of a telepathic signal. Ghosts appear in various densities. Some appear entirely as solid as in life, though still able to pass through walls. The dramatic phenomena of exorcism (Chpt. 6) speak for themselves, and indicate effects most easily interpreted in terms of the existence of discarnate entities.

(5) Recent accounts of children who appear to recall past lives include those in which a subsequently born child has a body which contains marks (e.g., of knife wounds) corresponding to the cause of death of an earlier murdered child (148). Helen Wambach (113) has given detailed accounts of regression experiments. Impressive is that the number who report humble earlier lives predominates over the much smaller number reporting lives in the middle class and the even smaller number reporting lives of the affluent. Clothing seen in the regressions and surroundings correspond to what is in the record for the time and place indicated.

Stevenson, influenced by many years in the study of persons who remember past lives, favors a spirit entity which reincarnates. Wambach lets her results speak for themselves.

10.9.4 Love As a Central Concept

There are several types of love and absence of an indication of what type is meant can give rise to misunderstanding, although the different types of love were discussed by Plato.

"Married love" refers to the bond which forms between the partners in successful marriages. It is not primarily erotic, but involves a mutual identification and caring. Agape is disinterested love, a high form of love in which the essence is a strong interest for caring and well being of the beloved, but without an erotic component or thought for reward or counter love. Then, there is religious love, "Love of God", or of other holy persons. Religious Love is the most difficult to foster, because of the immaterial nature of those who are loved and from whom it is hoped to receive love.

It is important to understand what kind of love is meant²¹ in this section, which points to the development in Western society of a gradually increasing feeling that one is connected to others, and that, in so far as one cares for one's self, one cares for others, too.

²⁰In spite of the violence of some poltergeist phenomena, it seems that an entity controls the violent throwings e.g. of stones, for their velocity is reduced as they approach a person so that she is only gently touched by the object.

²¹The love advocated "to all men" by Jesus Christ must be understood to mean "kind and positive feelings towards all people". Thus, in a recent conversation about the meaning of love with a Catholic priest, he agreed that he loved all his flock but when I asked him if he therefore loved his secretary, he indignantly denied it.

Consider how this might play out in three practical examples, which will tend to be developed positively in the New Paradigm.

(i) Changing of a reaction from Fear to one of Love in education. Thus, the student who, e.g., goes to sleep during lectures, often receives punishment to "correct the defect" (and to overcome the teacher's fear arising from evidence of her ineffectiveness). Would it not be more effective to find out, in caring discussion, what thoughts are associated in the student's mind with her sleepy behavior, - to persuade her of the love and care which surround her - and the presence in her teacher of a genuine wish to help her learn?

(ii) Correspondingly, attention is needed to those who break the law. They are incarcerated subject not only to the suffering following a loss of freedom, and loss of ability to support one's family, but also rough living and isolation. Some criminals are psychologically ill and may express their illness in hate towards the society from which they feel no love. But for the majority of people who deviate in their behavior from societal norms, it would be more effective, - cheaper, too, - to treat them as psychosocially ill, and not to punish them. What they need is help, e.g., psychological counseling and treatment. What is the evidence that incarcerating users of illegal drugs decreases their wish to go back to them - to burden society once more after they are released. Their incarceration is a heavy financial burden on society. Restitution should certainly be made to those who have been harmed (in theft for example) by the actions of the deviants. But, no restitution can be made if the ailing one is locked up in a prison cell. And the most effective and complete restitution will be made by those who have received and accepted enough loving care to generate a desire to make restitution for themselves.

(iii) Lastly, the wisdom of response to attack by a group wishing to decrease your tenure of land has had a five decades long exemplification of the results of a policy of an eye for an eye and tooth for a tooth in the actions taken by Israelis against the Arabs trying to get back the land they used to occupy in Israel (i.e., the former Palestine) before being driven out from them by the imposition of an Israeli state.. Heavily armed by the United States, Israel has had the means to reign terror, spread death and devastation on those whose lands its citizens have occupied by force. Conversely, the displaced people, the former citizen of the land now called Israel (now confined to a tiny corner of Israel), have received no corresponding gifts of tanks or bombers from the USA or any other nation, and remain unarmed though under attack. But what is the result of this aggressive one sided onslaught with super weapons onto an unarmed group? It is that the suicide bomb attacks on Israel get worse. Who would like to bear children in Israel now?

It would be cheaper and more effective to take a small fraction of the sums needed to pay for the instruments of war and use it to raise the living standard of those who are in poverty in the Middle East - i.e., bring love to the scene of international conflict.

Radiating compassion to all sentient creatures will be a characteristic of the New Paradigm. Manufacturing weapons to kill people would increasingly fade away. Our deteriorating environmental situation (Ch 2) will need sums of the order of our present military budget in the building of a pollution-free energy system. It will not be possible to find the funds necessary for our survival in building a new energy system and at the same time spend to such an abnormal degree on our armed forces.

Love is essential to infant development, too. Teenage pregnancy, caused by a lack of teaching in state schools about how to live moral and responsible lives, gives rise to

infants whom the mother must neglect (i.e., starve the love necessary for development) while she struggles with her school work or tries to obtain skills which may result in her having money to support her child.

Mark Woodhouse (149) expressed some of these matters in a relevant table comparing the old and new in some aspects of life (Table 10.3).

10.9.5 Intervention by an Outside Consciousness

10.9.5.1 General

Scientists, in their work, are non-theists, i.e. they do without influence of higher, non-material intelligence. Their aim is to show that a consistent account of Reality can be obtained, in material terms, without intervention of alleged higher beings.

During the last few decades, there has grown up a small sub-culture in which there is work bearing on evidence for the concept that there are indeed intelligences of a higher order who sometimes inject a manifestation with our society. The quality of the evidence ranges from the work of some channelers to certain correlations. Thus, it is impressive to read accounts of early after death state (passage through a tunnel, unnaturally bright lights, meeting deceased relatives and friends, a judgment), given in the *Tibetan Book of the Dead*, which was written more than a thousand years ago; and then studying similar accounts from persons recently deceased who are revived from death or near deaths.

In the present section, "divine" does not necessarily refer to a personal, Jewish or Christian Old Testament God, but to higher discarnate entities. The evidence that beings justifying this title are met with in After Death states is well summarized in "Channeling" by Jon Klimo (117).

Thus, scientific explanations of sense data are based on the idea that the whole is the sum of the parts. One begins with atoms or subatomic particles and builds up the interpretation through the molecular, cellular, corporeal, etc., states. All is controlled from "below" and it is this fundamental idea in the present paradigm which has drawn criticism in the last few decades (cf. particularly Jahn (133) and Haisch (150)). The counter concept (see particularly After Virtue, by R. MacIntyre (14)) sees some influence of teleological factors. In Greek and scholastic philosophy (e.g., J. Maritain, 151) this counter concept is taken for granted, i.e., there is influence "from above" (teleology). The idea is that a higher Consciousness can sometimes intervene and change the behavior of objects from their familiar path (151a).

10.9.5.2 The Second Law of Thermodynamics

One of the most basic laws in science states that, in a closed system, spontaneous reactions lead to an increase in entropy (Disorder). This Second Law of Thermodynamics is of wide applicability. Thus, one uses Intelligence to arrange a pack of cards in a logical order but after spontaneous use of the cards in a few games, one cannot discern any sense in the order of the cards. One puts ideas and energy into the cultivation of a garden. Remove them and the garden decays into disorder.

The Second Law originated in observations on chemical reactions, but the reaction involved in the life processes of growth are certainly spontaneous but markedly disentropic, i.e., they happen with a spontaneous increase in order as, e.g., in chrysalis to butterfly. The direction of chemical reactions in biology is goal-oriented and continues to be so, while the

organism is alive. In defense of the Second Law, it must be pointed out that living processes occur in open systems and the Second Law indicating a spontaneous increase of disorder applies to isolated or closed systems. On the other hand, as soon as life leaves an organism, its body promptly decays in accordance with the Second Law, although still within the open system and in the same environment as that it had when it was alive.

Thus, life processes possess a component not present in accounts of them given in university courses in Biology. The spontaneous self ordering of Life Processes has been often commented upon, as, e.g., in the idea of entelechy (152), élan vital (Bergson, 153) and morphogenesis (Sheldrake 154). It seems to be an example of teleology.

10.9.5.3 Psychic Healing

It is well known that there exist persons on the Philippines and in Brazil who carry out complex cures, often of cancer patients who have been declared incurable. These so-called "psychic" surgeons operate about one tenth of the time in a fashion consistent with the description, "miraculous".

TABLE 10.3
Paradigm Relations Table modified following Woodhouse's material. (150)

Characteristic	Old Paradigm	New Paradigm
Seeks in partner:	Someone who needs to be served or wants to serve; roles irreversible	Compatibility, common interests and values; someone to share with.
Guiding emotions:	Fear, control, anger.	Ego-level love; finds validation for whom one is and what one stands for.
Giving/receiving:	It's better for the controlling partner to receive than to give.	Gives to others and to self; strives for balance and fairness in giving and receiving.
Mode of relating:	Issues commands, needs to be in control; assumes role of teacher, superior wisdom	Enjoys emotional intimacy; shares feelings; trusting and vulnerable; values stability, but open to change.
Sexuality:	Defined mainly in terms of physical effectiveness of subordinate partner	Makes love for emotional and physical sharing; open and trusting attitudes about sexuality.

Self-esteem:	Outwardly often strong, but inwardly weak; seeks partner with low self-esteem	Good self-esteem; concern with shaping and refining identity; not easily threatened.
Center of life:	Oneself (social status, career) is center; self-validates through control, as in "I made you who you are;" intimidating	Self; accent on balancing different roles, ideals.

There are other examples of this kind of phenomenon, see, e.g. J. C. Fuller (155), The operative always claims that it is not he who is operating freely, but he is told what to do or even that his hands are taken over by some deceased surgeon or higher discarnate entity (156).

10.9.5.4 Structure of the Universe

It had earlier been thought that the Big Structure of the Universe, - the distribution of the galaxies, - would be uniform on a large scale, i.e., the results of the assumed universe-explosion would give rise, on average, to the same density of galaxies in all directions (it would be formed spontaneously without the presence of particular structures). This seemed consistent with the result of the uniform 4°K heat seen in all directions in the universe detected in 1955 by the French graduate student, LeRoux (157) and later rediscovered by Penzias and Wilson at the Bell Telephone Laboratory in (158).

However, results more recently obtained by the Hubble telescope show quite otherwise. Details are given in (Section 3.10.9). There is Structure in the Universe, as indicated by the anomalous bunching of galaxies in one part of the universe. This asks for an explanation. None has seemed to be available up to 2004. If the present model of the universe cannot account for the structure, - one may speculate that it is an example of intervention by a non-natural source.

10.9.5.5 Consistence with the Speculations of Teilhard De Chardin (159)

It has been shown that, in terms of biology based upon DNA as the molecule of inheritance, formation of this molecule as the ground of life cannot be understood in terms of the present paradigm. Correspondingly, evolution occurs and its result is an improvement in certain species²² (particularly in humans). The question, then, is how does it happen with its seeming positive directionality. This situation is consistent with the views of Teilhard de Chardin (159), who speculated that a controlled direction was being applied to the development of species, all of whom headed "towards the omega point," i.e., towards a maximum degree of perfection.

But some species (bees, crocodiles) have remained unchanged for millions of years. Also, intense attempts to change dogs results in many new kinds of dogs, - but they are all dogs, - not new species.

Since evidence for the presence and directed action of extraterrestrials has become strong (160), it is possible to see here, too, an alternative mechanism by which evolution could be occurring.

It is useful to end this subsection by defining two words which would be used in its discussion. One is Pantheism, a fairly well known word (God and the laws of Nature are one). The other is Panentheism, a more specialized term. According to it, God is both immanent (in things) and transcendent (everywhere) (Woodhouse, 161).

Theologians speak intellectually of God. Mystics maintain that they "feel the presence of the Godhead" in their daily lives, - in everything, and everywhere. They are panentheists.

10.9.5.6 Interconnectedness

One aspect of the New Paradigm is Interconnectedness. In the older view, each person was his or her own person, alone. The person could make contacts but, fundamentally, everything was a separate thing or being. In the New Paradigm, everything and every Entity tends to be connected to all other things and beings.

There are several ways of showing what is meant by this statement. To begin with: energy in a vacuum. Thus, electrical charges radiate when they accelerate. Materials consist of oscillating charges (e.g., the zero point energy in atoms) and energy from the radiation of these oscillators, exists in a space where, according to an earlier view, there was nothing (i.e., in an ideal vacuum). Such energy may compensate the energy lost in oscillation thus, this universal energy, existing everywhere through space, represents a hint of what is meant by Interconnectedness.

A similar idea originates from Mach, (162). It is a theory of inertia. Thus, on Earth a 100 lb mass is attributed to the attraction of Earth and 100 lb is what it weighs. It falls to Earth in space, however, the mass may be sufficiently far from the Earth so that its attraction by the Earth becomes negligible. On the other hand, the object still has the same inertia, the same resistance to acceleration, as it had on Earth. Wherefrom comes this inertia this resistance to movement? It was suggested by Mach that it is due to the fact that every particle, anywhere, experiences the effect of its interaction, with the field arising from the particles in the rest of the universe. Such an idea has been encouraged and developed by Puthoff (162). The concept supports an interconnectedness throughout the universe.

A different path which leads to Interconnectedness arises from a thought experiment proposed in 1936 by Einstein, Podolski and Rosen (163). Einstein was not satisfied with the Quantum Theory. He believed in definite and solid things, behaving according to relativistic mechanics, effectively, Newtonian mechanics except for bodies traveling near to the speed of light.

Einstein set out to challenge the Quantum Theory. Thus, according to it, two entities (photons, electrons, etc.) which have been associated in a structure, remain coupled in the sense that (for photons) if the state of polarization is parallel for one photon, it must be perpendicular for its previously associated partner. Einstein, et al., proposed that the formerly associated particles (or photons) should be separated into two beams, each sent in opposite directions. At a suitably large distance from the origin, one of these particles should be changed in orientation by means of an instrument. For example, if the particles are A&B, the B particle should have its polarization state change from, - say, - perpendicular

to parallel. As the two particles are coupled in a quantum mechanical sense, the other particle would now have to change its state of polarization from parallel to perpendicular. Einstein et al., (163) pointed out that the experiment could be arranged so that there would be a finite and measurable time elapse before the B particle knew of the change in the A one. Thus, in Einstein's view, it could not change until after a time elapse corresponding to that needed for an electromagnetic beam to carry the message. But according to Quantum Mechanics, it must change immediately. One may imagine that Einstein - who some see as an abnormally confident man - smirked when (as it is alleged) he remarked that, if the change did occur immediately it would be very "spooky". Thus, he was sure no change would be seen immediately in particle A when the state in B was changed; hence one prediction of the Quantum Theory would be shown to be incorrect. Einstein did not think there was more to it than appeared, - a view taken up by others, such as Bohm (164), and is alive today.

A convincing experiment to test out the EPR prediction was obviously difficult, because for the stringent requirement of devising a detection method to work at very short times (i.e., time less than the time it would take for information to pass between A and B at the speed of light). Bell, however, produced a theorem which gave limiting criteria which could be applied to an experiment aimed at testing the EPR challenge to the Quantum Theory.

This is not the place to present Bell's theory (165). It took 50 years from the paper of EPR before a convincing test experiment was published (Aspect et al., 166), but when it was, it indicated clearly that, indeed, the particle B did react to a change in state of particle A and - here is the point, - it reacted in a time shorter than that which would have been taken if the signal of the change had come via electromagnetic radiation at the velocity of light.

Since 1986, several other investigations have been made (167) and the essential result obtained by Aspect has been confirmed. Physicists have reacted in two camps to the implications of the experiment. The narrow view is to stick closely to the facts established, - (Stapp, 168) is to conclude something greater and that is the matter of this section: (unclear at present) Interconnectedness. For it can be seen that, if there is some means of communication between the two particles and this interaction occurs faster than the velocity of light, there may be (as yet unproven) "instantaneous" connection between all particles in the Universe.

The implication of Interconnectedness in the Universe in the cosmological sense is welcome. Thus, the rate of promulgation of gravitational "waves" has not yet been established, but the assumption is made that the velocity of propagation must be that of light. However, this brings up a difficulty. In considering the structure of the galaxies, it is normal to think of all of them in gravitational interaction. However, the extremes of the known Universe are too far apart so that, - if gravity travels at only c , and the age of the Universe is around 15B years, then the extremes of the universe cannot be in gravitational contact, as earlier assumed. If, however, another way of transfer of gravity exists, this limitation may be avoided.

10.9.5.7 Telepathic Contact

It has been shown (CH 5) that telepathy is real, independent of distance and not electromagnetic in character. It seems to be the mode of contact among putative extraterrestrials. A characteristic of the New Paradigm, then, will be to accept and develop telepathic interaction, as well as other useful aspects of the paranormal abilities of humans, particularly in distant healing.

10.9.5.8 Morphogenic Field

It is well known that the mode by which certain characteristic shapes are developed in the course of growth of a human fetus, - why an arm and not a wing, - is not as yet understood in biological terms. The suggestion first made by Sheldrake (154) that the initial occurrence of an event made its furtherance and replication easier, was initially exemplified in the freezing in a vat of liquid glycerine. Glycerine had been difficult to solidify: Sheldrake claims the difficulty lessened after this first freezing. However, the idea that there exists shape forming fields affecting Earth objects is the essence of his suggestion and will be developed in biology wherever it seems to be needed. This morphogenic field seems to be related to the concept of the Biofield (169).

10.9.5.9 Global Environmental Responsibility

It has been shown in Chapter 2 that overpopulation, exhaustion of non-renewable resources and the rise of pollution will make it difficult to sustain life in some part of the planet before the end of this century. It must be one of the most critical parts of the New Paradigm that each community must accept responsibility for the health of those parts of the Earth which it affects. This may involve a lessening in the dominance of independent sovereign states, and encouraging the institution of a World Government with powers to enforce the cessation of practices damaging sustainability of life on this planet. It will imply restriction in consumption (renewables only consumed) and a law which would require polluters to take care of their wastes in a manner that leaves the Earth unchanged.

10.9.5.10 Recognition of the Presence of Extraterrestrials

Questions relating to UFO's and extraterrestrials will be taken out of the closet and government knowledge about them made clear in the early part of the new millennium. This has already been done by the French Government and this lead should surely be followed by all governments (170).

An excellent treatment of the Reality of extraterrestrials is given in Mark Woodhouse (171). He gives 25 reasons for acceptance of their reality. For example, the question is raised as to why it should be made a crime for active military personnel to discuss their experiences of UFO's, if they do not exist? Correspondingly, Woodhouse quotes a CIA officer who argues that a cover up on knowledge of the presence of extraterrestrials is necessary for societal stability (171).

10.9.5.11 The Mystics' Message

In one sense, knowledge obtained from Mystics is the most direct - the most unmysterious-knowledge we have, because it avoids the intermediate steps of

experimentation and rationalization used in Science. Mystics experience direct knowledge, as direct and certain as that which a mother has in knowing who is her child.

I think that there are two messages which come to us from "true" mystics. The first is difficult to understand: the second appeals to us directly, to the heart as well as the brain.

The first message from mystics is that the Atman is Brahmin. What is the meaning of this short statement of a Big Truth? Atman is God immanent, the God within, the Consciousness which seems to be the immortal basis of each of us. Brahmin is All that Is, that in each of us, is a part of the One Consciousness. It is difficult to conceive a more profound statement, but it is necessary to understand it at a level above that of the intellectual.

The second message is connected to the first and can also be expressed briefly, though it is of broad significance to our lives, and to the future of the planet. It is the inculcation and practice of the New Paradigm that our lives should be directed inwards away from the external glitter, to recognize the Consciousness within us as we go through our various times. Do we practice love and compassion to our neighbors - to all whom we come across? Do we introspect to seek within us some contact with what Schrödinger called the one Consciousness? Do we understand the evidence that we are not to be identified exclusively with our material bodies, that we leave the body at death and that there is an after-death state, reflecting in quality our previous lives? Do we comprehend our responsibility to our home, the planet? Do we devote our lives to give, not merely to get?

10.10 MANIFESTO FOR AN INTEGRAL SCIENCE OF CONSCIOUSNESS(172)

10.10.1 Introduction

Modern science has been a central driving force of Western culture for 300 years. It fosters the qualities of open mindedness, rigor, integrity, courage, and (among some scientists) humility. Although these characteristics are helpful, scientists do not always recognize that science is based on a number of assumptions. When scientists define science in mechanistic and materialistic terms, they transform it into dogmatic scientism.

Consciousness or awareness involves a spectrum of states, some of which go beyond the five senses, i.e., outside the restrictive box in which science at present finds itself. One of the major points of the development followed in this book is that Consciousness is more than localized brain processes.

10.10.2 Key Philosophical Assumptions of Present Science

(1) The primary qualities are defined as the same for all observers and lead to objective knowledge. Secondary qualities are different for all observers and are not objective. They constitute subjective knowledge (unreliable).

(2) A directing Consciousness is an unnecessary hypothesis, chance and necessity are sufficient to explain the universe and its development.

(3) Matter gives rise to mind in the course of biological evolution. The death of the brain is the death of the person. Empirical knowledge can only be acquired through the physical senses and their instrumental extensions. Phenomena can be understood through analysis of its parts, i.e., reductionism and atomism. Purpose and meaning are excluded from scientific analysis.

Any evidence contravening these thoughts is unacceptable and must be rejected as due to error in measurement or fraud.

10.10.3 Need for Change

Scientists are living with the metaphysical equivalence of the flat Earth hypothesis by denying the significance of the vertical or depth dimension of human existence. There is much evidence that Consciousness is fundamental to the whole of existence.

There is a more subtle, perceptual faculty than the physical senses, and the kind of knowledge called intellectual. It is in our capacity to know intuitively from an experience of meditation and contemplation, a form of direct and immediate knowledge. Intuitive and participatory gnosis adds to and transcends the intellectual.

10.10.4 A New Framework

1. The universe is an interconnected unity.
2. The universe is self organizing and reflects order, creativity, meaning and purpose.
3. Knowledge can be acquired not only by means of the interpretation of sense data but also by other means, e.g., from intuition, from inspiration, including that engendered by art and music, and by telepathy.
4. Consciousness is formative: it drives evolution from within.
5. Consciousness can exist independently of the physical substrate.
6. Human consciousness may in some form survive death.

10.10.5 A Contemplative Perspective on Reality (172)

Human beings operate at different levels within the spectrum: spiritual, mental, emotional, and physical. The ontological question therefore is Who is the Knower? Consciousness is not an object, but the ultimate subject: the Self is the Knower. It is ultimately unknowable, precisely because it is the Knower.

10.10.6 Conclusion

An immediate imperative confronts Science in its present state. It is that the nature of Consciousness should be involved as a leading concept, both in Science and Philosophy. Such change would give rise to a revolution within science.

Now, hesitatingly, we occasionally unglue ourselves from our fascination with the outer glitter. Being and Potencia have entered the language of physics. Mind and metaphysics have entered from Schrödinger. The world is not only material. And it is not to be fully described in a digital language. There are strands in modern physics which lead away from Materialism.

It is already more Aristotle and Gödel than Russell and Monod.

Materialistic science has been a detour and an enjoyable one for some, but we do not only need to re-emphasize the Western Philosophy of the Greeks and of Aristotle, but integrate into it long lived-concepts of Eastern Philosophy, where Consciousness is of vital concern. If we can make a synthesis of these concepts of Consciousness with modern concepts in physics, then, - perhaps, - we can move in territory with less Maya and more Reality, - and thus form the much needed New Paradigm.

- SOME AFTERTHOUGHTS**
1. Modern Science brought "advances" to some one third of the world. The advances brought the material living standards of the average citizens in technical advanced countries to a level not before approached, by using up resources in the earth which can never be replaced. One of the results of these changes, has been growth in the world population, which, if continued, will fill the available space needed for the necessary agriculture. The exhaustion of world oil will begin between 2010 and 2020. Before the mid century, widespread suffering and death will be seen. It seems likely that as the nation giants struggle to grab the remains of the resources, war, probably nuclear, will breakout among them.
 2. Responsibility for the coming world catastrophe might be laid on the leading politicians, particularly those in office in the USA from around 1980, when knowledge of the coming resource exhaustion had been documented. But had the politicians attempted to take the necessary steps to avoid Disaster (curtailment of consumption, raising of taxes for money needed to build new energy producing machinery, lowering of the military budget). The electorate would have expelled those in power. Democracy does not serve its populations well when it is threatened by danger which they do not understand.
 3. A far greater matter lies behind the unfortunate use of Science to offer pleasure for a Century but which removes the Earth's resources for all time. Science is the Religion of the West (CH 1) but if this is to be a long-lasting state of affairs, the scientists have to be right. Research which began a century ago in para-psychology has lead to discoveries radically adverse to many of the teachings of basic modern science. Materialism can no longer be the basis of the public philosophy. Living beings are not simply sophisticated machines. People (animals?) do not cease to exist at the time of "death" Some, in particular near "death," those dying or dead see dead relatives. Clear messages are being sent by "dead" people through sensitives. Many other startling results arises from modern para-psychology. As the reality of these results spreads throughout the population a new paradigm will emerge. The aims of life in the west will change. It will be less concentrated on the struggle to possess the greatest compensation. Warfare will decline. The new paradigm will lead to a people (The Surviving Population from Resource Exhaustion) more caring of the earth. Spiritual life will be an increasing part of what it means to be human. Life here seems to be only a component of a longer journey.
 4. Laying the blame, motives of revenge, will diminish in life in the New Paradigm, but it will be noted here that these results of parapsychology research in the last 20 years are confirmations of new knowledge which was published before 1950. Again and again, the results (published in referred journals) have been shown of Scientists but there was always a refusal to read the relevant research papers, perhaps partly because acceptance of the New Knowledge would have led to the demotion of the position held by the leading scientists. Outright denial, including accusation of fraud, has been the most frequently used methods of defense of the statues quo but the most effective method has been ridicule. Many who have had

- thier own psychic experiences have feared to report them because it has been reputation-destroying to recount experiences beyond the explanation of present science. It can truthfully be said that the scientists who refused to read the journals on parapsychology have had a strong part in leading many in the West to approach death without hope. Scientists outside the field of parapsychology, are still in a state of strong Denial, teaching students Science incompatible with modern research results. It is their refusal to look, to read, for which they should take blame, for the consequences of their rejection of the new knowledge are wide and deep
6. Many changes will come with the New Paradigm and among these will be support of research in para-psychology; special attention in the coming society will be given to the Sensitives. New methods involving electronic techniques are being developed which may facilitate contacts beyond our world.

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Science has become the mainstay of our search for truth. We look to Science to validate everything. It's worthwhile, then, asking ourselves: Where is that attitude taking us? The answer is not too good really. We are going to be feeling the exhaustion phase of oil and natural gas within the lifetime of most of us now alive. However, because we have not seen far enough ahead and built substitute machinery to draw energy from several available resources, we shall go on burning fossil fuels, even coal, - to the end. Unfortunately, this brings up the question of the CO₂ and how it will drive the temperature of the atmosphere and it seems now that we may be threatened not merely with temperatures which make life uncomfortable and eventually impossible: we are threatened by SUDDEN climate changes and eventually the icecaps on both poles will melt and the sea level rise will be more than 20 feet.

These predictions stimulate us to take a look into some of the problems of the moment and ask ourselves to what extent Science as a general fount of truth is always a satisfactory source. For example, one of the most solid facts of Science is that masses attract each other, - gravity, - but after 400 years of pondering why, we still have no idea. Like wise the attraction of magnets for each other, - are the famous rule that in Electrostatics like charges repel and unlike charges attract as the basis of much in Physics and Chemistry and yet we do not really know why this rule exists. And what is an electric field? To shine a light on Physics, - the heart of Science, - as it is in the early part or the third Millennium, - Chapter 3 of this book takes a closer look. Darwin's theory of evolution, Einstein's contributions to the Theory of Relativity, the Quantum Theory, and present ideas on, a) the origin of the universe, and b) life are all shaking a doubted by frontier thinking scientists. I've explained why.

Then comes the question of those phenomena, - some of them are very familiar to us, - which scientists, however, deny. Of course I mean ESP (telepathy and precognition), but also things like ghosts and hauntings. It turns out that some brave scientists, strong enough to withstand ridicule - have investigated these matters pretty thoroughly. Sometimes people who have just died turn up again and communicate with their loved ones. Many strange experiences occur near death and in the last 25 years psychiatrists, heart surgeons, and others have learned much from what their patients tell them. Is what is related to us glimpses of an After Life? At first when these tales became accounts and were clarified, it seemed that the news was always good, Bliss and Love, were the things we were to meet when we died. But, recently, as the data came in as it was realized that people remember the good things but try to forget the bad, there is another side to death with can be terrifying as well as the blissful side which had been so often described. At least 15 percent of the experiences are not good and act indeed as a warning that we are to take into account in our lives.

The investigation of the Great Question, do we survive death and the decay of the body, has been worked upon scientifically for about a century and the data of course are

mixed but some authors in particular the UK author Alan Gould and a US author Steven Braude have individually brought out books which are remarkable in their detail and come quite firmly, - after fighting a number of battles on the way, - to a positive conclusion: Some personalities do survive death and some of them seem to live again on the earth.

But these collections of evidence for survival bring up a great many Problems. Our bodies begin to decay directly life is gone. If there is to be "something else" which survives, which takes with it our memories and experiences, indeed our whole personalities, - then we have to ask: What is it? Over the centuries we have talked about this problem from a religious viewpoint and of course the word soul comes up, but nowadays the scientists who work in this area have concentrated upon a concept which for decades was a non-entity but now blooms forth and even tends to become the center of a developing concept. I refer to "Consciousness." The founder of Quantum Mechanics, Erwin Schrödinger, gave encouragement to scientists to embrace the concept of "Consciousness". And although he seemed to look at it for much of his writings in this way, - that this was the entity which defied death, he also said, - and what did he mean, - that there is only one Consciousness. Now most scientists feel that Survival of death is impossible because they associate the You with your body only and that certainly does not last long after the heart has stopped. Evidently, gradually, we have to make a mighty turn in public philosophy and understand that our Consciousness is like the driver of a car (our bodies) and just as, when the car gets old and broken down, we climb out and get into another one, a new and youthful car, so it seems that, at least for some of us, there is an individual something, the Consciousness which exits the body when its time has come but enters another, - and perhaps many, - in succeeding generations.

In writing rather overconfidently about these matters I may be going a bit too far too fast. There are a huge number of unanswered questions in this new area (the Science of the After Life) but my main message is that there is positive evidence, obtained in a scientific way, that is too strong to throw away in a shower of ridicule, which, tragically, so many scientists have met the early statements about it during the last 100 years. It is time for a change. A change? Well, yes, a change in the way we live and what we live for.

The last chapter in my book, *The New Paradigm*, tries to say something about that. It certainly brings a new powerful element in life if we continue to live in some way in tune with the intricacies of adjusting to the positive evidence which appears to be before us now.

My book is meant for everyone who reads. There are bits of mathematics in Chapter 3, but they're high school or otherwise freshman standard and serve to illustrate how simply the great ideas of the Quantum Theory and Relativity can be derived.

I wish my readers good fortune and I hope as much joy in learning comes to them as came to me in writing this book.

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