

False Truths

The Error of Relying on Authority

EDWARD C. MENDLER

Also by Edward C. Mendler

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Edward C. Mendler

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PREMISES

It is the nature, and the advantage, of strong people that they can bring out the crucial questions and form a clear opinion about them. The weak always have to decide between alternatives that are not their own.
—Dietrich Bonhoeffer (as quoted on the web)

Ignorance more frequently begets confidence than does knowledge: it is those who know little, not those who know much, who so positively assert that this or that problem will never be solved by science.
—Charles Darwin (from the introduction to *The Descent of Man*, 1871)

The important thing is not to stop questioning; curiosity has its own reason for existing. One cannot help but be in awe when he contemplates the mysteries of eternity, of life, of the marvelous structure of reality. It is enough if one tries merely to comprehend a little of this mystery every day. Never lose a holy curiosity.
—Albert Einstein (from a statement to William Miller, as quoted in *Life* magazine, May 2, 1955)

Our memories are *prejudiced*, in the full sense of the term, by our past history and beliefs.
—Antonio Damasio (from *Self Comes to Mind*, page 133)

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Preface

The desire to know and to understand is the essence of mind. Absent such desire, consciousness is a mere wisp of the senses. That is a conclusion I have reached over many years, and it is one of the conclusions that I will try to support in this book. While knowing and understanding are in common parlance considered to be cognitive functions of the brain, desire is categorized as an emotion. The inseparability of cognition and emotion is a salient insight of many prominent neuroscientists of today, and I will herein offer my limited understanding of their findings.

Among the ancient Greeks such a desire came to be known as *philosophia*, or the love of wisdom, associated with a thoughtful quest for knowledge and understanding of the unknown, differentiated from the practice of propounding or teaching asserted knowledge or truths, known as sophism. Now there is certainly no impetus to deny the value of teaching, but when the goal puts indoctrination ahead of inquiry, it becomes clear why “sophistry” has acquired a bad repute and “philosophy” is commonly regarded as benign. Unfortunately, however, the distinction is often lacking. There are many tenets and beliefs propounded today as being based upon “sound philosophy,” both ancient and recent, which, when analyzed, can be shown to be as specious and deceptive as the arguments of any dedicated sophist. That is another of my long held conclusions, which I will repeatedly assert and try to sustain in this work.

The subject matters of philosophy traditionally include mind and reason, perception and thought, existence and reality, materiality and transcendence, all of which have led to concepts of divinity, the nature of human beings, and their relationships to the divine and to each other. The philosophers are supposed to approach all questions about such subjects without bias, without assurance of finding an answer, and with the most humble consideration of

their own resources of reasoning, investigation and testing, and with the fairest and most efficient methods of epistemology available to them. On that subject I assert no conclusion, but accept the honesty and good will of practically everyone who is imbued with a desire to know and to understand. Yet that too is a mixed bag, and questions must often be posed about both the methodology and the goals of many of those who offer conclusions from the analyses of their thoughts.

That is to say, with the passage of all my years I find myself obliged to express some doubts. In the first place, those who are known today as great Philosophers were generally *not* humble: they thought they knew what they were talking about, that they were right, and they left plenty of written works so asserting. In the second place, what passed as epistemology for thousands of years was devoid of understanding of how we come to “know” what we think we know, and particularly lacking in awareness of the effect of biology on cognition. Many philosophers of old (and some today) are convinced that “reason” is a certain route to truth, or at least to what they deem to be the truth. On that basis I do feel entitled to scoff at the conclusions of many of the philosophers of the world, and at the methods of reasoning they employed.

You may readily observe that I am not qualified so to scoff, and that is of course true. I have not established myself as a philosopher, and do not even claim to be widely conversant with the writings of philosophers. But what is it that qualified anyone to be regarded as a philosopher; to have his conclusions accepted as representing an approach to truth? The answer in general is the articulation of a line of reasoning that seems to lead to a set of conclusions. Often in the past such articulation was in multiple volumes. That volubility seems to be perpetuated today by the demands on scholars to “publish or perish.” Nevertheless, I will rely on this one volume to express my conclusions to you. I do not pretend to be a scholar. And in the sense of having devoted my life’s work to studying and expounding upon philosophical subjects, I am certainly not a philosopher. But aren’t we all philosophers? Don’t we all desire to know and to understand?

Besides possessing that desire rather deeply, I do assert that I have available to me a vastly greater body of information than was available to any of the great philosophers of the past. They were often referred to as “natural philosophers” because they related their conclusions about divinity, human nature, values, and society, to “nature,” that is, what they perceived around themselves. They coupled such conclusions with assertions about the physical world. These assertions were often based on the observations made by those philosophers themselves, Aristotle being a particularly salient example. But the observations of nature by Aristotle and other natural philosophers of old were exceedingly superficial, beset with false comparisons and mere surmise, and usually quite wrong. The conclusions of the ancients as to

material things have been shown over and over by more carefully conducted scientific investigations to be in the main thoroughly erroneous.

Nevertheless, such assertions were ages ago incorporated into the doctrines of religions as if they were integral to the explanations of theism itself. After all, a Being possessing omniscience and omnipotence pretty well had to be the craftsman of all material reality. These ancient concepts about the physical nature of the universe and of living things were thus propagated as requirements of the faith.

That practice is now usually recognized as having been a great mistake (and possibly contrary to the views of Saint Augustine), but it took a long time to undo it. Galileo was condemned in 1632 and it was not until 1992 that Pope John Paul II acknowledged that to have been an error of the Church. Darwin's book in 1859 was vehemently criticized by leaders of the Church of England, and the acceptance of the science of evolution is still rejected by some religious organizations. The basis on which they reject evolution is that it is contrary to a "creation" concept, deemed to be essential to their theistic doctrine. While most of the major religious organizations of the world now accept both cosmological development and biological evolution as properly defined by scientists, few of the major religious leaders have spoken out with any vigor in opposition to propagation of the "creationist" assertions rejecting the scientific explanations.

Religious leaders quite understandably evince a great unwillingness to accept assertions that the findings of science, or the principles of materialism itself, bear an *implication* that theism is irrational and that God does not exist. Such assertions are nowadays vociferously and repeatedly blared forth by the militant atheist crowd, and declared as if they were certainties, not mere implications. And beyond that, the possible contra-theistic implications of scientific discoveries, as well as endorsement of the epistemological supremacy of a materialistic approach to knowledge, are frequently, though more softly, expounded by many scientists and scientifically oriented philosophers who are neither atheists nor militants.

That brings us to the question of the "philosophy" of modern science. It seems fair to say that "philosophy" *per se* has lost ground to "science" and that the true natural philosophers of today are those scientists who seek out and try to articulate the meaning of the physical data they have gathered. Have they arrived at determinations that we may all now accept as meeting and fulfilling our desire to know and understand? My conclusion, which I will seek to support, is that they have not. In fact, over the past hundred years the examinations by scientists of the details of physical things, ranging from their smallest components to the entire universe, have led away from understanding; the prevailing view is that we cannot know or understand the details of reality, but only probabilities or alternatives.

There is in that an anomaly: it used to be only the theologians who asserted that we cannot by ourselves arrive at ultimate truths and the scientists who asserted the possibility of understanding a deterministic reality. The theologians perceive that there *is* an ultimate truth, i.e., the truth of God, and that it may ultimately be known to us if and when He chooses to reveal it. There are nowadays plenty of scientists who would more or less agree with that idea, although few of them would put it in those terms, and many would deny the existence of a divine origin.

That very anomaly epitomizes the organizing thesis of this work — The Unreliability of Authority. The origins and propagation of concepts derived from authority are the subject of Chapter 1 of this book, and my thoughts and conclusions about that subject are continued and carried further throughout this work. The opposite conclusions of today among those who call themselves philosophers, theologians and scientists, as well as among political thinkers and economists of various viewpoints, are, I submit, all examples of the flaws of reliance on the writings and pronouncements of “authorities.” No matter how distinguished and prominent they may be, and no matter how embedded and persistent their views may have become, the word of authority must, I insist, in every instance be questioned and analyzed. We owe that to philosophy — to the desire to know and understand. Unless and until we have so questioned and analyzed, the presentation of any such pronouncements as conclusions, doctrines, tenets or findings that are required to be accepted or are unquestioned, must be regarded as False Truths.

When presented with conflicting or opposite versions of “truth,” we naturally ask ourselves whether we can persuade “them” of the truth of our beliefs, or can “they” persuade “us”? Probably not. Besides, any effort to talk someone out of what he believes to be true is by its nature an affront. Can we sort out the origins of conflicting truths and select the true truth? Well, maybe, to some small extent, but it would be an exceedingly difficult task to do a thorough job of it. And again, even that process, and certainly any conclusion resulting from it, is likely to be regarded by the “loser” as an affront to the integrity of his previous conviction. Can we analyze the conflicting “truths” and find in them common elements sufficient to abate or mollify any remaining disparities, reducing them to the level of debatable points on which no one but a zealot would wish to engage in conflict? Well, let’s hope so. It is that effort that warrants this book.

Now, don’t misunderstand me: I am not presenting a “balanced” view. For one thing, that would require an erudition far beyond my meager capabilities or knowledge. For another thing, I am old, I have formed definite views of my own over many years, and I see no reason not to express them. After all, I am discussing what I deem to be *false* truths! Nevertheless, I do my best to give a fair shot — or at least a passing recognition — to views that conflict with or are opposite to mine.

Finally, let me warn you before you read further that I will not be your Guru on a mountain: I do not know and do not pretend to know, what the “truth” is on most of the subjects I discuss. In fact I doubt that in most things there are ultimate answers, or “truths,” available to the human mind. I would like to persuade you to begin to entertain at least some small doubts that the things you regard as ultimate, irrefutable truths may be less than that, or may even be flawed. In short, as you may have surmised from my frequent use of quotation marks around “truth,” I reject the very idea of truth as a useful concept. All I propose is that we together seek a working understanding. It is a small beginning.

At the same time, my greatest hope is that I may have inspired you to continue to study all of the subjects discussed in this book (and many more) and that you will learn, discover, and reveal to others many new insights and understandings. If those who learn from you, choose to call your discoveries “truths,” well, I will not complain or cavil, but, no matter how great an advance in knowledge you have achieved, my hope is that you will demur and declare your discoveries not to be truths, but only new elements in the eternal quest for understanding. That will be a real — a true — beginning.

Edward C. Mendler
Wayland, Massachusetts
August, 2013

Chapter One

Reliance on Authority

ORIGINS

Almost everything we know and accept as truth comes to us from an authority of one kind or another. The process leading to our trust in authority begins in our earliest years. It is a simple observation that young children learn from their parents, accept what their parents tell them and emulate their parents thoughts and actions. There is no new psychological or social insight in that statement; in most families in most societies it could hardly be otherwise. The habit and practice of acceptance of statements of truth from authority become ingrained very early, and they apply and have an effect not only as to simple, every-day, factual matters but also as to the formation of a “view-point” about the world, or *Weltanschauung*, to use the broader German word.

In addition to the direct role of parents, most children are obviously very susceptible in their years of growth, development and learning to the influences of other relatives, the other adults who are members of the group or society in which they live, their teachers, and to the views of their peers, who are of course subject to and guided by the same sources. This naturally tends to generate a “we feeling,” in which the “we” grows from the family to the group, and then eventually to a broader society, and thereby to the prevailing views and convictions that are discerned to be common in that society. A person’s outlook on life and on one’s place and role in the world are usually and in the ordinary course formed in the early, developmental years, and they are in most cases and circumstances later modified only to a limited extent and rarely rejected.

Examples of simple beliefs and understandings from around the world can easily be imagined: There is, no doubt, a ten year old girl in the city of Ourgla on the edge of the Great Eastern Erg of Algeria, over 500 kilometers

south of the Mediterranean Sea, who knows that vast areas of the Earth are covered with oceans although neither she nor her friends, perhaps not even her parents, have ever seen one. But the teacher in her school, whom her parents have taught her to respect, assures her that the atlases and globe exhibited in the school, showing vast expanses of water around the world, are accurate. She accepts that as readily as she accepts the Muslim beliefs and practices of her society.

In Inari, Finland, more than 250 kilometers north of the Arctic Circle, the few visitors who come to enjoy the lake, the spectacular scenery and the wildlife, are unlikely to include any tourists from central Africa, but the school-age children in Inari know that there are black-skinned people; they have seen them in books and magazines and perhaps on television. Those children accept that, just as they are likely to accept both the teachings of the Christian ministers and the tales of their ancient Sami culture.

Boys working in sugar cane fields or cattle yards in Uttar Pradesh may sometimes carry cell-phones with them and they probably have seen television in the nearby village, but they have no idea about how those devices work, and their knowledge that electronics is not magic and that the manufacture and use of such wonders is now widespread, not only in India, but around the world, comes from the assurances of their elders. Also, they may think of themselves as Hindu, but they are very likely aware of the diverse cultures in their land, including Bhuddists, Christians, Muslims and other faiths and sects.

The schoolchildren in every city and town in China have by now surely been regaled with stories of their country's great achievements in the design, construction and launching of rockets into space, and its plans for future grand ventures to the Moon and perhaps beyond. While the idea of travel off the Earth and into outer space is beyond their comprehension, they accept it all as true. The glorious history and achievements of their nation have been explained to them, and they may have learned of the existence of various religious beliefs, but it is unlikely that they have been encouraged to adopt any such belief.

And in many a city and town in America there are children who are presented daily with examples of the wonders of this country and its dedication to freedom, though they may be puzzled by the prevalence of diversity of views about politics, economics, science and religion. Many of them attend church with their parents, reciting prayers and pledging love and devotion to Jesus, the son of God. They have been assured that the Bible is an authentic source of knowledge and that their acceptance of it is very important, and of course they do accept it all as true.

Everywhere in the world those children of today will be the adults of tomorrow, and by and large they will cling to all of their already formed beliefs as truths. In many cases they will have had further education, they

will have traveled, and they will have learned much more. In most respects they will have confirmed to themselves that the simple truths they learned in their early years are indeed truths: there are oceans as well as great dunes of sand, there are people with black skin as well as white and tawny, electronics is a physical phenomenon, not magic, travel into space is possible, and American democracy is a hallmark of human freedom. Most of them will also have come to feel that devotion to the culture of one's country, and often to one's religion, is of great importance.

Some of them will have gone on much further with their learning and their understanding, and will have developed careers in many different fields, such as oceanography, climatology, agriculture, animal husbandry, medicine, computer programming, design, production and sale of manufactured goods, aeronautics, rocketry, astronomy, law, arts, sciences, teaching, religious ministry, human welfare services, military services, government, or other pursuits of various designations. Both their studies to prepare for such careers and the actual pursuits and human interchanges involved in such work will have had potentially broadening effects. They will have been exposed to at least part of the vast bodies of thought and knowledge that have been accumulated over the ages, and they may have absorbed or been influenced by some of it.

CONSEQUENCES

The nature and scope of that influence is, however, often very tenuous and superficial. An example is the awareness, which can hardly be escaped by anyone, that modern science perceives of a universe of hundreds of billions of galaxies of which the Milky Way is only one, containing our sun and its planets as minor components. That assertion is normally accepted, often with a shrug as to its pertinence. It is regarded as a determination made by persons who are quite acceptable as authorities in their field, but that does not alter the understanding, the beliefs and the commitments, derived from the earlier authorities that shaped one's general outlook on life and reality. Regardless of the size of the universe, there remains a belief among many, perhaps most, people that the Earth and life on it, particularly human life, are fundamental to the reality and meaning of the universe.

That effect lies at the root of the issue and thesis posed by this book, and is of course a subject to be returned to below. It is essentially a matter of culture, and the effect of culture on epistemology.

In any event almost all of those people, whether or not they have gained expertise or success in any of those or other fields, will, in the course of their daily lives, their integration as adults into the society in which they live, and their increasing exposure to dissemination of information throughout the

world, have renewed or reconfirmed some of their earlier concepts or ideas into new and broader form and scope than those they learned in their earlier years. They will have rekindled or reformed, or sometimes acquired and adopted, views and convictions on such specific areas and subjects as ethnic and social relationships, esthetics, technology and science, weather and climate, economics, law and government, and of course, religion; that is, on all of the subjects usually comprised under the rubric of philosophy.

These adult formulations of opinions will often — in the ordinary course, usually — seem to these people, wherever they live, to have grown with them, to be the natural, inevitable or undeniable outcome, consequence or conclusion from the truths they had learned and harbored as children, and therefore to be themselves truths. Yet they will also know, because of that very globalization of information, that there are different, often widely divergent, conceptions and viewpoints with respect to nearly every one of the truths to which they are beholden. The existence of such diversity is today known to everyone: what is true for me, or for us, may not be true for you, or for them, and vice versa.

That final awareness seems to come to us all; it cannot be avoided or escaped, and it has had two opposite effects. First, it has led to great efforts to find and implement means of avoiding antagonism or conflict between or arising from disparate views. Those efforts arise in part out of the simple altruism and good will that lies in the hearts of most human beings, but also out of the fear of conflict among people with long memories of suppression, of wars, and of the weapons of devastation that science has now brought forth. Those efforts include religious ecumenism, interfaith alliances, non-governmental organizations providing social and medical services across national borders, elimination of practices of racial and ethnic discrimination, openings toward cultural diversity, readiness to recognize alternative lifestyle practices, encouragement of international trade, acceptance of variant ideologies in the political arena and at the international bargaining table, and the development of international organizations such as the United Nations and its many agencies.

All of those efforts have come a long way, and all remain essential to the preservation of peace and sanity in the world, but of course they have not achieved a reconciliation of conflicting truths. In fact, to some extent many of these efforts have contributed to the second effect, which is a hardening of commitment to the “Truth” as perceived by those who espouse it. Truths are truths, and they don’t go away, even when they are opposites. The adherents of a “truth” may sometimes engage in proselytization, but even when they do not, they rarely fail to make it clear that their hope, their desire, is that the other fellows will, somehow, be persuaded of the adherents’ “truth.”

The persistence of commitment to concepts of truth as being necessary, undeniable or eternal is of course particularly characteristic of religious be-

liefs. There is today a widespread (and very propitious) emphasis on tolerance of “other” religions, but the tolerance is aimed at people and not at their beliefs. One would expect a Christian to have a humane respect for the personal dignity of a Muslim or Hindu, but not to accept their views as valid. And one would expect the Hindu or Muslim similarly to respect the Christian, and even to honor Jesus as one of the great prophets of history, but not to accept his divinity. In each case one may go beyond mere respect and acquire an understanding and even acceptance of the faith, loyalty and virtue of the other. But that still is not an acknowledgment of an alternate possible truth. The basic tenets of each religion are deemed by their adherents to be “givens,” that is truths, defined as constituting reality, certainty, or irrefutable facts.

Such certainty comes from authority. For the majority of adherents of each religion, the operative force of authority is, as described above, the normal process of growing up, of developing and forming a mindset, an outlook, an accepted body of commitments, that derive from and reflect those that were prevalent in one’s youth. On top of that there is the directly asserted authority of those whose role in society is to expound and perpetuate the tenets of the particular religion; that is, priests, ministers, mullahs, rabbis. And then there are higher authorities, such as popes, bishops, patriarchs, ayatollahs, as well as theologians and scholars who explain the origins of the tenets and expound their truth. Coupled with such authoritative sources of religious beliefs there are governmental sources of authority that have powerful effects, not only when exerted by satraps or tyrants but also when asserted by democratic and pluralistic governments.

In the face of all of that there is very little opportunity, and even less incentive, for any adherent, or “believer,” to question the bases, the roots, of the religion he espouses. Of course in the world today one can hardly be unaware, not only of the diversity of viewpoints as referred to above, but also of the existence of vociferous assertions of atheism and the presentation of “science” as opposed or alternative to “religion.” However, those contrary assertions are themselves usually seen as mere refutations of established and accepted authority. The loud expounders of atheism are not seen as having any authority of their own for their views, and are usually dismissed as contrarians who have some ax to grind with organized religion. Furthermore, the opposing of science and religion is generally not supported by authorities in either field, but is more often little more than media puff aimed at boosting the views of either a particular scientist who does have a gripe against religion or the views of a religious group that does assert a particular scientific theory to be contrary to their beliefs. The salient example of the latter is of course the assertion that “Darwinism” or evolution in general is contrary to belief in creation by God. While the “creationist” rejection of biological evolution has justifiably been criticized by many writers, both scientific and

religious, who may properly be regarded as “authorities” in their fields, that has not disposed of the subject.

There is in fact a continuing tension between religion and science. That is far from a new phenomenon, but traces from the very origins of religious, or even spiritual, thinking. Anthropologists and historians have described practices of animism, shamanism, spiritualism, and the like, leading eventually to great spiritual beliefs embodied in Buddhism, Hinduism, Taoism, and varieties of each, and then to multitheistic or pantheistic religions, and ultimately to the monotheism of the Abrahamic religions: Judaism, Christianity and Islam, which contemplate a single supreme being.¹ From the very beginnings of such spiritual feelings among early *homo sapiens* to the articulation of the complex belief systems of modern religions one of the principal motivations has been to understand the phenomena of the world in which we live: that is, science.

That quest to understand and to define the reality of the actual world reached its first intellectual peak at the time of the ancient Greek philosophers, beginning perhaps with Thales of Miletus and Pythagorus.² In the 3rd century B.C. Plato and Aristotle left great philosophic works of long-lasting influence, particularly on later theological concepts. They wrote about the nature of humanity, the nature of thought, the nature of physical things they observed, and the relationship of such observations of the physical world to their concepts of the soul and of a transcendent reality. They were later accepted by theologians, in ancient times and to some extent still in the modern world, as the preeminent authorities on all of those matters of philosophical thought, on the very processes of intellection and reasoning, and also on their “scientific” determinations, that is, conclusions with respect to physical things.

Therein arose the problem and the origin of the conflict between “religion” and “science.” In a nutshell, the problem might be described as essentially that on scientific matters Aristotle was wrong, usually dead wrong. Nevertheless, the philosophical and theological acceptance of his authority carried forward those erroneous conclusions for a thousand years, and the conflict did not arise until Galileo aimed his telescope at the skies and reported what he saw. The principles of commitment to authority and to absolute and unchanging truths had become essentials of religious faith and could not easily yield. But eventually they did yield; the error of the cosmology of Aristotle and Ptolemy is now universally recognized, and in that respect at least the conflict between religion and science is no more.

Yet there are still tensions. They persist for several reasons. The first is that religious beliefs long ago encompassed many concepts (beyond cosmology) about matters of physical reality that have have now been modified or at least drawn into question by modern science. The second, the other side of the coin, is that more recent analyses of the philosophical tenets of Plato and

Aristotle that formed the basis of medieval theology and were brought forward in the Renaissance, have shown them to be of dubious validity. The third is that the role of “authority” itself as a guide to truth is unreliable and likely to be dangerous to human well-being. In addition, there are related thoughts and considerations that contribute to the tension. One is that there were ancient Greek thinkers other than Plato and Aristotle whose ideas conflicted with theirs, and if followed might have led us all to different conclusions. Another is that the concept of human nature, based in important respects on the views of Plato and Aristotle, has been drawn into question, if not refuted, by modern studies.

Furthermore, the philosophical writings that account for and lie at the root of most modern religions dealt with many aspects of human nature and society other than spirituality or theology. The same authors wrote about “human nature,” which led naturally to concepts of society, government and economics. Those earlier philosophers left their traces upon and with later thinkers and writers who did not directly concern themselves with religious, spiritual or theological concerns, but wrote only about societal relationships, government and economics. Often the old ideas about “human nature” lurk in or are even expressed in the more “modern” writings. But today there are new insights into human nature, and there have been developed new concepts of the characteristics of human nature, and consequently diverse approaches to policies and structures of governmental and economic management of society. Those new concepts are often widely divergent, and themselves contribute to conflict in the world today.

Those are all subjects that I wish to explore and discuss in this work. That involves of course the direct and deep questioning of some of the basic tenets of religion. It also involves substantial, if selective, review of various aspects and assertions of modern science. And finally, in order to reach the underlying issue of the nature and condition of humanity, it is necessary to discuss human nature, society, government, law and economics.

In each case my focus is on the sources of the prevailing views; I mean to question all “authorities,” both ancient and modern. As mentioned in the Preface, I often disparage even famous, highly-respected, philosophers, theologians, scientists, historians, economists and political theorists. It is in fact their own thoughtful, intellectual analyses in which I find so many elements that I perceive as falsity. And since my reliance is on intellectual analysis, I often turn to the most recent scholarship in those fields, including studies and understandings that hardly existed until the 20th century, or in some cases, like the neuroscience of the brain, until very recent decades. The aim of my work is, as noted, to find and identify the *falsities* that lurk in so much of what both “we” and “they,” and our predecessors, have long regarded and accepted as unquestionable truth.

The focus of this work is of course on matters of interest and concern in America today. The thoughts that I express on religion relate specifically to monotheism, and particularly to Christianity. My views on government, economics and other matters of a societal nature relate distinctly to the America of the early twenty-first century.

Nevertheless, I began this chapter with references to childhood truths from different countries and cultures around the world for several reasons. In the first place I want to emphasize that wherever we live we all come to our adult convictions in essentially the same way, progressing from our youthful years into adulthood, and that in that process we are all very much affected by the now nearly universal dissemination of information, including particularly the information that we, as adults, often have widely disparate views and mindsets. The second point is that such disparity cannot be the basis of our holding that our views and convictions are “true” and theirs are “false,” nor of course the inverse. Convictions of “truth,” however firmly held, do not and cannot justify themselves.

NOTES

1. The three Abrahamic religions together claim at least 3.5 billion of the world’s population. Other religions often embody concepts that include many of the elements of “theism,” including transcendence, ontological dualism or hypostatization of concepts, and universality.

2. Except perhaps in China, India, the Arab world, and maybe elsewhere. I do not mean to slight other cultures or their spiritual and intellectual achievements of which I am ignorant.

Chapter Two

The Story of Beliefs

HOW THE ANCIENT GREEKS MISLED US

Let us begin with Plato, echoing Socrates.¹ In a nutshell, he asserted that what we observe — the objective world — is just a sort of shadow or an incomplete and imperfect representation of what really exists. We may think we observe such things as beauty or justice or goodness, but those are in effect delusions or at most partial truths, and not reality. The true reality, he said, is the absolute Form (capitalizing the word, as is customary for discussion of Plato) of Beauty, Justice, Goodness, and whatever other ideas or concepts that you want to describe and capitalize. That approach to an explanation of reality is of course dualistic. It asserts that our senses may detect one aspect of reality, but there is another reality. The process of ascribing a generalized mental concept into an independent, idealized form having an existence of its own is called hypostatization. The word comes from Greek sources.

What possible justification is there for hypostatization of concepts, ideas, or observed phenomena, into separate, abstracted realities? One may surely observe that some apples are better than others, that some combinations of colors or sounds are more pleasing to the eye or ear than others, that some men are more fair or just in their dealings than are others, and even that human beings in general exhibit through their conduct and their words a sort of aura or “spirit” that goes beyond and cannot readily be explained by the mere existence of their flesh and bones, which are, after all, very similar to those of mere animals. But how does observation of similarities and variations lead to a conclusion that there *must be* an absolute form or an essence?

That conclusion does not follow; it doesn't even make sense as a possible description or explanation of observed phenomena. It is just — no more nor

less than — a construct of imagination. Now imagination is surely a wonderful expression of the faculties of the human mind — to be admired and valued — but what is imagined may or may not be “true” or have a standing of or relationship to reality. When it came to the observed manifold similarities, variations and diversities of such things as men called beauty, justice, goodness, and spirituality, nothing like an explanation was available to Plato; he had no inkling as to how the human mind was formed, developed or worked. If Plato thought of his Forms as absolutes, he was wrong. However, some historians of philosophy have observed that Plato himself seems to have harbored at least a few doubts and regarded the Forms as hypotheses or mysteries.

There certainly were mysteries. The very perception of physical things was a mystery. What is sight? Is light a substance like fire? Do our eyes project it or receive it? Is sound a quality of the air? Why do some contacts of body to body produce feelings of joy and ecstasy and others only pain. Neither Plato nor any of his contemporaries had answers to any of those questions, though they posed them and thought about various possible answers. They discerned motions of heavenly bodies and changing shadows, and arrived at some conclusions about distances and the shape of the earth. They saw fundamental differences between earth, air, fire and water, and concluded that those constituted the elements of stuff.

Beyond that, they wondered about mind, thought, perception itself: what are they and where do they come from? The Greeks of those ancient times spoke with each other and wrote about such things, and marveled at language itself and the ability of human beings to communicate in ways that no other creatures could. They had not only thoughts, but feelings, and they came to appreciate that there were distinctions between beauty and ugliness, good and bad, justice and injustice. And among them it was Plato who carried such thoughts forward and articulated them at length, ascribing most of his conclusions to the master of his youth, Socrates, who left no writings of his own and was said only to have posed questions.

It quickly becomes evident to anyone who has read any of the Socratic dialogues that the questions posed are not inquiries, but are closer to suggestions for response with which Socrates can then agree and on which the next question can elaborate. This so-called Socratic method will, I suppose, be familiar to most first year law students and others who have studied methods of argumentation and persuasion. The professor who is in charge of framing and asking the questions always wins the debate.

The historic analysts of the ideas of Socrates, as set forth by Plato, find therein rejection of observation as a source of knowledge, rejection of empirical study, and instead assertions that knowledge comes only from insight into the divine, that sensory perception is opposed or contrary to reality, and finally the concept that a human being has a separate, and presumably eter-

nal, essence, called a soul. These conclusions of Socrates and Plato are thus mental games; they are not derived from or intended to be related to observation or testing of the physical surroundings of the world. They are conclusion devoid of any basis other than Socrates' or Plato's own mental constructions. They are not entitled to acceptance as rational or even as reasonable; they are on the face of them irrational and unreasonable conclusions, and are wholly unsupported.

I wish to suggest that hypostatization of abstract concepts is wrong, illogical, unreasonable and unacceptable. The process of hypostatization of concepts into asserted ultimate realities was eventually embodied into a more generalized philosophical approach and ordained as "ontology," the study of "being" as a reality. The idea is simply that there are ultimate realities of everything. A seminarian studying "ontology" may explain to you that there is an essence of "chair," while the diverse objects that you may regard as chairs exhibit some of the characteristics of the actual ontological essence. I wish to suggest that ontology in that form is also a false approach. That is not to say that the word itself should be eschewed. The concept of ontology is useful as a measure of a possible actuality that may not have been observed or may not be susceptible to observation. That concept is an important element of epistemology, but, I suggest, should not dominate or override the elements of the process of knowing that depend upon the workings of the human brain that are dependent upon the body and the sensory systems therein.

Then we come to Aristotle. He was the star pupil at the school established by Plato. The school itself was a success and established the value of organized schooling for a democratic society. Aristotle, was another prolific writer, whose works survived and then were later used by Christian philosophers to support the doctrines that had been developed in the earliest times of the Christian church, following from Judaism and from earlier religious concepts. Besides that, Aristotle tutored Alexander the Great and thus his ideas may have reached into the realms of various subject peoples.

While Aristotle did not accept Plato's "Forms" as having a separate reality of their own, he certainly did not reject the Platonic concept of there being a reality separate from what the senses alone reveal to us. His refinement of Plato's concept began much more specifically with observation of what our senses do in fact indicate to us. Unlike Plato, he did not denigrate observation, but insisted on it as a starting point. Because of that, his method is today often lauded as being more "inductive" and "scientific" than Plato's. He did consider actual substances as the starting point of inquiry and did in fact engage in biological and other studies of nature.

Nevertheless, in many respects Aristotle is surely more assertive and conclusory than Plato, however deductive and *a priori* were Plato's methods. After all, Plato presented his ideas through Socratic dialogues, nominally a

series of questions and answers, while Aristotle's writings are far more directly assertive and conclusory. He certainly did further dualistic and ontological concepts — so much so that one cannot study philosophy or theology today without being steeped in them as the essential elements, but his conclusions are still no more than the product of his own mental constructs.

A key to Aristotle's approach is his concept of hylomorphism. The idea is that observed substances and qualities possess in themselves a series of inherent forms, changing from the imperfect to the perfect. Everything must, he asserted, begin with or arise from a "potential." He perceived seeds growing into plants, larvae changing into insects, babies growing into adults — all forms of progression from a "potential" towards an "actuality."

Then Aristotle sets out to explain how such changes come about. He describes four "causes" of change: the "material cause," being the material or substance out of which something is made; the "formal cause," being the plan for making it; the "efficient cause," being the action or process of changes by which the intended product is actually produced; and finally "the final cause," being the purpose which the product or change is intended to serve.

The final "cause," that of purpose, is the essence of Aristotelian teleology. He assumes, but does not support the proposition, that every change, everything, has a purpose, and that the very concept of purpose requires some intelligent source. That leads him of course to the concept of design: everything that comes to meet the final test of fulfilling a purpose must reflect a design by some intelligence of the end result. The basis of this contention is the concept (briefly stated) that a "potential" cannot arise by itself, so there must have been an "actuality" existing for every potential that we observe as they progress towards an actuality, however incomplete. As we will note below, Thomas Aquinas later set forth the concept, perhaps more succinctly.

Now if one is talking about making a new garment to wear down to the Agora, Aristotle's four elements of cause aren't a bad set of descriptions. Start with some cloth, design a tunic, sew it up into the right shape, and Lo, it will meet the purpose of one's being properly dressed for shopping downtown! Even if one is talking about a plant, part of it makes some sense. Put a seed in the ground, water and tend the soil, and eventually a plant appears. The kind of plant depends on the kind of seed. Is that a "plan"? Is there a "purpose" inherent in the seed? Even if we say that the plan and purpose of a cabbage seed is to make a cabbage, and the plan and purpose of an acorn is to make an oak, how does it follow that the different plan and purpose of each must have been designed by an intelligence?

Those questions are more than a quibble about Aristotle's terminology. He makes Purpose into a guiding principle for the determination of "being" and reality. He starts with the concept that the basis of "being" is either Potentiality or Actuality. Potentiality is an unformed, incomplete, suscepti-

ble-to-change status. Actuality is the perfected form (or “final cause”) of the change. He says that “beings” generally are composed partly of potentiality and partly of actuality. Total or pure potentiality cannot exist by itself because (he asserts) something cannot come out of nothing, but at the same time every being has some potentiality in it.

There is of course an appealing logic to some of that. It passes as “common sense” that there is a “cause” for everything, and it is observed that things ordinarily grow or develop from simple to complex forms. No reason to reject that!

But Aristotle inserts an exception. He contends that motion or change cannot be eternal, and thus that there must have been an unmoving mover. An unmoving mover could not have been Potential, but must have been Actual. And therefore, he concludes, there must be a pure Actuality, a final, completed being; that is: God. Now, as we all admit to ourselves, infinity of time or motion is hard to imagine; it is, as they say, counterintuitive. But Aristotle didn’t demonstrate anything; he just said there must be a God. He posed a question to which there was no available answer, so he made one up — and declared it to be necessary! The key to his conclusion is the assertion that there is a Purpose inherent in every cause, and he did not even offer any explanation or “proof” to support that proposition.

Did you get all that? I have surely cut corners and paraphrased the lengthy and detailed explanations of Aristotelian philosophy, even as they appear in popular encyclopedias. Aristotle is complicated! But I hope that you have — along with me — detected several rather glaring errors of logic in that reasoning. He makes assumptions, but does not support them. He assembles diverse concepts into arrangements that do not fit, do not make a pattern or a fabric. His principal assumption is that there must always be a purpose — the teleological premise, which is said to derive from Socrates’ contention (or Plato’s assertion thereof) that “Whatever exists for a useful purpose must be the work of an intelligence.” I don’t think that aphorism, whatever its source, can even begin to justify a belief in an incorporeal being with omniscience.

Bertrand Russell said that “almost every serious intellectual advance has had to begin with an attack on some Aristotelian doctrine.” Incidentally, Russell also called Aristotle’s ethics “repulsive,” and his logic “as definitely antiquated as Ptolemaic astronomy.”² Nevertheless, Russell points to the great advance in thinking about such issues that Aristotle made beyond all his predecessors. Without a doubt we all must honor and be forever grateful to the ancient philosophers, perhaps Aristotle in particular, for they introduced the processes, the techniques, the habits of thought, that formed the bases of what is today called — not philosophy — but science.

Plato and Aristotle were of course not the only ones, nor were their conclusions exclusive or even primary in their own day. There was, on the other hand for instance, Democritus. He and his mentor, Leucippus, were

materialists who held that the world could be explained by natural laws. They were the first to assert the theory that all matter is made up of atoms. They proposed mechanistic analysis and determinism. They asked How something happened, and what came before to make it happen. They did not ask Why something happened nor seek to define “purpose” or “final cause” in the Aristotelian manner. Democritus studied and wrote about many scientific and philosophic subjects, and is sometimes referred to as “the father of modern science.”

His ideas, thoughts and works, if carried forward, could possibly have lead the world to far more rational understandings. But Democritus and Leucippus were from Thrace, and were ignored, if not rejected, by the Athenian philosophers. Bertrand Russell cited an ancient Athenian authority as saying that Plato disliked Democritus “so much that he wished all his books burnt.” And Aristotle, having been born in Thrace and later moved to Athens, was well aware of Democritus’ thoughts, and often criticized them. Aristotle declared that there were (no questions asked or allowed) four elements: fire, air, earth and water, plus aether, his own addition; and he rejected the atomic theory, insisting that the elements were “continuous.”

More significantly, he rejected mechanistic and deterministic analyses and insisted on his teleology.

In any event it seems a shame that the false, or at least dubious, ideas of Plato and Aristotle prevailed as if they were final, irrefutable conclusions, and have had such great and so persistent an effect on philosophic and scientific thought for the past 2400 or so years. That came about in part because of historical happenstance. As noted above, the school that Plato founded in Athens was a significant success and Plato’s best pupil, Aristotle, was another prolific writer, whose works survived and then were later used by Christian philosophers to support the doctrines that had been developed in the earliest times of the development and propagation of Christianity. If, instead of the works of Plato and Aristotle, the works and thoughts of Democritus had been carried forward, would the world be different today?³

Bertrand Russell not having been around to advise, Christian philosophers from the early years on looked to Plato and Aristotle as sources. Maimonides and other Jewish philosophers and Averroes and other Muslim philosophers also turned to Aristotelian theology as a source.

THE MIDDLE AGES MUDDLE

Among the Christians, first Augustine and then Anselm⁴ (both being Saints) started with a reliance on the observation of instances or things called “just” or “good,” and concluded inductively that there must be some absolute standards for such, and therefore an absolute Being who caused them to exist.

Incidentally, Augustine⁵ criticized “reckless and incompetent expounders of Holy Scripture” because of their rejection of knowledge of the “earth, the heavens, and other elements of the world” derived from “reason and experience.” He also used an Aristotelian concept of “potentiality” to account for later appearance of life forms through a process that we would now call “evolution.”

Anselm, seeking to go beyond inductive reasoning, referred to God as “that than which nothing greater can be conceived,” and argued that if such as that existed only in mind, or in conception or intellect, then it couldn’t meet the test of that definition because in the mind it could be conceived to exist in reality, that is, beyond being “conceived.” Therefore, he argued, “that than which nothing greater can be conceived” must in fact exist in reality. That is called “the ontological argument.” That argument is no longer in much favor, having been criticized by no less than Aquinas and Kant.

Then came Saint Thomas Aquinas. In his great work, the *Summa Theologica*, completed in 1273⁶ Aquinas relied on Aristotle to support his contention that the existence of God and his essential characteristics could be shown by “reason” based upon information derived from the senses. He offered an “ontological” argument of his own, based on his version of sense data, and like Aristotle purported to rely on inductive reasoning from observation of common phenomena to discern cause and effect. Of course he devised postulates to explain the observed phenomena, and of course he adopted Aristotle’s theory of causation and his concept of complete Actuality, called the entelechy of being. The word “entelechy” is an English version of the ancient Greek word meaning “actuality,” perhaps an example of the tautology that pervades the arguments.

To make the point clear (while risking being repetitious), the essence of the arguments of Aquinas, based on Aristotle, may be summarized as follows:

Growth and change are observed phenomena. Change involves cause and effect; the cause is “efficient,” which means that the result resides in it. The creatures of the earth, and the earth and firmament themselves, all came to be by some cause which contained all of that in it. With respect to each creature, each thing, there is a final, ideal, form, a perfected form, the entelechy. An actual thing or being cannot come to exist unless the cause contained a potential for it. The potential for everything that exists resided in the original cause, a pure potential. But something cannot come from nothing. Therefore, the original cause, a complete potentiality for everything that exists, must be a complete actuality, the entelechy of all creation.

Aquinas concluded of course that that is God. Then Aquinas noted that such things as knowing, power, creativity, goodness, etc. are observed among the creatures and things of the earth, and, still following Aristotelian

induction, he ascribed all of those qualities to God in, of course, completed or perfect form — omniscience and omnipotence.

While asserting such “reasons” to prove the existence and characteristics of God, Aquinas, like most of his predecessors and those who followed as Christian theologians, asserted that “faith” comes first, and the proofs of God by reason are only (assertedly valid) supplements.

We will consider below both the “efficiency” of cause and the nature of “faith.”

WE ARE NOT ENLIGHTENED

René Descartes is said to have rejected Aristotelian precepts, including the teleological explanation of cause, and that of course did not stand him well with the Roman Catholic Church. When Galileo was condemned in 1633, Descartes decided to defer publication of a treatise on which he had been working for years.⁷ When he did publish, Blaise Pascal, a contemporary, charged that Descartes’ ideas were deistic.⁸ Although Descartes considered himself to be a devout Roman Catholic, in 1663 the Church finally placed all of his works on its Index of Prohibited Books. We are of course not here concerned with the depth of Descartes’ faith, but only in analysis of the philosophical ideas he expressed.

The essence of Descartes’ approach to understanding of the unknown is, in a word, “reason” (or his version of it.) He began, nominally at least, by rejecting all concepts subject to doubt, and then sought to think up, or reason, what is knowable or true. He asserted that the senses were unreliable. His famous example is a piece of wax which initially had characteristics identifiable by the senses of sight, touch, smell, etc., but when exposed to flame or heat, lost all of those characteristics. He concluded from that (and other examples) that his sensory perceptions were unreliable, and that his only source of understanding of the essence of what wax was would be his mind, his judgment, his reason.

He perceived that he was in fact thinking; and having rejected sensory sources of perception as unreliable, he concluded that thinking, i.e. mind, was the only reality. That is, he concluded, the essence of an individual self is the mind. It follows, as he asserted, “I think, therefore I am,” or *cogito ergo sum*. It also seemed to him to follow that mind, or consciousness, was the essence of the soul. Like Plato, he separated mind and body, regarding mind as a separate, independent thing, having no “extension” of physical reality.

In his treatise entitled *Meditationes de prima philosophia, in qua Dei existentia et animae immortalis demonstratur*⁹ (translated in French as *Méditations Métaphysiques*) he set out (in Meditation III) to give arguments of reason to demonstrate that God exists. His first argument is a combination of

the concept that “something cannot come from nothing” with a somewhat nuanced version of Anselm’s “ontological” argument, i.e., that the existence of the idea of God indicates that God must exist. The second argument turns on a teleological analysis of the “cause” of his existence (which in his terms is his mind), and the rejection of the alternate possibilities of: himself, eternity, his parents (leading to infinite regress), or a source “less perfect than God,” which to his thinking left only God. Tying these together, Descartes equated his own idea of God and thus God’s reality as being just as “self-evident” as was his conception that “I think, therefore I am.”

There is no fair basis for rejecting Descartes as among the great thinkers of the past, but there is also no ground for finding in his conclusions any fundamental breakthrough; his analyses remain essentially dualistic and do not come to grips with the issues of either the nature of causation or the operations of the human brain. As to the latter, based on the very meager knowledge of brain structure then available, Descartes attributed reasoning to the pineal gland, which is wrong.¹⁰

Neuroscientists of today, who do now have a good deal of knowledge of brain structure and understanding of how the brain works, are specific in their rejection of Descartes. For instance, in his book, *Synaptic Self*,¹¹ Joseph LeDoux takes on some of Descartes’ flaws, and Antonio Damasio wrote a seminal book in 1994, entitled *Descartes’ Errors*,¹² in which he did indeed describe the processes by which mind arises in the brain.

When it comes to mathematics, however, we all need to applaud René Descartes. Without his insights we would not have the system of Cartesian coordinates, nor an integration of algebra and geometry into an analytic system, and would possibly not have had the development of Newton’s fluxions or Leibnitz’ calculus.

About 100 years later Immanuel Kant did truly provide several elements of enlightenment. By that time it was known that our visual perceptions arose from the reflection of light by objects into the eye, the focus of an image onto the retina, and the transmission of nerve impulses into the brain, which then mapped a mental representation of the object. The means by which the brain did this mapping was then almost wholly unknown, but Kant had the insight to understand that it involved the ordering in the brain of elements of time and space and some sort of chain of reasoning, and that the same kind of mental activity of the brain results from other sensory inputs. In short, he concluded that there was an inseparable relationship between sensory experience and our reasoning about it.

In his most famous work, *Critique of Pure Reason*,¹³ he rejected the metaphysical approach of “pure reason,” recognized to some extent the experiential basis of knowing, and sought to synthesize the two into a new epistemology of understanding. In doing so he said he was proposing a “Copernican revolution,” suggesting that metaphysical understanding was no longer

singly a product of mind, but depended upon an integration of perceptions of the senses with cognitive analysis.

At that time there was, as noted above, practically no understanding of how the central nervous system and the brain actually work, either as to reception and transmission of sensory input or as to the mental mapping of images and concepts. The lack of knowledge left the door open, as it always does, to the room of unfounded conclusions. Kant made perfectly valid distinctions between “analytic propositions,” or statements of the type we would call redundantly or tautologically self-evident, and “synthetic propositions,” or statements of concepts or ideas that depend on some additional knowledge of the subject or its context. So far so good, but Kant did not accept the prevailing opinion of philosophers of disparate schools, such as Hume and Leibniz¹⁴ that the knowledge supporting such a proposition required an external source, such as experience or testing. To the contrary, Kant proposed that there are preconditions or *a priori* forms or concepts that precede or underlie any knowledge acquired by experience.

His analysis led him to the further conclusion that our cognitive understandings based upon sensory input, or experience, can produce only “appearances,” and that knowledge of a “thing in itself” (*ding in sich*) is impossible. This represented a reversal of some of the ideas he had previously expressed. It was a sort of return to Plato, whose thoughts Kant had in earlier years adopted and rejected. He forthrightly acknowledged the basis for this reversal as his commitment to belief in God, immortality of the soul, and human freedom, saying: “Thus I had to deny knowledge in order to make room for faith.”¹⁵ Since God, immortality, freedom, and other hypostatized abstract concepts fall into the category of things in themselves, they are not susceptible to being established by science, i.e., by investigation through sensory perceptions, nor by the same token are they susceptible to disproof. Therefore, he contended, belief in them is justified because they comport with traditional morality, the keystone to which he held to be human freedom. The analysts refer to these concepts as Kant’s “transcendental idealism” or “metaphysics of morals.”

Kant held human freedom to be an axiomatic basis of morality, which in itself justified our acting as if (*als ob*) God exists. These views are comparable to those of his contemporary Voltaire, who also prized freedom and who said that “if God did not exist, it would be necessary to invent him.”¹⁶ The essence of Kant’s conclusions are that observational science cannot by itself justify a belief in God, nor can reasoning, unless there is injected into it an *a priori* conception. Many later philosophers have pointed to flaws in Kant’s analyses and to conflicts and discrepancies in his conclusions. Kant himself held that Christianity supported reasonable and natural morality and that the truth of its supernatural assertions was irrelevant. At the same time he expressed strong criticisms of ecclesiastical structure, ritual and superstition.

The time of the Enlightenment when Kant wrote brought new developments not only in philosophy but also in sciences, particularly astronomy and geology, and he contributed to those as well. He wrote about the effect on the earth's rotation of the frictional resistance of tidal currents. In 1755 he surmised that the fuzzy nebulas observed among the stars were probably themselves galaxies of stars, separate and distant from the Milky Way — a conclusion not established until well into the 20th century. With respect to his concept of God, in addition to his injection of an *a priori* mindset, he offered the *a posteriori* concept that the observed material world itself is so ordered that it implies an ordered, designed, universe. One can wonder if modern quantum theory might have changed his mind on that point.

NOTES

1. Since Socrates left no writings scholars wonder how much he said and how much Plato attributed to him. Thomas Jefferson said in a letter to William Short, quoted in the Stanford Encyclopedia of Philosophy: "When, therefore Plato puts into his [Socrates] mouth such paralogisms, such quibbles on words, and sophisms as a schoolboy would be ashamed of, we conclude they were the whimsies of Plato's own foggy brain and acquit Socrates of puerilities so unlike his character."

2. Bertrand Russell, *A History of Western Philosophy*, Simon & Schuster, 1972.

3. Of course Democritus' pronouncements on the physical world were also often erroneous.

4. See encyclopedia articles on Saint Anselm.

5. See encyclopedia articles on Saint Augustine, and articles by Howard J. VanTill in journal of Science and Christian Belief.

6. English translation available from sacred-texts.com or NewAdvent.org.

7. The substance of his withdrawn *Treatise on the World* was published in 1637 as essays on *Discours de la Méthode* (Discourse on the Method), *Les Météores* (The Meteors), *La Dioptrique* (Dioptrics) and *La Géométrie* (Geometry).

8. Pascal said (as variously phrased in translation): "I cannot forgive Descartes; in all his philosophy, Descartes did his best to dispense with God. But Descartes could not avoid prodding God to set the world in motion with a snap of his lordly fingers; after that, he had no more use for God."

9. In English the latin title means: Meditations on first philosophy in which the existence of God and the immortality of the soul are demonstrated.

10. As pointed out on the website of the Stanford Encyclopedia of Philosophy, Descartes was also wrong about the actual location and functions of the pineal gland.

11. Joseph LeDoux, *Synaptic Self*, Penguin Books, 2003.

12. Antonio Damasio, *Descartes' Errors*, Penguin Books, 2005.

13. Published as *Kritik der reinen Vernunft* in 1781 and revised in 1787.

14. Hume was called an empiricist and Leibniz a rationalist.

15. English translation from the second edition of *Kritik der reinen Vernunft*.

16. *Si Dieu n'existait pas, il faudrait l'inventer*. From a 1768 epistle to another author.

Chapter Three

The Persistence of Old Ideas

OLD AND NEW

Moving on from ancient times, the 13th century, through the 17th and 18th, and into the 20th and 21st centuries, there has been quite a bit of change and advancement in the understanding of the nature of observation through the senses of common phenomena, and in the analysis of the information obtained by processes of reason. Science has come a long way.

But what about change in theological theory? Well, not too much. There had been a Protestant Reformation, and there were Protestant theologians who had introduced some variant ideas, including perhaps a beginning or an approach to thinking of God as a principle or a defining goal, rather than as a being. However, the dominant force of Christian theological thinking remained in the Roman Catholic Church, and its official doctrine had changed very little. Nor did the Protestant theologians offer anything fundamentally different.

The historical courses of the development of religion, as a social and organizational phenomena as well as an intellectual exercise, have been reviewed by several authors, including: Thomas Cahill in *The Gifts of the Jews*,¹ Karen Armstrong in *The History of God*,² and Robert Wright in *The Evolution of God*.³

Almost every philosopher and theologian has of course faced up to and written about the relationship of the material world to concepts of the divine. I will here consider only three modern writers who have specifically dealt with the interplay between science and religion, and have discussed the issue of epistemological dualism. They are Jacques Maritain, Pope John Paul II and Sir John Polkinghorne.

JACQUES MARITAIN

In 1961 Jacques Maritain, an eminent Thomistic philosopher, then teaching at Princeton, wrote an essay on God and Science, published in the Princeton Alumni Weekly and included in his book, *On the Use of Philosophy*.⁴ He asserted that the elements of Aquinas' reasoning are "undeniable" or "necessary." He distinguished the knowledge of science, which deals with "the multifarious observations and measurable interactions" occurring in nature, from the knowledge of [ontological] philosophy, which "makes us grasp . . . what things are in the intrinsic reality of their being." He asked "Now how would things be intelligible if they did not proceed from an intelligence?" And he answered that "In the last analysis a Prime Intelligence must exist, which is itself Intellection and Intelligibility in pure act, and which is the first principle of the intelligibility and essences of things, and causes order to exist in them, as well as an infinitely complex network of regular relationships, whose fundamental mysterious unity our reason dreams of rediscovering in its own way."

While Maritain consistently referred to scientific knowledge as affording only an "oblique" view of reality, he did revel in the relativistic merger of matter and energy, the continuum of time and space, the stellar formation of elements, the dynamism of the cosmos and the elusive, imperfectly knowable structure of fundamental particles, all conjuring a grand image which he saw as "suited to a sound philosophy." And as to the notion of evolution — of matter and in particular of living organisms ("if it is true," he hedged) — he asserted that "understood in the proper philosophical perspective," it "presupposes the transcendent God as the prime cause . . . moving [created things] from above so that superior forms may emerge from inferior ones, and, when man is to appear at the peak of the series of vertebrates, intervening in a special way and creating *ex nihilo* the spiritual and immortal soul of the first man and of every individual of the new species."

This is the kind of reasoning Maritain had in mind when he asserted that "Religious faith is above reason, but normally presupposes the rational conviction of God's existence."

POPE JOHN PAUL II

Neothomism was certainly still in high favor during the Papacy of John Paul II, who in 1988 issued an Encyclical Letter, entitled *Fides et Ratio*.⁵ It was of course addressed primarily to Bishops of the church, and certainly not to the likes of me. In any event, he began with a forthright polemical purpose, describing the mission of the Church as one which "on the one hand makes the believing community a partner in humanity's shared struggle to arrive at

truth; and on the other hand . . . obliges the believing community to proclaim the certitudes arrived at, albeit with a sense that every truth attained is but a step toward that fullness of truth which will appear with the final Revelation of God.”

The “certitudes arrived at” include “the ultimate truth about human life,” the “first universal principles of being,” “certain fundamental truths of Catholic doctrine,” and, of course, “the Revelation of Jesus Christ.” With those in place it seemed to me that there would not be much left for “humanity’s shared struggle to arrive at truth.” If “the ultimate truth,” even if not in “fullness,” is already known and lies in the doctrines of the Church about God and Christ, then what is left for philosophy and science? Are they useful and to be countenanced only to the extent that they support those ecclesiastical conclusions?

The Pope did indeed (and understandably) assert his concentration “on the theme of *truth* itself and on its *foundation* in relation to *faith*” (his italics). He complained that at the present time “the search for ultimate truth seems often to be neglected,” that the judging of the personal state of individuals by “pragmatic criteria based essentially upon experimental data” ignores “a truth which transcends them” and that “the ephemeral is affirmed as a value and the possibility of discovering the real meaning of life is cast into doubt.” He castigated “different forms of agnosticism and relativism” and “widespread scepticism.”

The Pope repeated the longstanding concept that “the truth attained by philosophy and the truth of Revelation are neither identical nor mutually exclusive,” relying on statements from the First Vatican Council that “there exists a knowledge which is peculiar to faith, surpassing the knowledge proper to human reason, which nevertheless by its nature can discover the Creator,” and more fully that:

“There exists a twofold order of knowledge, distinct not only as regards the source, but also as regards their object. With regard to the source, because we know in one by natural reason, in the other by divine faith. With regard to the object, because besides those things which natural reason can attain, there are proposed for our belief mysteries hidden in God which, unless they are divinely revealed, cannot be known.”

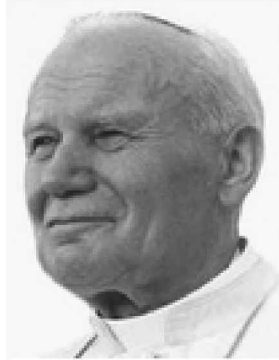


Illustration 3.1. Pope John Paul II. Reproduced upon statement of Servizio Fotografico L'Osservatore Romano, that this Photograph is not subject to copyright.

This asserted dichotomy of knowledge poses several questions. In the first place, where does it come from? Can it be discerned by “natural reason”? If it can only be discerned by faith, is not the existence of such a dichotomy a tautological paralogism, a conclusion drawn from its own premise? The same question applies to mysteries which cannot be known unless they are divinely revealed. How can one know that there *are* such mysteries unless one accepts without knowledge, without reason, that there are such?

The Church’s answer to these questions is itself twofold. First, there is the assertion of the primacy of faith, defined as acknowledgment of God “in his divinity, transcendence and supreme freedom.” Once such a being is acknowledged, who is to doubt that transcendence does not include otherwise unknowable mysteries? As cited in the Encyclical, the Church teaches that “the obedience of faith must be given to God who reveals himself.” One should not make too much of the word “must,” but it is clear that a commitment of “faith” is not intended or expected to be based on knowledge or understanding; it is a matter of acceptance. Faith means acceptance of Revelation (almost always capitalized); that is, revelation to the authors of the Gospels and other writings deemed to be sacred and true. It is not necessary for each believer to receive a personal divine revelation; the epiphany (if any) of most believers lies in acceptance of the truth of revelations asserted by authority. In other words, the basis of faith is not reason, but a self persuasion without substantiation of sensory evidence.

The second answer, of much greater epistemological interest, is that reason (of the normal human sort) may approach an understanding of at least the existence of transcendent mysteries. The sources looked to for that proposition include primarily Saint Anselm and Saint Thomas Aquinas, but also some modern philosophers, including Jacques Maritain. While the Pope said that “The Church has no philosophy of her own nor does she canonize any

one particular philosophy in preference to others," it is clear that those are preferred sources.

Furthermore, the Encyclical is specifically and strongly critical of "radically phenomenalist" systems, the rejection of "metaphysics," and a "separate" philosophy which claims "not only a valid autonomy, but a self-sufficiency of thought which is patently invalid" because it refuses "the truth offered by divine Revelation," and thereby precludes "access to a deeper knowledge of truth." Among the systems particularly castigated as a "threat" is "*scientism*," defined as "the philosophical notion which refuses to admit the validity of forms of knowledge other than those of the positive sciences; and . . . relegates religious, theological, ethical and aesthetic knowledge to the realm of mere fantasy," and which "rejects the notion of being in order to clear the way for pure and simple facticity."

While a tone of petulance, or at least rhetorical flourish, may sound in the words "refuses to admit," "relegates . . . to mere fantasy," and the reductive "pure and simple facticity," John Paul II showed in contrast his abiding good will in a closing paragraph:

Finally, I cannot fail to address a word to *scientists*, whose research offers an ever greater knowledge of the universe as a whole and of the incredibly rich array of its component parts, animate and inanimate, with their complex atomic and molecular structures. So far has science come, especially in this century, that its achievements never cease to amaze us. In expressing my admiration and in offering encouragement to these brave pioneers of scientific research, to whom humanity owes so much of its current development, I would urge them to continue their efforts without ever abandoning the *sapiential* horizon within which scientific and technological achievements are wedded to the philosophical and ethical values which are the distinctive and indelible mark of the human person. Scientists are well aware that 'the search for truth, even when it concerns a finite reality of the world or of man, is never-ending, but always points beyond to something higher than the immediate object of study, to the questions which give access to Mystery.'

In response one may ask what is meant by the "*sapiential* horizon." Does that mean only that scientists should always keep "philosophical and ethical values" in mind, or does it mean that their "horizon" must be limited to Gospel? Scientists commonly agree that "the search for truth . . . is never-ending," and that mysteries are involved, but what are, and who defines, "the questions"? And are the search and the questions aimed at truth, whatever that may be, or only at predefined Mysteries, with a capital M? From the standpoint of intellect or reasoning per se, what is it that induces us to accept ontology or the philosophy of "being" at all? Can't we simply start our quest for understanding without hypostatization of concepts, without any Platonic or Aristotelian precepts at all? Why is the human mind not free?

Well, the Pope did offer one answer to that in terms that are familiar to modern psychology: “Hypotheses may fascinate, but they do not satisfy. Whether we admit it or not, there comes for everyone the moment when personal existence must be anchored to a truth recognized as final, a truth which confers a certitude no longer open to doubt.”

Nevertheless, there still are some of us whose “personal existence” survives, or perhaps even revels in, doubt and the intellectual rejection of finality and certitude. I, for one, am well aware that there are myriad mysteries the answers to which I long to know, but a belief in a transcendent being with omniscience and omnipotence affords no satisfaction whatsoever.

JOHN POLKINGHORNE

Yet satisfaction in a perceived transcendent truth continues to be found by many who are not beholden to the traditions of Roman Catholicism. John Polkinghorne served as a priest in the Church of England and as a professor of mathematical physics at the University of Cambridge. Thus recognized as eminent in both science and theology, he presents a viewpoint in some respects different than that of the Pope. Nevertheless he asserts his Christian beliefs firmly and clearly and presents the ways in which he sees possible support for such beliefs in the findings of science.

In his 1998 book, *Science and Theology*,⁶ he addressed the dichotomy of routes to “truth,” or more properly to knowing. His stated goal was “a balanced account of the many issues currently under discussion in the lively exchange across the intellectual frontier between science and theology,” and he was forthright in distinguishing judgments or conclusions that he deemed to be “metaphysical” or “ontological.”

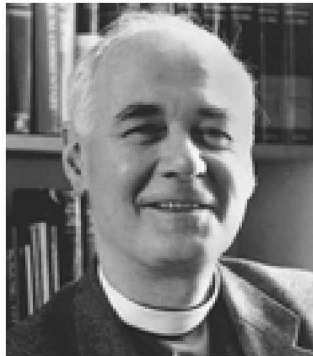


Illustration 3.2. John Polkinghorne. Photograph reproduced by permission and courtesy of Nicholas Beale on behalf of Sir John Polkinghorne.

Polkinghorne began with the familiar theme of dichotomy of method and goal: “Science does not have a privileged route of access to knowledge

through some superior ‘scientific method,’ uniquely its own possession; theology does not have a privileged route of access to knowledge through some ineffable source of unquestionable significance of their encounters with manifold reality. In the case of science, the dimension of reality concerned is that of a physical world that we transcend and that can be put to the experimental test. In the case of theology, it is the reality of God who transcends us and who can be met with only in awe and obedience. Once that distinction is understood, we can perceive the two disciplines to be intellectual cousins under the skin, despite the differences arising from their contrasting subject material.”

A balanced account would be nice, but the problem with the statement is obvious: The equation of the “reality” of the physical world and the “reality” of God. That begs the question of course; *are* there separate realities? Polkinghorne concedes the point by saying, as to God, “Since Augustine, [theology] has known that one must believe in order to understand and understand in order to believe.” The issue remains, I would suggest, one of epistemological duality. One might say that there are two ways of *thinking* is evident; but that there are valid alternative ways of *knowing* remains to be demonstrated. (Or in light of modern cognitive science, as discussed in Chapter Eight below, it might better be put the other way around: The processes of *thinking* are essentially the same in all brains, but the retention of thoughts, things deemed to be “known,” may vary among individuals through different synaptic connections forming long-term memory.)

Polkinghorne began by analyzing science and theology as to their respective methods and substance, opening with the declaration that: “Neither science nor theology can give plain, matter-of-fact accounts of the unseen realities (quarks; God) of which each needs to speak. Both also encounter situations too complex to be discussed without some degree of selective simplification. Thus science and theology must both make use of analogical resources in their reflective discussions.”

As to science, Polkinghorne offered a succinct exposition of the “murky” (as he calls them) issues still unresolved in quantum theory, including Heisenberg’s uncertainty principle: It is not merely that the positions and momenta of quantum entities cannot be measured at the same time, it is that they do not possess positions and momenta but only potentialities for these properties. As he says, the inability to measure is “epistemological” and the principle itself is “ontological.” He says that physicists’ embracing of this principle (rather than a rejected alternative concept) “is an act of metaphysical choice.”

In pursuing his association of uncertainty with metaphysics he cited several other phenomena, including quarks as fundamental particles, the putative “nonlocality” of quantum entities, the “inflation” of the cosmos at 10^{-35} seconds after the Big Bang (all considered in Chapter Six below), and finally,

the “anthropic principle.” Does referring to these as “metaphysical insights” mean anything or add to our understanding? Is it not more straightforward simply to say that scientists have discerned effects that they cannot yet explain?

The anthropic principle is the name given to the observation that carbon-based organisms could not exist if some of the fundamental constants of the universe were very slightly different in quantity. As he pointed out, the basic fact is widely accepted in the scientific sense, but a teleological conclusion is not. He cited a view that the possibilities include either myriad universes of which ours is one by chance or that it was established by a “Creator whose will is that its history should be productive of life.” Is not, I ask, the latter (teleological) view, essentially deistic, conceiving of God as a lacuna of science? It is also a limiting or reductionist assumption, excluding possible physical explanations not yet known. Since, it seems, any such explanation would have to “precede” or be “outside of” the prevailing Big Bang concept of the universe, it may be fair for Polkinghorne to call it “metaphysical,” but that does not warrant or give any credence to the existence of an incorporeal being having a will. The alternative to metaphysics may be more physics, not just God.

When it comes to 20th century concepts of epistemology, human nature, and the workings of the mind, Polkinghorne at last looked to science and not just to the speculations of almost all his philosophical predecessors. With respect to dualism, he does refer to several “difficulties,” as he calls them. Nevertheless, he sought a “more subtle” way of bringing “the two aspects of reality” into “equal balance.” He asked whether science and theology are “equally valid,” or whether the sciences may be a “reductionist” description of only “derivative effects” of some “fundamental description of human ontology.” Shades of Plato! But does he have a “more subtle” approach?

He turned to the human mind and consciousness. By 1998 he had access to quite a bit of scientific analysis of those subjects, but unfortunately he misstated or distorted some of the essential findings. In the first place “mind” is not exclusive to human beings, but occurs in identifiable forms in other animals. Science was not then (and is not now) devoid of understanding of the physical origin of mind, but approaches comprehensive understanding, including both genetic and neurological elements. Mind and consciousness are surely emergent phenomena, and the point in evolutionary development at which neurological activity worthy of those designations first appeared is moot.

The statement that “Our intellectual powers greatly exceed anything that could credibly be required by natural selection,” as well as the assertion that altruism could not plausibly arise from selective adaptation, surely misapprehend several well established principles of evolutionary science. They are simple rejections of the well recognized evolutionary phenomenon of emer-

gence, they ignore the documented empirical examples of “altruism” in wild animals, and the studies relating altruism to societal development in the human mind. Contrary to being valid scientific conclusions, Polkinghorne’s views seem to evince belief in a kind of Kantian *noumena*, the concept that moral or ethical principles are built-in in the human mind, for which science has found little evidence beyond possible innate inclinations to empathy in all animals having a complex central nervous system.

Again he asserted that the human ability to comprehend mathematics and the intricacies of physical phenomena, such as quantum theory, general relativity, etc., “goes far beyond anything that could conceivably be of relevance to survival fitness.” He says that “To treat these human powers as just happy accident, a collateral spin-off from some more direct evolutionary necessity, is to make an unmotivated assertion of highly dubious plausibility.”

But that is obviously a fundamental misunderstanding of natural selection and the way in which evolution actually works. The few human beings who understand and can manipulate advanced mathematics, etc., have brains that are structurally the same as the brains of all the rest of us who don’t understand those things at all. Our brains did not evolve for the *purpose* of solving differential equations; that ability arose as a natural progression of cultural accumulation and sharing of knowledge over thousands of years by many human minds that did evolve by selective adaptation, exaptation and emergence. The capability of abstract thinking is not asserted by evolutionary scientists to be the result of a direct adaptational advantage, but rather as possibly an exaptation (a derivative or secondary application of an adaptation) or merely a cumulative cultural development through neural structures that did contribute to tool-making, hunting techniques, speech, social development, or other simple survival and reproductive advantages.

Further defining his version of theism, Polkinghorne asserted that the physical “quantum vacuum” (that is, the “nothingness” of the space-time continuum in which physicists find the origins of energy and matter) will be seen by a theist to exist “solely because God decrees that it should be so.” He says that “the work of the Creator continues, not least through the natural processes that are expressions of God’s will,” that “we live in a world that is the carrier of value,” and that “human ethical intuitions” originate in “God’s good and perfect will.” These theistic assertions are surely among what he refers to as “metaphysical answers . . . given for metaphysical reasons.”

When Polkinghorne speaks of God, he capitalizes the words Being and Creator, but with respect to creation he says that: “Much confusion exists in the minds of many because of a false association of creation with the beginning of things. The doctrine of creation is not concerned with temporal origin but with ontological origin. It is proposed as the answer to the question of why anything exists at all, and not to the question of how it all began. . . . God’s role is not merely initiation but sustaining, holding the universe in

being throughout its history, whether that history is finite or infinite in duration.”

Polkinghorne acknowledged that his view of “natural theology” is “an insightful, rather than demonstrative, discipline” and that it does not claim its answers to be “logically inevitable, but that they [are] insightful and intellectually satisfying.” It is refreshing and reassuring to find a reputable theologian who is willing both to decouple God from creation of the physical universe and to concede that his conclusions are “insightful” but not “inevitable.”

Yet his theism is still irrevocably teleological. His God governs “the unfolding history of the universe,” suggesting that purpose lies behind the incremental steps in material and biological evolution. His God is still a Being and the Creator, and is responsible for “holding the universe in being.” There is, I submit, still no basis for those assumptions. Making them may well be “intellectually satisfying” to Polkinghorne, but it isn’t to me.

NOTES

1. Thomas Cahill, *The Gifts of the Jews*, Anchor Books, 1998.
2. Karen Armstrong, *The History of God*, Alfred A Knopf, 1993.
3. Robert Wright, *The Evolution of God*, Little, Brown, 2009.
4. Jacques Maritain, *On the Use of Philosophy*, Princeton Univ. Press, 1961.
5. The encyclical is available from Pauline Books & Media in Boston, and possibly on the Vatican website.
6. John Polkinghorne, *Science and Theology*, Fortress Press, 1998.

Chapter Four

The Error of Dualism

CAUSATION

The dualism of reality still calls for a bit more discussion, particularly with respect to causation. That other, nonmaterial, reality can only be detected or approached, the theologians tell us, by means of “faith” or by understanding of the “reasoning” that is asserted to support the acceptance of faith. We will talk about faith later, but let’s now again consider the “reasoning.” Besides the already discussed flaws in the ontology of “being” and in hypostatization of abstract concepts, the “reasoning” supporting theology involves the inter-related assertions of purpose and design. The teleological concept that the universe is governed by purpose is related to Aristotle’s assertion that causes are efficient, or in other words that effect lies in cause. Now that may seem to be an undeniable proposition, a truism. If a particular action is the instigator or source of a particular result or outcome, isn’t it obvious that the outcome, the effect, was the inevitable result of the particular action or cause? Isn’t effect always, by definition, the child of cause? What else is meant by “cause” and “effect”?

Well, from a physical standpoint that is a complicated question. Scientists observe phenomena and seek to discern and understand the origins, or causes, of what they observe. But “cause” is often mysterious; science often fails to determine or identify anything as a “cause” other than an observed phenomenon that preceded the observed result. When there is an adequately tested empirical correlation of the two phenomena, then scientists speak of cause and effect. But even then that conclusion is beset with the ancient charge of logical frailty: *post hoc ergo propter hoc*. What comes after is *not* necessarily on account of what came before. An empirically established correlation may well suffice to justify a scientific theory, or sometimes even to

elevate the theory to the status of an accepted scientific conclusion, but it does not and cannot make observed effect *ipso facto* implicit in an observed antecedent cause.

Aristotle's concept of cause and effect is not only logically flawed, it was based on empirical observations that were themselves devoid of anything like the care or tests of modern empirical science. His statement that men had more teeth than women was mocked by Bertrand Russell with the comment that he should have looked into his wife's mouth. Another cited example of Aristotle's flawed conclusions is his assertion that the sex of an embryo is determined by the direction of the wind at the time of conception. We may forgive those errors from over two millennia ago, but we cannot and must not ignore the error, the falsity, of his conclusion that causes are inherently or necessarily efficient.

That is not to say that there is no such thing as cause, nor to say that effects are independent of causes. If we combine hydrogen and oxygen, we always get water, not sometimes water and sometimes bourbon. Observations do indicate a consistency, a universality, to most physical phenomena. The outcome or effect of physical action is not random in time or place. But Aristotle meant more than that by "efficiency;" he meant that every cause includes a "final cause," that is, a purpose.

He asserted in effect that nothing changes unless there is a purpose existing in the origination of the change, i.e., the cause. Beyond the logical flaws in that contention, it must be noted that in Aristotle's day very little was known about cause and effect. The very understandings of mathematics were rudimentary. The essential concept of zero, arising in Arabic wisdom, had not yet been introduced. The concepts of infinity and of randomness were at most wild speculations, unstructured and unsupported by any intellectual understanding. The atomic composition of matter was unknown. The sciences of chemistry, physics, cosmology and biology barely existed, and most of the tenets then accepted have since been shown to be patently false. In every case modern scientific analysis has distinguished chance and necessity, demonstrated the presence and role of randomness, begun to explain actual causes and effects, and made it clear that the universe and life in it are not discernibly governed by antecedent purpose.

Nevertheless, teleology remains as an essential ingredient of the description of God's role as the Creator. This accounts for the persistence of "the argument of design" as the most prevalent of the asserted "reasons" supporting the existence of God. The origin of the argument may be found in Socrates' dictum that "whatever exists for a useful purpose must be the work of an intelligence," but nowadays it is more often articulated in the framework propounded in 1802 by William Paley, a priest of the Church of England, in his book entitled *Natural Theology: or Evidences and Attributes of the Deity*,

*Collected from the Appearances of Nature*¹ opening with his often cited description of the watch found in a field of similarly shaped objects, stones.

Paley's arguments have been considered and refuted by many scholars and biologists, and there is no point in reviewing them here.² They are now asserted primarily, if not exclusively, by those who "oppose" or seek to refute the validity of biological evolution, i.e., the "antiDarwin" crowd, mostly those asserting a concept of "intelligent design." The biological evolution of species has now been so thoroughly documented and demonstrated that the "validity of the theory," or more properly the reality of the phenomenon, cannot be doubted by rational people.³ The flaws and sloppy arguments of the Intelligent Design authors have also been more than adequately refuted, and will not be reconsidered here.⁴

In fact the findings of scientists about biological evolution (as well as geological and cosmological evolution) have now been widely accepted by almost all reputable theologians and religious organizations of the world. The disturbing fact, however, is that in the United States antievolutionary concepts are still widely disseminated by some churches and by preachers on the air, and are shown by polls to be accepted by a substantial portion of the public. The failure of leaders of the mainstream religious organizations to take up the cause of rationalism and oppose that deviation is not only a disappointment but also a spur to the vehement antireligious thrust of "militant" atheists.

The main point that I here espouse is, however, that scientific analysis has pretty well disposed of purpose and design as causes in the evolution of the universe and life within it. As to cosmology, Aristotle argued in favor of an earth-centered universe on teleological grounds, and asserted that the structure of the universe had to be circular because the circle was a perfect form and God would not devise anything less. It took even mainstream theology a long time to accept a "scientific" version of the structure of the universe, which is far from earth-centered, or sun-centered, and far from perfect in any sense of the word. About all that is left to theology in the realm of cosmology is the idea that God is, as Polkinghorne put it, "the answer to the question of why anything exists at all." We will come back to that question below.

With respect to biological evolution, it was made clear by Darwin, and has been well confirmed by the subsequent development of the science of evolution, that natural selection is *not* driven by any purpose or design. The survival of a variant form of an organism instead of a cognate form or allelomorph arises from its fitness to the particulars of the ambient surroundings or "environment" in which the organism appeared. No "purpose" is detectable in the existence of either the variant alleles that are possible or in the particulars of possible environments; they are both essentially contingent. The survival itself and the elements that comprise or constitute fitness are to some extent deterministic, or "necessary." The ancient debates about the

relationships of contingency and necessity have been much refined by modern science. While randomness is involved, there is no evidence or indication that purpose or intention is involved. Remember that Darwin apologized at the outset for the term “selection” and made it clear that no purpose or intention was involved in the phenomenon he described.

The “design argument” is invoked in particular with respect to the evolution of humans. It is a theological precept that “man was created in the image of God” and that man has an “immortal soul.” The “image of God” concept no longer calls for God to be in a physical form similar to a human; the “image” has become only a metaphor for most believers. But the “soul” idea was not so easily disposed of. If humans have a “soul,” and animals do not, then the soul must have been injected, presumably by God, at some point along the way in the evolution of an antecedent primate into a form we now call human. Did that take place in “hominins,” or only later when the genus “homo” appeared? Did all members of genus homo have souls, including now extinct species, such as Neanderthals, or only *Homo Sapiens*?

There are “creationists” who reject the very idea of evolution of humans from “lower” forms of animals largely because of those issues. There are also people (many more than the narrow creationist crowd) who accept evolution as scientifically true but still believe that humans have an immortal soul. Among many of them the nature of the “soul” and its immortality may have also become rather metaphorical too. In some contexts it is interesting to think about, analyze and discuss a life characteristic or a mental state that one might designate as “the soul” of a person. There are in that manner identifiable good souls and bad souls. And good souls may in a sense live on and influence the minds and conduct of many humans who follow them. Myth and metaphor certainly do have their uses.

EPISTEMOLOGY

The theological concept of dualism poses a basic epistemological issue. Is there any possibility of discerning two realities? On the face of it, one would ordinarily assert that only what is accessible to human senses and human mind is deserving of being called reality. But right there is the rub; what *is* accessible to the senses and the mind? What actually happens in the human mind as a result of exposure to external stimuli and the articulation of signals through the brain, or as a result of our “consciousness”? Those are *new* questions, difficult questions.

The philosophers of old had lots of thoughts, their brains worked by and large the same way ours do today, and they came up with God. Many normal human brains since then have accepted and adopted the idea of God. In other words, God is a *human* reality, a reality of the human brain. I am obliged to

say again that that does not in any way or to any extent indicate that God *exists*. But it is undeniable that God exists as a mental reality in the minds of billions of human beings. And that phenomenon is *not* a product of stupidity, delusion or invidiousness. Also, it is a phenomenon that is very likely to continue for a long time.

Furthermore, the concept of materialism, the idea that only what is accessible to sensory perception is deserving of being called reality, comes from the same source — the human brain. Materialism itself, as a concept or discipline, and its conclusions as to reality, are products of the human brain.

It is silly to say, as some of the antievolutionists do, that materialism, or more particularly Darwinism, or evolutionary theory, is a “religion.” There *is* such a thing as science, it was formerly called natural philosophy, it is a materialistic discipline, it does encompass fairly well defined sets of rules and procedures, it rests on trial, experimental and empirical results, and it does not involve external dogma. It is not a religion. Nevertheless, it is not the sole owner of the human mind. It does not and cannot by itself indicate that God does *not* exist.

To put it in other words, the conception of dualism of reality, being a product of the human mind, cannot be expunged from the possibility of reality, i.e., the existence of separate realities, by the conclusions of *some* human minds that that conception is false. Modern studies of the human mind have brought a great deal of understanding of the processes that take place in the brain. The neurological forms and actions that underlie and lead to cognitive conclusions are described in remarkable detail by modern neuroscientists. However, they do not begin to tell us much about the merits or validity of any particular *content* of cognitive conclusions.

Cognitive science cannot generally tell us which of two contrary conclusions is “correct.” There are, however, philosophical and neurological analyses that may form a basis for differentiation — at least with respect to *some* conclusions. In fact current science shows that many conclusions are often incorrect. The unreliability of “eyewitness” identifications in law suits has become notorious. There are many examples of optical illusions and equivalent auditory distortions of cognitive analysis. There are also examples of losses of memory and even of events existing in someone’s long-term memory that did not actually ever occur.

Nevertheless, learning and memory *are* important to the substance of the conclusions we reach. In most cases a thorough knowledge of scientific data — biology, evolution, physics, cosmology, etc. — does lead to its acceptance. It is always fair game to decry ignorance and the assertion of conclusions that are patently contrary to established scientific data, and to criticize the deliberate distortion of known data, but when a thoroughly knowledgeable person still asserts a belief in a separate immaterial reality, we can only wonder.

My wonderment arises from the apparent — the salient — implausibility of the belief, particularly belief in an incorporeal mind. But when the holder of such an implausible belief explains it in terms that evince a source in family history, childhood learning, social comfort or psychological satisfaction, I understand. I recognize all of that as results or functions of the normal processes of the human brain. I do not reject such a person as ignorant; I only ask whether there is possibly any new or additional scientific data that would lead him to doubt his belief in God or to question its origins. Usually there is not, or at least no conceivable physical data that would lead him to abandon his theistic beliefs.

And that leads me to a final point: There is no scientific data that can possibly *prove* that God does not exist. Yes, Darwin's explanation of natural selection and the subsequent development and confirmation of the science of evolution did and does indeed refute the substance of the "argument from design" which had long been, and continues to be, the mainstay of the putatively rational explanations for belief in God. But the elimination of "purpose" from the evolution of life, or from its origin from chemical processes, does not and cannot prove that there is no such thing as purpose in the cosmos. Science has made divine intention unnecessary to explanation (as the Marquis de Laplace told Napoleon long ago⁵), and also highly implausible, but it has not excluded it from possibility.

It seems to me (from personal observation, not based on any supposed "scientific" basis) that people do not normally tend to or accept a dualistic approach to reality. People ordinarily relate "reality" to what they can see and perceive through their own senses. While there certainly are tendencies to "spiritualism," and sometimes to belief in ghosts or spirits, or some transcendent essence, and to some people those thoughts have a reality of their own, they are usually, I think, conceived of as a different kind of reality, a quasireality that is not on a par with or an equivalent to the reality of sense-perceived things. To many people with little or no scientific understanding, "light" is a mystery itself, a sort of ghost that exists, but is essentially inexplicable.

The big exception to that is of course God. Religious teachers and organizations have for millennia propounded the theory and existence of God as an absolute separate reality. For a long time, and to some extent still today, that reality has been presented as the primary reality, to which the sense-perceived reality is only secondary. On the other hand, it seems to me (again by personal observation) that there are more and more people nowadays who are tending in the opposite direction. That is, they fully accept what they perceive by their senses as the reality — the real, the true, reality — and they believe in God as an epiphanal, if not ephemeral, reality. That is to say, many people today who "believe in God" find it hard to believe that there actually exists an incorporeal being with a mind. Most of them thoroughly believe

that there are *principles* that are universal and essential, and they have been persuaded that such principles could not exist if there were not a God. That persuasion comes not only from the accumulation of the thoughts of ancient philosophers (however flawed their thoughts may have been), but also from the regular, drumbeat of repetition of that idea. The arguments of the so-called Humanists that morality is humanly derived and may still be universal (however sound those analyses may be) have so far not prevailed through the many and varied societies of the world.

As time marches on, the universe described by Aristotle and Ptolemy, with the stars being points of light embedded in a tight little surrounding sphere has faded away. The number of people, among the billions of humans, who care to and begin to understand the nature and scope of material existence, with hundreds of billions of galaxies extending through billions of “light years” and in unimaginable ways, will surely and steadily increase. Once you understand that light is an electromagnetic variation originating from various forms of interplay of matter and energy, it is still a bit of a mystery, but it is no longer a ghost or a separate reality, but is part of our *one* material reality.

Dualism of reality arose in the human brain and will remain there, but its influence on the thinking, the understanding, the knowledge, and probably the practices, of human beings is, I suggest, almost certain to wane.

NOTES

1. William Paley, *Natural Theology: or Evidences and Attributes of the Deity*, Collected from the Appearances of Nature, Twelfth Edition, J. Faulder. London, 1809; available through www.hti.umich.edu.
2. See *Evolution vs. Creationism*, Eugenie C. Scott, Greenwood Press, 2004.
3. See *Evolution*, Douglas J. Futuyama, Sinauer Associates, Inc., 2005.
4. See *Evolution for Creationists*, Edward C. Mendler, iUniverse, 2007.
5. When Napoleon asked the Marquis de Laplace why he had not mentioned God in his treatise on astronomy, Laplace replied: *Je n'avais pas besoin de cette hypothèse-là*. I didn't need that hypothesis.

Chapter Five

Faith and Anti-Faith

FAITH

Any consideration of the concept of God brings us necessarily to the matter of “faith.” The term is much used and highly prized by the Roman Catholic Church, and to a considerable extent by different religious organizations, both Christian and other. However, it has lost a bit of luster among the more “modern” theological views. As noted above, in his 1988 encyclical entitled *Fides et Ratio*¹ Pope John Paul II asserted that “the obedience of faith must be given to God who reveals himself,” constituting an acknowledgment of God “in his divinity, transcendence and supreme freedom.” In other words (as said before), “faith” is not intended or expected to be based on knowledge or understanding; it is a matter of assent or acceptance, based on “Revelation.” Nor is it necessary for each believer to receive a personal divine revelation; the epiphany (if any) of most believers lies in acceptance of the truth of revelations asserted by an authority. In other words, the basis of faith is not reason, but a self persuasion without substantiation of sensory evidence.

Nowadays the very idea of “acceptance of authority” is a red flag to many people, including especially those who have had any training in logic, epistemology, or even politics and history. The history books, as well as the daily newspapers, are filled with examples of disasters resulting from reliance on authority. The wariness of authority has understandably come to affect reliance on sacred texts and on the pronouncements of leaders, even revered religious figures. Many, probably most, of those who “believe in God” no longer accept the Bible as infallible in all respects, but look on most of it as allegory, parable or myth. And there are quite a few parishioners of various denominations who are less than trustful of the reliability of their priests and

ministers. The preachers who still assert that every word of the bible is the literal truth are, happily, few and far between — but they still seem to have a very unsettling effect on the prevailing rationality of some elements of the American public.

Aside from the rejection of *ipse dixitism*, or pronouncements of authority, there is the problem of self persuasion without support of physical or sensorily detectable evidence. In a psychology text book that would ordinarily be called “delusion.” While a few of those who persuade themselves and affirmatively reject contrary sensory evidence may be clinically delusive, it is hard to believe or even imagine that the great masses of believers are suffering from delusion. There are simply too many believers who are *compos mentis*, mentally and socially functioning, reasonably well educated, ordinary people, to brand them all, or their asserted belief in God, as delusional.

The explanation of their belief, even among those who have considered and found wanting (or have even rejected) the putative rational basis for belief, is that they accept an underlying dualism. They may know, or at least suspect, that physical data and the rational analysis thereof does not and cannot indicate the existence of God, yet they are prepared to accept the possibility of some kind of other, or transcendent, knowledge. Very few of them would characterize their belief in such terms. Very few have any understanding of epistemology as a discipline or of the extensive findings in very recent years of the way in which the brain forms ideas and comes to conclusions. Therefore, we may properly conclude that belief in God, despite contrary physical data, is not delusional, but is rather a product of another aspect of human psychology — the perfectly normal demand of the human brain for comfort and assurance in face of uncertainties and unknowns, and the perfectly normal developmental processes of learning.

As Pope John Paul II said: “Hypotheses may fascinate, but they do not satisfy. Whether we admit it or not, there comes for everyone the moment when personal existence must be anchored to a truth recognized as final, a truth which confers a certitude no longer open to doubt.” That is almost a psychological truism; no one can bear to doubt his “personal existence;” everyone wants to feel assured that he has a place in the universe. Hypotheses, even when formulated into scientific theory affording reasonable explanation, rarely satisfy a felt human need for certainty. But scientists often deliberately avoid and renounce certainty; science is by its nature uncertain.

The processes by which the brain brings a person to a conscious conclusion are now fairly well understood² They start with a great variety of inputs, including sensory stimuli, short-term memory, long-term memory, complex routings of neuronal synaptic connections through various parts of the brain having separate and identifiable functions, bringing along with them the neurological processes called emotions, and ultimately formulation of an

idea in the frontal cortex, which then in effect sends it back for storage in memory.

Very few persons, if any, experience such a process without having previously had a concept of God embedded to some extent in their long-term memory, usually in the formative years of childhood when synaptic patterns were being developed in the brain. If the brain is considered as a “system,” when a concept is injected and there is no contrary or rejecting data available to match or respond to it, the system, seeking some solution or answer, may well, and apparently often does, accept, and thereafter come up with, the injected concept — in this case the conclusion of God. Thereafter that concept may serve as a generic catchall answer to whatever is otherwise unknown, and to some extent as an inhibitor of acquiring or learning things that seem contrary. The God conclusion is deeply embedded and the brain is always lacking in complete data.

So we may conclude that it is a normal psychological phenomenon for a human being to “believe in God.” It may be argued that there were in ancient times people who originated and elaborated the idea of God who had not previously had the concept of God fed into their youthful brain’s memory systems, but that does not alter the analysis. It is essentially accurate for almost all believers living today, and we are talking here about human psychology. The question of how the God concept first arose millennia ago is not pertinent here. The point is simply that “faith” rests on human psychology, and human psychology does not and cannot by itself serve as evidence of the truth of the conclusion. Faith in God does not indicate that God exists.

In his 1998 book, *Science and Theology*,³ John Polkinghorne is less assertive, but he also is suggestive of a psychological basis of his belief. He describes the theistic view as holding that the universe exists “because God decrees that it should be so,” that “natural processes that are expressions of God’s will,” that “we live in a world that is the carrier of value,” and that “human ethical intuitions” originate in “God’s good and perfect will.” It is clear that these are what Polkinghorne calls “metaphysical” conclusions, and that they do not carry or support any implication of their truth. In what way are these concepts “insightful,” as Polkinghorne asserts? Doesn’t that mean only that they are psychologically satisfying to him? He says they are “intellectually satisfying,” but I find them to be the opposite: intellectually trivial and epistemologically superficial. Therefore, to me such pronouncements are disturbing when uttered by persons with prominent intellectual powers.

Finally, as to cosmological matters, Polkinghorne proposes God as the answer to “why anything exists at all,” instead of nothing. I suggest that that is a silly question and a silly answer. We simply don’t know. Accept it: nobody knows; “God” is not an answer! As referred to above, Polkinghorne poses other unknown, unresolved and weird phenomena as suggestive of the existence of God, including Heisenberg’s uncertainty principle, quarks, the

“nonlocality” of quantum entities, the “inflation” of the cosmos at the onset of the Big Bang, and the anthropic principle. It is true that scientists have discerned effects that they cannot yet explain — and that may never be explained. It is true that mathematics, cosmology and quantum mechanics indicate the existence of phenomena that are “transcendent,” i.e. possibly beyond rational causative explanation. Does that indicate a Mind, an incorporeal Mind, behind the scenes of these mysteries? Does mystery itself suggest that God must exist? I think not; I think it is a weird quirk of the human mind to even suggest that answer.

Mathematicians assert that pi is a transcendent number, i.e., neither rational nor finite. Does that mean an incorporeal mind must have “created” the circle? C’mon!

ANTIFAITH — FAIR AND FOUL

Atheism, or the rejection of the theory of God, has been around for a long time. Some of it arose almost as soon as religious organizations arose. Yet there has always been, and still is, a lot more anticlericalism than there is true analytical atheism, which followed. Only a very brief and selective review will be offered here. In 1811 Percy Bysshe Shelley wrote a treatise on *The Necessity of Atheism*.⁴ Criticisms of organized religion, as well as analytical atheism, were carried forward in varied forms by such thinkers as Thomas Hobbes, Baruch Spinoza, David Hume, Emmanuel Kant, Bertrand Russell and John Dewey. The nature and details of their analyses are varied, and all worth consideration, but that is not my purpose here.

In 1842, seventeen years before the publication of *The Origin of Species*, Charles Darwin wrote a memo in his notebook explaining to himself the reasons for his reluctance to disclose his developing theory. Among these was his fear that atheists would use it for their “evil agendas.” He also specifically stated that he did not want to be labeled an atheist. In fact he contended through most of his life that he deserved to be called a theist, and he often defended theistic ideas. Late in his life he said that he supposed that he was an “agnostic,” using the term that had been coined by his friend Thomas Henry Huxley in 1869.⁵

In Britain in the 1840s the perceived consequence of an atheistic “evil agenda” was the possible disruption of an orderly, class-structured society by aroused members of the growing working classes. The order and stability of society that was so prized by the “upper” classes of course served and protected their wealth and their control of governmental affairs. The leaders and the clergy of the Church of England were part and parcel of the controlling elite. Darwin himself was a member of that elite; both his father and his wife’s father were wealthy men. His mentor at Cambridge, Reverend John

Stevens Henslow, was a priest in the Church of England, as were all of the professors at Cambridge in that era. When Darwin had earlier been at the University of Edinburgh, one of his professors there, Robert Grant, was known for anti-religious views, and in order to avoid association with such ideas, Darwin later declined to accept Grant as a reviewer of some of the materials returned from the voyage of the *Beagle*.⁶

In 1844 something of a sensation arose in London from the publication of a book entitled *Vestiges of the Natural History of Creation*,⁷ purporting to describe both geologic and biologic evolution. The book was in no sense an atheistic treatise, and it set forth no substantive support for its conclusions. It seems that the idea of the author was to encourage the impoverished working classes to look forward to a better life through the natural developments of history. However, the very questioning of established tenets of the Church produced vigorous rebuttal from Bishop Wilberforce, as well as rejection by the learned elite of the very idea that “natural laws” could be a substitute for divine action.

In my view, this tale does not evince an “evil agenda” of atheists, but quite the contrary, an evil agenda of those with entrenched power to hang onto it. Being of a normally conservative inclination, I am always wary of rapid, and certainly of violent, disruptions of established social norms. The inheritance of the earth by the meek (so to speak) will take a while and involve many changes that can, one hopes, be accomplished without violence and even without harm to the non-meek who now dominate and control the world. But isn't it disturbing when religious organizations assert their status and their theistic tenets as contrary to that kind of change?

Moving ahead to the 20th century when the Communist movement was in its full sway, one of the main charges hurled against it was that it was “Godless.” Historians may tell us, but from today's standpoint it would not seem that atheism as such was a goal or even a significant element of the concept of communism. The communists asserted — with some justification — that religion was “the opiate of the people,” and their agenda required an aroused people. They did surely abuse those ideas. Their agenda led to aggressive postures and defiance of long established norms of human and international conduct. Their theories and concepts also led to an oppressive “dictatorship of the proletariat” with no signs of achieving any idealistic “withering away of the state.” In the end they demonstrated only the flaws in the economic, social and governmental forms they established, which have consequently themselves withered away. While “communism” is understandably condemned today in the viewpoint of democratically inclined people, it is certainly a mistake to reject every concept of Karl Marx or other “socialist” thinkers because the Soviet Union was “Godless.” There are still important lessons to be learned in the world about the relationships between free

enterprise and societal management of economic activity, and neither theism nor atheism has much of anything to do with it.

Now, in the 21st century, what is the status of atheism? There are some odd groups and some sensible groups. And among contemporary atheists there are some thoughtful people and philosophers and there are some ranters and ravers. I have no intention of attempting a review of the field, but will comment on only a few.

The most sane and respectable groups of those who call themselves atheists, or at least agnostics, are the “humanists.” While humanist groups may usually be avowedly atheist or agnostic, some of them are affiliated with and supported by religious organizations. The most prominent organization in the United States is the American Humanist Association, founded in 1941 and based in Washington,⁸ with local affiliates around the country. Another respectable organization is the Council for Secular Humanism, based in Amherst, New York,⁹ founded and headed for many years by Professor Paul Kurtz, who has written about humanism. He resigned in 2010, it being said that he had objections to a thrust towards a less-than-academic approach into a businesslike or marketing approach to the dissemination of atheistic and humanistic ideas. He might also have taken issue, as I do, with the stridency of its publication called *Free Inquiry*, and particularly to its use, for advertising purposes, of a nasty article by Richard Dawkins, referred to below.

Among the most prominent and outspoken atheists, often cited and criticized as such today, are Richard Dawkins, Sam Harris, the late Christopher Hitchens, and Daniel Dennett. Dennett is a professor of philosophy and co-director of the Center for Cognitive Studies at Tufts University. I have no comments to make about him other than to commend his scholarship and clarity.

As to Dawkins, Harris and Hitchens, however, I am moved to say that I personally regard them as abusers of atheistic thought and philosophy. They are called, or call themselves, “militant atheists,” and they are inclined to rant and rave on the subject. I do not doubt their academic qualifications, nor that they are knowledgeable and prolific writers, and have in some cases contributed cogent analyses of the weaknesses of theistic theory. My objections to their approach to the subject and to some of their conclusions will appear below.

Richard Dawkins was a professor at Oxford for over a dozen years. His prominence as an evolutionary scientist is well established. His book, *The Selfish Gene*,¹⁰ continues to be widely admired, though his theory is not wholly accepted by evolutionary scientists. He has continued to promote an understanding of evolution and to struggle against the mindless antievolutionists, producing several books. His book *The Greatest Show on Earth*¹¹ is an excellent exposition of *The Evidence for Evolution*, its subtitle.

It seems, however, that since his retirement from Oxford in 2008 (if not before) his principal goal in life has been to castigate religion in all forms and to ridicule all who believe in it at all.

In 2006 he brought out *The God Delusion*.¹² Now that is a catchy title, and we may accept it as meeting “marketing standards.” But for Dawkins it is not just a title: he asserts that belief in God is in fact a delusion. Well, I used the term — but then I explained it away. Dawkins doesn’t; he has repeatedly referred to those who disagree with him as stupid, ignorant, insane, idiot, ridiculous, and “deluded to the point of perversity,” and perhaps by other epithets that escaped my brief research. He has been accused of “intellectual intolerance,” and of being “shrill and strident,” which charges he effectively acknowledged to an interviewer to be true.¹³ He excused himself as having “lost patience.” Since patience is a rare trait at best, and the trade of militant atheism is undoubtedly stressful, we may also excuse some excesses.

However, Dawkins wrote a nasty mockery of the basic tenets of Christianity and of the story of Jesus that is so crude, repugnant and racist that I will not quote any of it here. It is sophomoric; it does not describe either the beliefs or the story in anything like the actual beliefs of Christians or the biblical tales. It was obviously intended to be offensive to Christians and as a nasty joke for the benefit of those who prize sneering as an inducement to their bias. It does not contain anything at all in support of atheism; it is only an attack on religious people. It is in short, hateful. It does not further atheism, it abuses and abases it.

Another example of Dawkins’ arrogance and absolutism relates to the acceptance by Martin Rees of the 2011 Templeton prize. Dawkins and others of his coterie objected because they regard the Templeton Foundation as aimed at upholding religion vis-à-vis science. Rees (Lord Rees of Ludlow) is a former president of the Royal Society, Britain’s most prestigious science organization, and is or was the “astronomer royal.” He has been reported to be an admitted non-believer, but still, following family tradition, sometimes attended the Church of England. His response to Dawkins was an expression of dismay that by forcing young people to choose between their family religious traditions and science the “professional atheists” were actually inducing a rejection of science.¹⁴

To Dawkins, Hitchens and Harris it does seem to be a question of choice between us and them. Middle ground is not allowed; either you reject God and all the trappings of religion or you are branded as among the hopelessly ignorant. Even in *The Greatest Show on Earth* Dawkins thought it somehow useful or helpful to add an appendix entitled “The History-Deniers” setting forth poll figures showing the percentages of Americans who have old-fashioned concepts of creation and little or no understanding of evolution, and comparative figures from Britain and other countries. While we all know that “creationism” has a disturbing basis of support in the United States, the poll

questions are loaded, and I doubt that, as Dawkins asserts, they “suggest that at least 40% of Americans are creationists — that’s dyed-in-the-wool, out-and-out, anti-evolution creationists.” And besides, if they were, his explanation of the details of evolutionary science, however cogent and eloquently presented, would not influence them; his explanations do not come to grips with dualism of reality nor at all with human psychology.

That is, I suggest, the fundamental flaw in Dawkins’ approach. He believes that science, being a cogent analysis based upon observations of the world available to our senses, is the only possible approach to comprehension of what is true, or probably true; that is, to reality. That is the same mistake that is regularly made by “Intelligent Design” proponents. For instance, Phillip Johnson, author of *Darwin on Trial*,¹⁵ complains that: “Naturalism assumes the entire realm of nature to be a closed system of material causes and effects, which cannot be influenced by anything from ‘outside.’” He footnotes comment that “naturalism” implies that “only natural or material phenomena are real” and “what science can’t study is effectively unreal.” Dawkins would almost surely agree.

Johnson rejects evolution itself because it derives from an approach that he sees as inherently or necessarily contrary to theism (or his version of it), and Dawkins rejects theism because it derives from an approach that he sees as inherently or necessarily contrary to science (as he sees it). Besides being arrogant, intolerant, dogmatic, and counterproductive in effect, absolutism of that sort is, I suggest, contrary to sound principles of epistemology based on the findings and understandings of cognitive science.

With respect to the other two “militants,” Christopher Hitchens and Sam Harris, I refer to a book entitled *I Don’t Believe in Atheists*,¹⁶ by Chris Hedges, a former correspondent for the New York Times, who spent years in the Middle East and also taught at Princeton. The book resulted from Hedges’ debating Hitchens and Harris in California in 2007. He provides more than adequate evidence of the animus of Harris and Hitchens towards Islam and their ignorance of history and international relations.

Harris is quoted as saying in his book, *The End of Faith*,¹⁷ that “Some propositions are so dangerous that it may even be ethical to kill people for believing them,” and that “This is what the United States attempted in Afghanistan, and it is what we and other Western powers are bound to attempt, . . . elsewhere in the Muslim world,” and that “Given what many of us believe about the exigencies of our war on terrorism, the practice of torture, in certain circumstances, would seem to be not only permissible, but necessary.”

Then Hitchens is quoted as saying in his book, *God is Not Great*,¹⁸ that: “I think the enemies of civilization should be beaten and killed and defeated, and I don’t make any apology for it. And I think it’s sickly and stupid and suicidal to say that we should love those who hate us and and try to kill us

and our children and burn our libraries and destroy our society. I have no patience with this nonsense.”

Well, I have no patience with those two; their views are odious. Setting forth such views as associated with atheism is an affront to humanity and an abuse of atheism as an intellectual discipline.

It is also worth noting that the very idea of “militancy” with respect to atheism has been seen to be a bit ridiculous. A.C. Grayling, an English atheistic philosopher (author of *The Good Book: A Secular Bible*,¹⁹ which, incidentally, he denied is a parody), mocked Dawkins by asking “How can you be a *militant* atheist?” comparing that with being a “*militant* non-stamp collector” or with “sleeping furiously.”²⁰

On the other hand, in response to complaints by theists about atheistic militancy and fundamentalism, Grayling made a reasonable point — in reference to believers of years gone by — that “[W]hen the boot was on their foot, they burned us at the stake. All we’re doing is speaking very frankly and bluntly and they don’t like it.”

The militancy, arrogance and cocksureness of some of the prominent atheists surely do impede efforts by people of differing viewpoints to seek understandings that may be common to us all. However, those postures of militancy and excess are not limited to atheists, but are also rather prominent among some of the proponents of belief in God. One can find examples on the airwaves and in the press of statements by religious proponents that can only be called fanatic, and are hateful not only of atheists but often of adherents of any different religious beliefs.

Quite apart from the kooks and hopelessly far out, there are also damaging approaches sometimes taken by people of more intelligence and fair-mindedness. For instance, it is rather common for believers, including clergymen and others of good will, to allude to and use the doubts and uncertainties of science (which are essential to the integrity of science) as an indication that science is or may be flawed or incorrect, so it may be ignored. Or alternatively, scientific doubt is asserted as an indication that religious belief is a valid alternative, or “just as good” as science. Those are both so obviously illogical that it is hardly worth arguing about them, but their prevalence in religious argument is intellectually shameful.

More reprehensible are the attacks on and distortions of science by authors who have in fact studied science, learned enough about it to identify some of the areas of doubt and uncertainty, and the differences among scientists, and then use that data in an attempt to refute the science itself. That is the approach of a number of the proponents of “creationism” and “intelligent design.” That is not an acceptable means of promoting their belief in God. It is simply an attack on science itself, an attack on rationality, and as such it is more than a false concept: it meets my test of being an “evil agenda.”

Also aside from disputes between theists and deists on one hand and atheists and agnostics on the other, a greater problem — a major one in the world today — is that religion itself has been politicized. We have been daily admonished in the news about the threats of “Islamic terrorism,” and the risks of “Islamization.” There are organizations and websites dedicated to opposition to Islam, asserted to be a culture dangerous to our own “way of life.” The contrary efforts of Islamic leaders in western nations and of “inter-faith” organizations, though growing, still do not reach the eyes and ears or the ken of many people. They have so far not been effective in carrying to the general public the understanding that Islam as a doctrine or religion is, though different, as basically devoted to peace and justice as are Judaism and Christianity, and quite compatible with the culture of both.

My knowledge of Islamic doctrine is very limited, but it is fairly clear that the principle of jihad is not a demand for continuing or unrelenting violence against all nonmuslims. The word and the concept have certainly been used by mullahs and imams in relation to and for the purpose of justifying political action and violence, usually in response to what they deem to be action and violence against Islam. And yes, the word is properly used to describe a Muslim “holy war.” But the word “crusade” in its origin denotes a “holy war” by Christians against Muslims and Jews, and is now used in a very different sense, as in Dwight Eisenhower’s book, *Crusade in Europe*.²¹ There are very few Christians around now who would propose taking up arms in a “crusade” to “defeat” or “destroy” Judaism or Islam, and there are many Muslim leaders and scholars in the United States and elsewhere who denounce the use of the word or the concept of “jihad” as a call to violence. It is used as a proposal of violence only by deviant political factions.

At the same time it cannot be denied that Islam has been politicized in the Muslim world. The only remaining theocratic governments are Islamic. The leaders in those and other Muslim countries find it necessary to assert Islam as essential to the identity of their people. Nevertheless, most nations with Muslim majorities have protected and maintained a respectable level of secularism, and that seems to be on the rise. At the moment (in 2013) we cannot know for sure, but it would seem that in quite a few countries with Muslim populations there may well be majorities who would prefer that their governments become essentially secular. Also, it seems clear that the great majority of the Muslim populations of the world are as opposed to and horrified by terrorist actions and proposals of a few of their coreligionists as are we in the non-Muslim world.

Here in the United States we have an outspoken minority who vigorously assert that our nation is, and should be, Christian. Some of them would even wish it to be theocratic, and vociferously contest the fundamental separation of church and state. And there are even a few who condone terrorist acts, such as murderous assaults on clinics and doctors who assist in abortion.

While people of the violent stripe seem to represent only a small minority, it cannot be doubted that there are many Christians who have in one way or another been politicized, if only with respect to what they deem to be moral imperatives affecting governmental policies. Nor can it be doubted that there have been candidates for and holders of governmental office who have pandered to and sought to take advantage of such politicized manifestations of religious beliefs.

When it comes to politics, the term False Truths takes on a new meaning and a life of its own!

NOTES

1. Referred to in Chapter Three and Note 5 therein.
2. See the section on Neuroscience in Chapter Eight below.
3. Referred to in Chapter Three and Note 6 therein.
4. Percy Bysshe Shelley, *The Necessity of Atheism*, from *The Works of Percy Bysshe Shelley in Verse and Prose*, H. Buxton Forman, 1880.
5. *The Autobiography of Charles Darwin*, W.W. Norton, 1969.
6. See Edward C. Mendler, *Evolution for Creationists*, iUniverse, 2007.
7. Robert Chambers, *Vestiges of the Natural History of Creation*, W.& R. Chambers, London, 12th Edition, 1884. The working classes in England in 1844 were already somewhat aroused. In that year Friedrich Engels, then in Manchester, wrote *The Condition of the Working Class in England*, though little known since it was in German (*Die Lage der arbeitenden Klasse in England*) and not published in English until 1887.
8. American Humanist Association, 1777 T Street NW, Washington, DC 20009.
9. Council for Secular Humanism, P.O. Box 664, Amherst, NY 14226.
10. Richard Dawkins, *The Selfish Gene*, Oxford University Press, 1989.
11. Richard Dawkins, *The Greatest Show on Earth*, Free Press, 2009.
12. Richard Dawkins, *The God Delusion*, Bantam Books, 2006.
13. Richard Dawkins interview with Decca Altkenhead, Oct. 24, 2008, on www.guardian.co.uk/science.
14. Martin Rees and the Templeton prize: why are the atheists so cross? April 7, 2011, www.guardian.co.uk/politics.
15. Phillip Johnson, *Darwin on Trial*, InterVarsity Press, 1993.
16. Chris Hedges, *I Don't Believe in Atheists*, Free Press, 2008. As an aside, my reliance on Hedges' book does not indicate that I agree with all of his conclusions.
17. Sam Harris, *The End of Faith*, W.W. Norton, 2004.
18. Christopher Hitchens, *God is Not Great*, Twelve, 2007.
19. A.C. Grayling, *The Good Book: A Secular Bible*, Bloomsbury Publishing, 2011.
20. A.C. Grayling interview with Decca Altkenhead, Apr. 3, 2011, on www.guardian.co.uk/culture.
21. Dwight Eisenhower, *Crusade in Europe*, Doubleday, 1948.

Chapter Six

Physics and Mystery

COSMOLOGY

The Big Bang is at the root of the prevailing theory of cosmological development, and it is worth examining how science came to that view and what it means.

In ancient times men looked at the night sky and observed that most of the white points of light seemed to be fixed; that is, they stayed in the same relationship to each other, albeit in a pattern that revolved as the night and the seasons passed. Other points of light were not fixed, but moved through the field of fixed stars from month to month or even from night to night, being planets, comets and meteors. The sun and moon of course moved across the sky every day. Thus was the theory of the cosmos begun in China, Persia, Egypt and elsewhere, always based on the earthly location of the observer as the center of all things. In the 2nd century A.D. Ptolemy devised a systematic mathematical theory of the cosmos, based on fixed spheres surrounding the Earth, derived from Aristotle. The observations up to that time, coupled with the earthcentered dogma, required Ptolemy to posit some very peculiar motions of planets, called epicycles. The Aristotelian/Ptolemaic concept of truth, although false, continued to prevail for over fifteen hundred years.

In the 16th century it occurred to Copernicus that, while our base of observation is the Earth, the position of any one observer of the celestial spheres might not be better than that of some other observer. That led him in 1543 to propose that the sun, rather than the Earth, might be the center of the universe.

Then, beginning in 1610, armed with a telescope of his own design and construction, Galileo made new observations of the apparent motions of planets through the sky and saw four moons orbiting Jupiter, which did not

match the Ptolemaic model. That led him to support the Copernican concept. When he published his views, expressed in the form of a Dialogue, the Church perceived a rejection of its Aristotelian precept, and the sad and notorious story of Galileo's suppression began¹ Truth, or rather the stubborn commitment to false truths, asserted its power over mere observation.

Notwithstanding the suppression, Galileo had initiated the science of astronomy, and its findings could not be denied for long. Johannes Kepler analyzed celestial measurements by Tycho Brahe and determined that planets followed elliptical, not circular, orbits around the sun. Another Aristotelian certainty refuted! And then, expanding upon Galilean measurements of falling bodies and Kepler's orbital formulas, Isaac Newton produced a "law of gravity," which was long accepted as a final and thorough explanation of the operation of the universe.

Telescopes were steadily improved and enlarged, and the science of optics further developed. However, the only source of information that telescopes provided was visible light falling into their lenses, and it was generally assumed that the distances to the stars were so great that it was very unlikely that much could be learned about them by telescopic observation. That false truth did not last for very long.

By means of a prism white light was broken down into a spectrum of colors, first by Newton and then by others. Eventually different colors were identified as representing different wavelengths of the light. In 1814 Joseph von Fraunhofer began a study of the mysterious dark lines that appeared in odd patterns across a prismatic color spectrum of light coming in from the sun. And by 1860 Gustav Kirchoff and Robert Bunsen, demonstrated that when a gas is heated enough to glow, the spectrum of the light coming from it displays distinct lines at various points in the spectrum. Kirchoff's lines (called "spectral lines") were soon associated with the Fraunhofer lines (called "absorption lines") and the patterns of both were identified by laboratory experiments with particular elements, each of which, when heated to glow, displayed its own distinctive sets of lines. Besides the German scientists, the American David Alter studied similar phenomena and he may have been the first to suggest that analysis of the spectrum of light might be useful in the field of astronomy. It certainly was.

The patterns of lines in the spectra of light from stars could now be compared with spectra from elements made to glow in a laboratory, and thus the chemical composition of the celestial source, or of the gasses through which the starlight passed, could for the first time be determined.

Spectroscopic techniques were extensively refined, and the exact frequencies of light at which each spectral and absorption line occurred in the pattern for each element were determined and plotted. By the end of the 20th Century the particular elements, and many types of molecules, in clouds of galactic

gasses through which starlight had passed were analyzed and identified by telescopic spectroscopy.

Another advance, a very important one, came in 1842 when Christian Doppler, an Austrian, announced the principle that the apparent frequency of a wave depends on the motion between the source and the observer. In a nutshell, a wave is made up of crests and nodes, and if the source, such as a train whistle producing a sound wave, is approaching you, each crest leaves the train a little closer to you than the last crest, so they get to you closer together than they would if the train were standing still. When the crests of a wave are closer together, the frequency is higher, wavelength and frequency being reciprocals. If the train is moving away from you, the crests are further apart and the frequency is lower. Doppler made his discoveries with respect to sound waves, but a wave is a wave, and the principle applies equally to light.

In the range of visible light the frequencies of colors (ROYGBIV) extend from red at the low end to blue (then indigo and violet) at the high end. Therefore, when a source of light is moving away from you, the Fraunhofer lines in its light will seem to move toward the red end of the color spectrum (called a redshift), and when it is moving toward you, its light will move toward the blue end (a blueshift).

By using a spectroscope and comparing Fraunhofer lines, it became possible for scientists to discern actual redshifts and blueshifts of celestial objects, indicating that they were moving with respect to the Earth. In the 1920s, Edwin Hubble, an American astronomer, made observations demonstrating that some of the fuzzy-appearing points of light in the sky, called nebulae, were in fact separate galaxies of stars outside the Milky Way. Although Kant had long ago so speculated, some astronomers, including Harlow Shapley at Harvard, were horrified at the very idea. But it stuck, the old truths were cast aside, and a new age of astronomy was born.

In 1929 Hubble reported on observations of many celestial objects outside our own galaxy and confirmed that they revealed in general a measurable redshift. He also showed that the greater the distance to the celestial source of light, the greater its redshift. Those findings indicated to most cosmologists that the universe was expanding. Interestingly enough, Hubble himself rejected that idea and regarded redshift as a yet unexplained phenomenon.²

The idea of expansion was not entirely new. Einstein had recognized that his 1915 field equations of general relativity suggested expansion, and in order to bar it he inserted a factor called the "cosmological constant." He was committed to the truth he had grown up with: that the universe was eternal and essentially unchanging. Several theorists, such as Willem deSitter, a Dutch astronomer, and Alexander Friedmann, a Russian cosmologist, devised variant analyses or solutions of the equations, some of which afforded

alternate possible descriptions of cosmic development, including expansion. It was, however, Hubble's observations that made expansion an acceptable scientific theory. It is an interesting aside that Einstein himself once referred to his inclusion of the cosmological constant as a mistake, but, as we shall see, later findings and analyses seem to have rehabilitated it!

Actually, the very idea of an expanding universe depended upon and required Einsteinian relativity, in which space and time are both variable components of a single continuum, and in which the velocity of light is fixed and cannot be exceeded. Newtonian mechanics, based upon fixed and separate elements of space and time, could not have allowed for an expanding universe.

Georges Lemaître, a Belgian, was both a priest and a scientist, having studied at Louvain in Belgium, at Oxford in England and at MIT in the United States. He reasoned that if the universe was steadily expanding, it must have once been very small and compact. If all of the energy now present in the universe was once concentrated in a spot, that small bundle must have been awfully dense and hot! (It should be noted that "energy" and "matter" are equivalents, or different aspects of the same fundamental thing, in accordance with Einstein's equation of 1905: $e=mc^2$.)

In a paper in 1927 Lemaître first propounded the idea that the origin was a sort of "primeval atom" from which the entire universe had then expanded, cooled and developed. He spoke on the subject at a conference at CalTech in 1933, and Einstein expressed admiration for the idea. George Gamow and other scientists developed it further; and in 1949 Fred Hoyle, a supporter of the rival "steady state theory," dubbed it the Big Bang theory.

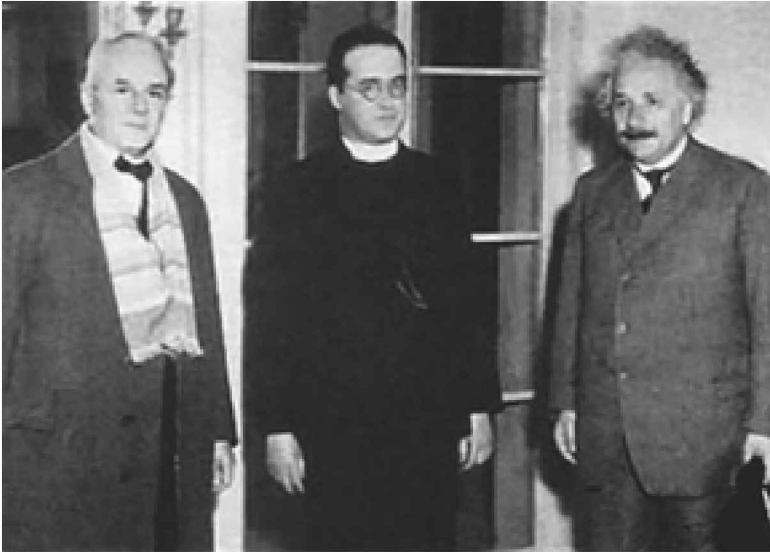


Illustration 6.1. Robert Millikan, Georges Lemaître, Albert Einstein. Photograph taken at California Institute of Technology on January 10, 1933; reproduced by permission and courtesy of Archives Georges Lemaître, Université catholique de Louvain, Louvain-la-Neuve, Belgium.

Since then that basic idea has been largely accepted. The theory predicted a “cosmic microwave background radiation” which was actually discovered — empirically identified — in 1964, and later studied and measured by satellites. The technology of telescopes has advanced tremendously, including the ability to view celestial phenomena not just in the narrow band of visible light, but also at infrared and radio frequencies and at ultraviolet and xray frequencies. Highly specialized satellite measuring instruments and the Hubble Space Telescope have returned vast amounts of new information. The Hertzsprung-Russell diagram, first devised in 1912, described the relationships and developmental histories of different types of stars. Further theories of the processes of formation of stars, of galaxies, and of clusters, have been developed from many later observations, and they fit and support the Big Bang concept.

A great variety of new empirical discoveries have combined to support the concept and to add new detail as well as credence to its theories. The observed distribution in the universe of the simplest of the elements — hydrogen with one proton, helium with two and lithium with three — matches the theoretical nucleo-syntheses predicted for the opening moments of the Big Bang, while corroborative processes of nucleosynthesis have been demonstrated in laboratories.

Particle accelerators, or “atom smashers,” were first developed before the middle of the 20th century³ and since then increased in power to the level of

the Large Hadron Collider (LHC) at CERN, the European Center for Nuclear Research, located on the border of France and Switzerland. They have revealed vast new lodes of information and understanding of the actual structure of elementary particles, and the LHC promises much more.

Assembling all of that information, the cosmologists presently estimate the occurrence of the Big Bang to have been about 13.7 billion years ago, plus or minus 10 million years or so. Of course no galaxy with a redshift great enough to match that age has been or can be detected. No one, they say, will ever be able to see light originating before the cosmic microwave background radiation came into existence because the density of the plasma of matter and energy before then, and probably for thousands of years after that, would have rendered the extant universe opaque to visible light.

Nevertheless, despite the opacity, despite the inability of human devices and experiments to penetrate further into physical reality, explanations of the unknown and undemonstrated are propounded through processes of reasoning and theory, based on analogies and principles of uniformity and invariance. If the Big Bang is conceived of as an event, an occurrence of a “singularity,” a point of no dimension at which the entire universe was concentrated, then *something* happened! The theoreticians say that it is not possible to actually measure at the levels of Max Planck’s theoretical minimum possible length (10^{-35} meters) or time (10^{-43} seconds), or maximum density (5.1×10^{96} kg/m³). But once those parameters of the initial “singularity” are passed, the theoreticians begin to describe what they think must have happened, including myriad developments within the very first second.

Far and away the most startling assertion of what happened within that first second (actually at about 10^{-35} seconds) is the phenomenon called “inflation.” Astronomers were faced with a dilemma: telescopic observations indicated a homogeneity and isotropy of the universe and a flatness, or absence of observable curvature of space, as well as other related problems, that were inconsistent with the concept of the Big Bang as a sort of explosion of the initial kernel containing everything. In 1980 the scientist Alan Guth proposed a solution, which has since then been incorporated into Big Bang theory as an essential element. That is the rapid, exponential and huge expansion of space itself — from the size of a grape to nearly the size of the universe we see today — in that tiny fraction of that first second.

The explanation of how this “inflation,” as it is called, resolved the dilemma depends on a “scalar field” and mathematics — as so much of cosmological theory does — that are beyond the scope of this book and my competence. But the substance of the explanation is that this sudden inflation brought about a separation of an underlying single unified force present in the kernel of origin into the separate forces we recognize today, allowing the strong nuclear force to operate independently, thus permitting the formation of quarks and their consolidation into hadrons and the separate formation of

leptons, which particles themselves could subsequently employ and generate the weak nuclear force and electromagnetic force, and also gravity.

Those theoretical speculations were of course very much influenced by the discoveries and developments in the field of particle physics throughout the 20th century, including of course quantum physics, discussed below.

Leaving aside the mathematics of scalar fields, this inflation is spoken of as being driven by “dark energy,” a sort of negative, or repulsive, gravity, which is equated with the “cosmological constant” in Einstein’s field equations. In any event, dark energy and dark matter are the hot buttons of cosmology today, about which, as was stated on a NASA website on Astronomy: “More is unknown than is known.”

The posited inflation is itself subject to doubts. Paul Steinhardt, a Princeton scientist, has pointed out that the observed uniform and flat states of the universe could have come about without inflation, and that even if inflation took place, small changes in the energy formulas governing it would have produced results other than the observed conditions. As an alternative, Steinhardt and others have proposed a “cyclic theory” pursuant to which the Big Bang was not a single beginning of everything, but was a sort of waypoint in the repeated expansion and contraction of energy and matter in successive universes.⁴ That leaves no point of beginning at all, only a point of “bounce.”

Whether a unique beginning or a bounce from consolidation of an earlier beginning, the theory is that soon after that first fraction of a second a process began that eventually led to the universe we perceive today. First there were nucleosyntheses of quarks, protons, neutrons, and electrons, and their related “force” particles, such as gluons, photons and presumably gravitons. Then came the formation of atoms in a dense, unstable plasma, which dissipated and left behind the cosmic background radiation whose remnant is found today. Soon there were clouds of atoms, mostly hydrogen and a little helium and lithium, which spread, cooled, swirled, clumped and eventually formed into stars and planets, which themselves eventually clumped into galaxies, which are also seen to have their own groupings and relationships in clusters, all connected by gravity.

The cumulative gravity of the uncountable number of particles forming a star pressed them so tightly together that their temperature, or energy level, rose to the point at which they began to fuse with each other, forming helium out of protons and neutrons, and then other elements, including carbon, nitrogen and oxygen. In the process of fusion there were leftover fragments of matter that turned into energy (again note that the measure is $e=mc^2$), producing an outward radiative pressure.

Fusion and the outward pressure eventually waned when the star had used up most of its remaining resources, and then gravity took over again and made the star collapse. When a large star collapsed, a great explosion, called a supernova, resulted, and in it the temperatures reached were so high that

even heavier elements, such as lead and uranium were fused, and then were scattered by the explosion into galactic clouds of dust. From that dust new stars and planets were formed and are still being formed. And living things, including humans, are properly (if poetically) described as consisting of star dust.

Today our telescopes can see hundreds of billions of galaxies, each containing hundreds of billions of stars, with huge gaps of space between the galaxies and clusters of galaxies, still showing redshifts indicating their increasing separation. The velocity of light having been measured (at 299,792,458 meters per second), distances to remote stars and galaxies are measured in light years, being the distance traveled by light in a year (which is over 31,550,000 seconds). The nearest star to our sun is about 4 light years away, and the most remote galaxy so far detected shows a redshift indicating that it is at least 12 billion light years away.

These descriptions of the history and development of the cosmos — and of life within it — are, I think, now generally accepted by almost all reputable theologians as materially sound. The more astute among them are surely aware of the myriad doubts and mysteries embodied in scientific theories and analyses. Yet they know that matter and energy are interchangeable aspects of the same (albeit mysterious) thing, and that both exist in various forms in the universe. They know that the bodies of human beings are composed of atoms and molecules that are indeed the remnants of former stars. They know that almost all of the assertions as to physical facts that were made by the ancient Greeks, including Plato and Aristotle, the theologians of the Middle Ages, the philosophers of the Enlightenment, and even contrary facts asserted by many scientists from Galileo and Newton to date, are false. Yet theologians of today have not at all rejected or repudiated the concepts and theories of those same people; they continue to hold that — besides the material reality there is another, a separate reality. Is the existence of such other reality supported by any theories or analyses other than those of Plato, Aristotle, Aquinas, and the others referred to and considered in Chapter Two above? I don't think so.

Returning to cosmology, the actual description of the expansion of the universe in scientific terms (leaving aside the mathematics) itself departs from our ordinary or intuitive conception. It is not like an explosion of shrapnel into surrounding space. It is a metric expansion in which the parts of the universe become more distant from each other because the space in which they exist becomes larger. Those parts are not themselves moving through space into other outward areas of space. This expansion of space itself appears to apply only to the vast gaps between the observed structures of bodies having mass, namely galaxies and clusters of galaxies. Such things as stars, galaxies and clusters of galaxies do not themselves expand (nor does Brooklyn, as Woody Allen pointed out), because, as it is explained, they are

“gravitationally bound.” That is to say, those structures are held together, it is said, by the gravitational attraction between the particles of matter of which they are composed.

That itself seems to me to be a strange explanation for several reasons. The clusters, galaxies, stars, and indeed the very molecules and elementary particles of which they are composed, are all filled with space, lots of space. That space within particles, stars, galaxies and clusters is certainly no different (is it?) than the space in the vast gaps between the structures of galactic clusters, and must certainly be equally subject to whatever force or phenomenon produces the expansion of space. Therefore, such things cannot be wholly exempt from the expansion of space, but must experience a degree of expansion that is so slight that it is negligible, or perhaps undetectable by the means and the instruments available to us. Such exceedingly slight expansion (of structures that are “gravitationally bound”) would seem to indicate that the force of gravity vastly exceeds the repulsive force of — the cosmic constant, or dark energy, or whatever it is called.

Yet the force of gravity is described by scientists as far and away the weakest of all natural forces; weaker than electro-magnetism and the nuclear forces by so many orders of magnitude that it gives rise to a “hierarchy problem” which makes it impossible, so far, to fit gravity into the otherwise organized schemes of particles and forces.

The metric nature of the expansion of the universe leads to other conclusions that are far from ordinary or intuitive. First, the observed deepspace redshifts are evidently not the result of motion through space, but a result of the stretching of space; a different kind of Doppler effect. But some observed redshifts and blueshifts surely do result from motions of bodies through space. Then, taking into account the principles of general relativity in which time and the velocity of a moving object are interdependent, the time it takes for light to reach us from a body that appears to be, say 12 billion light years away, does not indicate that that body is now 12 billion light years distant. It has been moving, and space has been expanding, since then, and it may now be 18 billion (or some other number) light years away. Thus, though the Big Bang occurred 13.7 billion years ago, the size of the universe may be, say, 80 billion or 100 billion light years in extent. No one knows. Mathematically speaking, the governing formulae are called the Friedmann–Lemaître–Robertson–Walker (FLRW) metric, and the more recent Lambda-CDM or Lambda-Cold Dark Matter model.

The scope, and evident approach to accuracy, of the measurements of the cosmos are truly remarkable, and that presents us with an amazing discrepancy, a huge lacuna of knowledge. Using various measurements, techniques and assumptions, cosmologists determine and add up the mass of all the objects they perceive in the entire universe, and conclude that they account for only about 4 percent of the total of mass and energy that must, or should,

exist if their other measurements and observations, particularly as to gravity, are correct. Only four percent of the known universe has been seen or otherwise detected. Only four percent is “ordinary matter,” the kind that interacts with electromagnetic energy.

Another 23 percent of the stuff of the universe consists, it is said, of what is called “dark matter.” It has “mass” and therefore possesses or responds to the property called gravity. But dark matter does not respond to telescopes tuned to any frequency, whether radio, infrared, visible, ultraviolet, xray or gamma ray; it does not interact with electromagnetic energy. It has not been seen, and no one knows what it is or where it came from. One observation supporting its existence is that the stars in outer arms of spiral galaxies rotate around the centers of the galaxies at such velocity (i.e., with such angular momentum) that they would fly off away from the galaxy if there were not more gravity, i.e., more mass, holding them in. That leads to the conclusion that there must be a halo or cloud of “dark matter” surrounding such galaxies and providing the needed gravitational force.

Compounding the confusion and uncertainty, that still leaves 73 percent of the stuff of the universe unaccounted for. That is called “Dark Energy,” and the scientists have no explanation at all as to what that is. The observed expansion of the universe seems to call for some repulsive force counter to gravity. The posited exponential “inflation” of space took place, so they say, in a tiny fraction of the first second of the Big Bang, but since then the redshift data indicates that the universe has continued to expand, albeit at a much slower pace. And now, in very recent years, measurements of certain very distant supernovae indicate that the rate of expansion may be increasing. To explain those phenomena, the cosmologists tell us that there is “dark energy,” an antigravity force. It has no more claim to reality or truth than did (or does) Einstein’s “cosmological constant,” a factor arbitrarily inserted into a mathematical formula in order to make it plausible or acceptable.

The underlying basis of the problem is that gravity itself has not been explained. With respect to the force called electromagnetism, there are formulae (from Maxwell and others) defining its “fields,” and there are detailed analyses of its associated force particle, the photon. Much of that has been supported empirically. But the “gravitational field” is not understood, and no “graviton” particle has been detected. Also, in accordance with Einstein’s theory of general relativity it may be, and is, said that gravity is not a force at all, but is a condition of the curvature of space in the presence of a substance having mass.

But what is mass? The answer proposed is that it is a property of matter resulting from the “Higgs field,” which is represented by the “Higgs boson.” That mysterious hypothetical particle has been eagerly sought to be detected by hitherto unobserved traces or scatterings from the collisions of protons at nearly the speed of light in the LHC at CERN. The asserted detection of the

Higgs boson in mid-2013 may have brought theory one step forward, but it still did not explain gravity, or why space is curved in the presence of mass. In fact, the question of what space is has not been answered. Is space a thing, an “aether,” that can be bent?

Does all that uncertainty not entitle us to say that the explanations, the descriptions, of the universe that are presented to us by cosmologists today are not truths at all, but are false? Are those descriptions not just as false as were Aristotelian spheres or Ptolemaic epicycles?

There is no denying that observational cosmology has progressed tremendously from Galileo and Tycho Brahe through Huygens and Cassini, the Herschels, and the use of huge ground-based telescopes, to the Hubble Space Telescope, and its successors yet to come. Nor is it at all doubted that the theoretical explanations have long since left Ptolemy behind and been advanced by Kepler, Newton, Einstein, Penrose, Hawking, and many others. But there are still no explanations that deserve to be called true.

Nevertheless, there are millions of people around the world, including scientists, who accept and regard the current pronouncements, including often even the speculative hypotheses as to inflation, dark matter and dark energy, as the truth. It is the human mode to regard what appeals to us at the moment as true to be the truth, whether it is or not.

Beyond that, there are some cosmologists who go further, and delve into the mysteries not only of gravity but also of the very origin of the universe itself. That origin is attributed to a property of space itself, called “vacuum energy.” The idea of the existence of “energy” as inherent in, or a property of, otherwise “empty” space is, it seems, related to the idea of “virtual particles,” which are undetectable in themselves, but assumed to exist because of observed actions of “real” particles. It becomes necessary to put many words into quotation marks because they are terms of art in the art of quantum physics. Though we may call it an art, quantum physics is now thoroughly accepted as at the root of the entire science of physics, and it will be further considered below.

As noted above, the kernel that initiated the Big Bang is usually called a “singularity,” which means a point at which the “laws of physics” do not apply or do not exist. The point is presumed to meet or surpass the Planck limits and to have infinitely small size and infinitely great density. But of course “infinity,” at either the large or small end of the scale, is meaningless to the human mind, except as a mathematical concept.

Was there really such a point that gave rise to the Big Bang? Where was it? We are not supposed to ask “where,” because it was nowhere: there wasn’t any “spacetime continuum” until the kernel was somehow activated. OK. Then what made it activate? Some quantum theorists say that resulted from “strings” or “loops,” of about the size of Planck’s minimum, that exist (or existed) in every speck of — dare we say it? — space. What space? Those

ideas are criticized by some scientists as “metaphysics,” not science, because they are beyond the possibility of measurement, test or empirical analysis.

Let’s go a step further and consider nucleosynthesis. This is said to have occurred during that first second, but only after a finite lapse of time, albeit a tiny fraction of a second. Until quarks were formed, and joined to create protons, there was no “matter” at all — even though the singularity is said to have had infinite density. This was presumably all in the form of energy, although the very idea of “density” implies a material substance. If there was nothing but “quantum jitter,” then its “density” is an equivalent derived from the relationship $E=mc^2$, although that formula is certainly a function of the time-space continuum.

Once particles of matter formed — out of some kind of conversion of energy — they must have existed in “space.” Didn’t that space still contain “strings” or “loops” of the kinds contemplated by “string theory” (morphed into “matrix theory”) or by the theory of “loop quantum gravity”? Was the quantum jitter, whatever its nature, still activating the Bang? If every speck of space contains or has the capability of quantum jitter, isn’t the Bang still going on? If so, isn’t that “steady state” creation? Or is the theory that the initial Bang created “space-time,” a phenomenon we observe today, and that that ended the capability of strings, loops, virtual particles, or other somethings, to initiate a Bang? These are wildly speculative questions of course, but proposals and articles of supposedly scientific status pose such issues, and yet do not come to grips with them.

Gravity is much discussed and is usually identified as a mysterious force yet to be integrated into acceptable theory. Is there any evidence, or even any theory, that gravity can exist independently of matter? Did dark matter arise from the Big Bang? How did it happen to have gravity but not magnetic or electric charge? What in fact *is* electric charge, and why are some particles positive and some negative? Cosmologists see the Big Bang as having produced both matter and antimatter (particles with opposite electric charges) without distinction, and offer theories as to processes that have resulted in the dominance of ordinary matter (positive protons, negative electrons), but is there any tender of explanation for the existence of electric charge at all? These questions, among the many others one could ask, are surely in many respects naive, and ignore the applicable and explanatory mathematics. But does mathematical consistency make its own conclusions true?

The very idea of the term “singularity” has become, somewhat anomalously, plural. In addition to the Big Bang we now have multiple Black Holes, also called, or containing, “singularities.” Astronomers have identified several black holes, and surmise that a large one exists in the center of almost every galaxy. A black hole is described as possessing such a strong gravitational field that it is surrounded by an “event horizon” from which nothing inside can escape. The mathematics of “escape velocity” for a satel-

lite orbiting the Earth or another planet are fairly simple, depending on the mass of the planet and velocity of the satellite. When applied to a black hole, the formulas require a velocity exceeding that of light, which is (in our Einsteinian spacetime) impossible. Also, like other celestial structures, black holes are usually spinning, and that further distorts space and creates an “ergosphere.”

The unanswered question is as to the source or nature of the “mass” that accounts for the “external” or observed physics of a black hole. Inside the event horizon sphere, presumably at its center, there is supposed to be a “singularity.” Is it of Planck dimensions? Does it have “mass,” producing a gravitational distortion of the surrounding space? If not, what is the source of the gravitational field? What happened to the matter that formed it in the first place? What exists between the event horizon and the singularity itself? If, as Stephen Hawking suggests (as I understand it), virtual particles may be formed outside the event horizon in effect replicating information as to actual particles trapped inside it, what in fact does that mean in physical terms? Does anyone really know what the hell is going on?

It is very difficult to conjure up a mental picture of a “neutron star” in which the gravitational attraction of neutrons to each other has compressed them so tightly together and left so little space between them that the density is such that a sphere of that matter of the size of the earth could have a mass greater than the sun, or a pea have the mass of a mountain. If you dropped a baseball of that density on the surface of the Earth, it would instantly sink to the center or even pass through, and would alter our orbit around the sun. Yet it can be thought of and described. But now we are asked to think of far greater density, to imagine gravity squeezing neutrons so tightly together that neither they nor their component quarks any longer have any separate identity, or really any existence. That is a “singularity,” and it is not “real” in a material sense or in the terminology of material science.

What is observed in the sky is exceedingly strange. The proffered explanations are just as strange, and often rather farfetched. The ability to match a theory of what might be happening to a set of equations is a remarkable intellectual achievement, but it is still not an explanation. Thus the conclusions must be either that the actual nature of the universe is so strange that even the most brilliant of humans, and surely the rest of us, are still largely in the dark, or that the so-called laws of physics are, contrary to basic premises, not universal, but are applicable only to observable phenomena, and evidently not to phenomena which in fact occurs at parameters of magnitude beyond our ability to perceive and to measure. It does seem that at some level, in some circumstances within the actual universe, neither matter nor energy can exist in a manner that conforms with the meanings in which we use and understand those words.

In other words, a philosopher, a theologian, might say that reality is transcendent — beyond material comprehension. The perceptions of our senses, aided with most remarkable instruments of human invention, and analyzed with the most exquisite tools of thought and mathematics, still leave the fundamental questions unanswered and without any perceived means of approach to answers. Physical, material, reality does seem on the face of it to be composed of some highly improbable components. We can only stand by in awe of the mysteries.

But does the improbability of explanation suggest that *any* or *every* improbability is fair game — that each one is equally acceptable? No, I don't think so; I don't see any logic or reason in that which is acceptable as a rational, frontal cortex, product of a human brain. The idea of an "intelligence," a "creator," behind or outside of this transcendence, this improbability, is no more than another wild speculation. It is very imaginative, and in light of modern analysis of the large role that emotion plays in the functioning of the brain, it is easy to see how human feelings call for an external, all encompassing spiritual basis. It is also evident why the very concept of the Big Bang appealed to theists, as it did to Pope Pius XII, who said in 1951 that the Big Bang theory did not conflict with the church's concept of creation. But, I submit, the idea of God remains a human mental fabrication with no logical basis and no material plausibility whatsoever.

Now, instead of closing on that point, I would suggest that, while "ultimate mysteries" may never be resolved, we are far from giving up the game of seeking better understanding through study and observation. Larger and more powerful telescopic probes can be put into orbit and sent further into space, and they can bring us more information about supernovae, quasars, the accretion discs around supposed black holes, the structures of galactic clusters, and numerous other barely studied mysteries of the cosmos.⁵ And coupled with knowledge from the LHC at CERN, and someday perhaps from particle accelerators of even greater power, we are very likely to learn much more about the very nature of energy and matter, possibly and eventually even dark matter and dark energy, possibly even the nature of electric charge and of gravity.

In the meanwhile, we will just have to put up with half truths and false truths, even when they are foisted off on us as if they were the real Truth.

WAVES, PARTICLES, QUANTA

Quantum physics arose from studies of the peculiarities of light. The idea that light consisted of a stream of particles was proposed at least as early as 55 BC in Rome by Lucretius, a follower of the earlier Greek atomists, such as Democritus and Leucippus, referred to in Chapter Two, but like those of

his Greek forebears, Lucretius's views were ignored. By the time we got to the 17th century the earlier wave theories of light had become prevalent. René Descartes assumed that light was propagated as a wave, and as usual he relied on his own reasoning and thereby completely missed and distorted the actual physics. Pierre Gassendi, another French philosopher, disagreed with Descartes, and asserted a particle theory of light. Isaac Newton preferred Gassendi to Descartes, adopted a particle theory and argued against the wave theory.

The wave theory was, however, asserted with renewed vigor in the 17th century by Cassini, Hooke and Huygens, developed in the 18th century by Euler, Fresnel and Poisson, and confirmed in the 19th century by Young, Foucault, Faraday, Maxwell, Hertz, Michelson and Morley. Because of Newton's great prestige it took all of that to overcome his false truth.

Michael Faraday and James Clerk Maxwell carried the theory much further forward, and showed that light was composed of two elements: electricity and magnetism. Maxwell arrived at the conclusion that light was no more nor less than a form of electro-magnetic radiation, which propagated through space at a constant velocity. His 1873 *Treatise on Electricity and Magnetism* set forth the mathematical formulae which are the basis of the present understanding of the workings of electric and magnetic fields. Heinrich Hertz produced actual radio waves in his laboratory and showed that they acted just like visible light.

Measurement of the velocity of light had been attempted, but not achieved with sufficient accuracy until the Michelson-Morley experiment in 1887. That experiment, incidentally, disposed of the long and firmly held idea that any wave needed a medium in which to be propagated. In the case of light it was called the "luminiferous aether." Another false truth disposed of! Electromagnetic waves, it turned out, propagate themselves through space at a fixed velocity, as indeed Maxwell's equations indicated.

However, the fixed speed of light violated another principle, regarded as a truth since the time of Galileo. That was the mechanical principle that the velocity of an object depends on the velocity of its source or the observer. If I throw a ball ahead at 50 miles per hour from a car going 60 miles per hour, the ball will move at 110 miles per hour with respect to the ground over which it is traveling. But if I shine a flashlight ahead from that car, the velocity of its light is not increased by 60 miles per hour, it remains just the same as it would if the car were stopped, or if it were going 1,000 miles per hour.

But how can that be? Well, the answer was provided by Albert Einstein in 1905 in his paper on the theory of special relativity. The speed of light through space is fixed and cannot be exceeded. Time and space are codependent components of a single continuum. Two moving objects will each measure time the same way, but the time of each will appear differently to the

other, depending on their respective velocities. That had not been noticed before, nor is it noticed now, because the time difference does not become significant until velocity (v) approaches that of light (c). The measuring formula includes the reciprocal of the square root of 1 minus v squared divided by c squared. That is the essence of the Lorentz transformation, sometimes called “gamma” in mathematical usage.

And yet another problem faced the wave theory of electro-magnetism: the photoelectric effect. Experiments by Hertz had shown that when light of high frequency impacted a gas or surface (metal in particular), electrons were emitted and an electric current made to flow. Furthermore, the energy of the emitted electrons was measured and shown to depend on the frequency of the light, regardless of its intensity. Those effects did not seem to be consistent at all with light being a wave.

Again in 1905 (his Wunderjahr) Einstein came up with an answer. He suggested that light itself consisted of — particles! He called them quanta, a term that had been used by Max Planck and others before him. This sudden reversion to explanation in terms of particles offended the majority of physicists who were then devoted to the wave theory. Max Planck himself, as well as Niels Bohr, rejected the idea, and it did not gain general acceptance until it was corroborated by experiments by Robert Millikan (who himself doubted Einstein’s concept) at CalTech from 1914 to 1919.

In 1900 Max Planck, studying so-called “black box radiation” had theorized that light energy existed only in discrete packets, called quanta, and that the amount of energy depended on the frequency of the light. That amount was determinable by multiplying the frequency of the light times a constant, h , which came to be known as the Planck Constant. Its amount, or value, was later determined by Millikan. The quantum of light was later named the photon, and nowadays most light phenomena is described in terms of photons. Planck himself regarded his analysis as a mathematical artifact and not as a description of reality.

Einstein had of course not wholly discarded the wave theory of light, and before long physicists recognized a “wave-particle duality” of electromagnetic radiation. In 1924 the young French physicist, Louis de Broglie, made the astounding assertion that particles in general also exhibited wavelike properties, and thus participated in the wave-particle duality. Wavelike properties of electrons were soon demonstrated, followed by neutrons and protons. More recently wave diffraction of even large carbon molecules, called fullerenes, has been detected. Wave-particle duality was here to stay. The term “wavicle” was suggested in 1927 by Arthur Eddington and later used by Banesh Hoffman, who worked with Einstein in Princeton, but the actual duality seems to continue to have an appeal to physicists.

In 1913 Neils Bohr had come up with a new description of the structure of an atom. Before then the hydrogen atom was thought of as an electron, a

particle identified in 1897, in orbit around a larger particle in the nucleus. The nuclear particle was identified by Ernest Rutherford in 1919 and called a proton. Bohr sought to provide a solution to the problem that, if conventional Newtonian physics applied, electrons would fly off or fall into the nucleus of the atom. In the Bohr atom electrons exist in discrete energy levels, not orbits per se, around one or more protons in the central nucleus, “jumping” from a lower to a higher energy level and thereby releasing or emitting a quantum of energy, that is, what is now called a photon.

In the ensuing years (mostly from 1924 to 1927) several (now famous) young physicists added to the description. DeBroglie proposed his concept of the wave nature of particles. Wolfgang Pauli came up with an “exclusion principle” barring electrons in an atom from having the same quantum characteristics, including a characteristic called “spin,” based on Pauli’s observation that the electrons exhibit an “angular momentum,” behaving as if they were spinning on an axis. Erwin Schrödinger devised an equation describing the energy levels of electrons in the Bohr atom. Werner Heisenberg had a matrix analysis arriving at the same conclusion through different mathematical means. Heisenberg accepted, but Schrödinger rejected the transfer of electrons between energy levels, the latter referring to “quantum jumps” as “nonsense.” Max Born contributed to Heisenberg’s matrix mathematics and devised a rule of “probability” which enabled him to provide a solution to Schrödinger’s equation. Paul Dirac’s PhD thesis in 1926 applied a new mathematical method. Heisenberg wrote a paper setting forth the “uncertainty principle,” based on the observation that the measurement of either the position or the momentum of an elementary particle, such as an electron, involved probing it with light, i.e., a photon, and that the energy of such a probe would itself either move the electron or change its momentum.

With this background, the newborn science of quantum physics was brought into the general acceptance of the leading physicists of the world at the 5th Solvay Conference in Brussels in 1927. The first Solvay Conference had been organized in 1911 by Ernest Solvay, a chemist and industrialist who had been a benefactor of the University in Brussels. The first five conferences were all concerned with various aspects of the newly discovered relationships between electromagnetism and the structure of the atom, and were presided over by Hendrik Lorentz. One of the youngest attendees in 1911 was Albert Einstein and one of the eldest was the great mathematician, Henri Poincaré, who died the following year. By the time of the 5th conference in 1927 Einstein had become famous and sat in the middle of the front row, as shown in illustration 6.2.

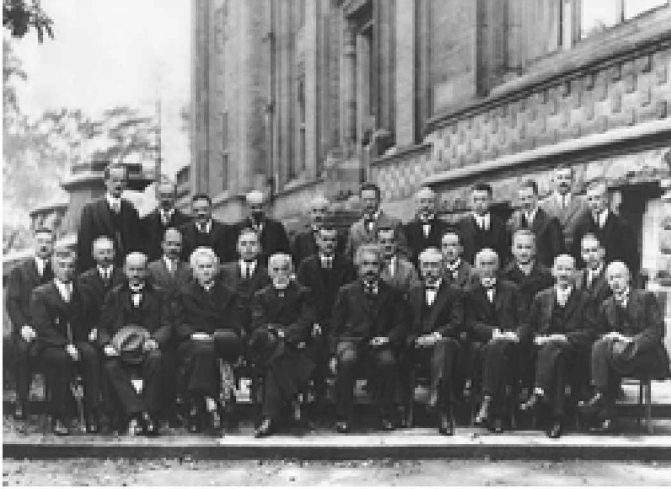


Illustration 6.2. Attendees at the Solvay Conference in 1927. Photograph by Benjamin Couprie, reproduced by permission and courtesy of the Solvay Institutes, Brussels, Belgium.

In the front row, starting from the left of the picture (Illustration 6.2), are: Irving Langmuir, Max Planck, Marie Curie, Hendrik Lorenz, Albert Einstein, Paul Langevin, Charles-Eugene Guye, Charles T.R. Wilson and Owen W. Richardson. In the second row are: Peter Debye, Martin Knudsen, William L. Bragg, Hans Kramers, Paul Dirac, Arthur H. Compton, Louis deBroglie, Max Born and Niels Bohr. And in the third row are Auguste Piccard, Edouard Herriot, Paul Ehrenfest, Edouard Herzen, Theophile deDonder, Erwin Schrödinger, J. E. Verschaffelt, Wolfgang Pauli, Werner Heisenberg, Ralph H. Fowler and Leon Brillouin. At least fifteen of these are Nobelists.

Many of these scientists, especially the younger ones, were committed to the basic ideas embodied in the so-called Copenhagen interpretation of the atom, devised principally by Bohr and Heisenberg. The Copenhagen interpretation took hold in 1927 and has (with modifications) prevailed ever since. This includes particularly the ideas of uncertainty and the probability, lacking any determinable certainty, of the location of a photon or of an electron in an atom, with that probability being defined by a mathematical “wavefunction,” and the possibility of an actual location of the particle upon the “collapse” of the wavefunction, brought about by a measurement. The probabilities are a statistical collection, and invoke the mathematics applicable to both of those terms. To many of the young physicists the very idea of a deterministic universe, capable of being defined by more than mere statistical probabilities, was an old truth, left behind as outmoded or false. But some, including Einstein, were not ready for the wholesale abandonment of determinability.

Beginning at the 1927 conference and on several subsequent occasions Einstein and Bohr debated the subject. Bohr asserted a “principle of complementarity” which accepted the contradictory characteristics of wave and particle as observable independently but incapable of being resolved or explained as a single phenomenon. Einstein stuck to the view that the theory was incomplete if the contradiction was not resolved, and that there must be something missing.

In the experiment of passing a single beam of light through two slits, it is shown that an interference pattern will appear, indicating that the *wave* passed through both slits, but how, it was asked, can a *particle*, a single photon, pass through two slits simultaneously? Bohr’s answer lay in what is called “quantum superposition,” holding that the two states (of particle and wave) exist simultaneously, but cannot be observed separately, and that the attempted observation of one of the states causes the other to disappear or “collapse.”

At the next Solvay conference in 1930 Einstein posed a thought experiment involving in effect the weighing of a box before and after the release of a single photon, thus determining the momentum of the photon at a particular time. At first Bohr was stymied, but eventually won the day by pointing out that the box was necessarily immersed in a gravitational field and that the application of Einstein’s own theory of relativity would make the measurement of the time uncertain.

In 1935 Einstein joined with Boris Podolsky and Nathan Rosen in the “EPR paper” again questioning Bohr’s complementarity.⁶ This paper dealt with “entanglement” of two particles, the “principle of locality” and the concept of “hidden variables,” all subjects involving mathematics well beyond the expository limits of this essay. David Bohm, following earlier ideas of Louis deBroglie, rang in with support of the EPR idea that quantum mechanics posed a paradox and was thus an incomplete theory.

The most famous response to the EPR paper, basically supporting its contentions, was that by Erwin Schrödinger, involving a cat.⁷ His article described an experiment in which a cat was placed in a box with a molecular mechanism that might or might not release a poison at any time, leaving it indeterminate, according to Schrödinger, whether the cat was alive or dead until the experimenter opened the box. The supporters of the Copenhagen interpretation asserted that the opening of the box was not the event that triggered the “collapse” of the uncertainty, it was the molecular release of a poison particle that did it. Still, no one could know whether or not the poison had been released and the cat was dead or alive until the box was opened, that is until the test or probe was made.

Einstein and his coauthors had asserted the principle of locality, meaning that a physical object, a particle for instance, can be affected only by something very nearby. This accords with the concept of local realism, meaning

that what we measure here is what IS here. That is to say, if we weigh an atom of gold, its weight (in our gravitational field) existed as a reality before we measured it, and cannot be influenced in any way by another atom of gold, or anything else, situated, say, on a planet in the Andromeda galaxy, or even at a remote point on the Earth. A related concept is called “counterfactual definiteness,” which is in essence the assurance that when an action or condition has previously been properly measured, then a recurrence of the same action or condition may be taken as factually equivalent.

But quantum mechanics proposed “superposition” of particles; that is a condition in which an electron (or even an atom of gold) does not exist in one position, but exists in *all* of its possible “states” at the same time. The “states” of an electron (or a gold atom) include its position and its momentum, and Heisenberg pointed out that measuring position will change the momentum and vice versa. The “realists” can readily accept that as a practical (or epistemic) truth, but Heisenberg and Bohr went further and said that the particle measured does not *have* both location and momentum at the same time, only statistical probabilities thereof.

Einstein and colleagues pointed out that that violates both locality and realism, and therefore that something must be missing from the quantum theory. One suggestion, though not asserted in the EPR paper, was that there must be hidden or latent variables that need to be added to the equations in order to make them descriptive of reality. However, a book in 1932 by the great mathematician, John von Neumann, already contained a mathematical analysis of quantum mechanics which rejected the very possibility of such hidden variables. Since then there have been other refutations of the existence or even the possibility of “hidden variables” in the equations.

Another issue that Einstein and others found disturbing is that of “entanglement.” In his famous paper about the cat in the unopened box Schrödinger discussed the concept and called it *Verschränkung*, which he himself translated as “entanglement.” What is meant by the term is that when two “systems,” e.g. two electrons, interact due to forces between them, and thereby become endowed with correlative properties, such as position or momentum or “spin,” then when the two systems (electrons) later become separated, they *remain* correlated in the same way, and do not become entirely separate or independent entities.

Schrödinger referred to that concept as *the* defining characteristic of quantum mechanics and found it unsettling, particularly the thought that such correlations might persist with truly separated systems. He suggested that such entanglement might persist only at a distance in which the time for light (electromagnetism) to travel between them was negligible.

Einstein also continued to assert the independence of separated particles, a sort of principle of separation corollary to the principle of location, and in keeping with his principles of relativity he insisted that information could not

be transmitted from one location to another at a velocity greater than that of light. Some years later, as the argument continued, Einstein referred to the putative remote entanglement as *Spukhafte Fernwirkungen*, translated as “spooky actions at a distance.”

By 1964 the issues were joined by John Stewart Bell, an Irish physicist, who introduced a theory, later further developed by him and others, and now called Bell’s Theorem. It holds in effect that there are basic incompatibilities between local realism and counterfactual definiteness on one hand and demonstrated phenomena, including entanglement and nonlocality of quantum particles on the other. Bell’s work showed that some experimental testing of the conflict might be possible.

Several techniques of experiment were used and proposed, and usually confirmed the non-locality of entangled particles. However, the particles used were photons, and the inefficiency of photo detectors caused a “detection loophole,” and the proximity of test devices sometimes made a “communications loophole,” all of which left doubts about the conclusions. Among the most convincing tests were those later conducted in 1982 by Alain Aspect in France and in 1998 by Anton Zeilinger in Austria. By then the “loophole” problems had been overcome, and in 2007 Zeilinger and his colleagues had demonstrated entanglement non-locality over a distance of 144 kilometers, between two locations in the Canary Islands. Incidentally, in the same year Chaoyang Lu and colleagues at Cambridge University in England managed to “entangle” not just two but six photons! That, by the way, seemed to have opened the door to the possibility of quantum computers — using “qubits.”

Thus it has become clear that spooky action at a distance is here to stay. Nevertheless, the principle of locality remains as an essential element of general relativity, which has certainly not been refuted by quantum mechanics, however spooky! As physicists keep telling us, their ultimate goal is “a theory of everything” that will bring together general relativity and quantum mechanics and include an explanation of gravity, which is now missing from both theories. The hope is that the recently (2013) asserted identification of the Higgs boson by the LHC at CERN will at least aim us down that road.

In the meanwhile, however, we are asked to be content with a sort of philosophical dodge, explaining away the fundamental conflict between quantum nonlocality and relativistic local reality. One of the proffered explanations is that Heisenberg’s “probabilities” are only “potentialities,” and that the locality of the spacetime continuum is an “actuality.” Shades of Aristotle! That approach is to me even more scary than spooky! Another idea is that quantum probabilities are only possibilities of future information which becomes such only when the “waveform” collapses and the superposition ceases, and that such information is not transferred in excess of the speed of light. And another thought is that nonlocality may in fact prevail generally up

to the Planck length of 10^{-33} cm and thus be generally applicable to quantum particles.

Well, I got those thoughts from an article by Abner Shimony, a distinguished professor emeritus of Boston University, and I apologize for paraphrasing (and possibly distorting) them, but I have to say that I do not find them to be at all satisfying.

One other aspect of quantum theory needs to be considered, and that is “decoherence,” which is generally referred to as the mechanism which accounts for our everyday, garden variety, observation of matter and energy as being in accord with “classical” physics.⁸ To describe decoherence it is first necessary to define “coherence.” The idea is that systems (particles) which are in a superposition (and thus entangled) have a particular relationship of “phase angles,” which are mathematical components of the wavefunction accounting for the superposition. Now when systems in such a superposition interact with other things around them (the environment), that affects the phase angles of the wave and causes “decoherence.” That makes it seem as if the wavefunction had collapsed, and thus the observed objects begin to show the characteristics of matter in classical physics.

Upon reading about that I was glad to know that my desk, keyboard and computer are rather thoroughly decohered, and are not likely to drift off in any spooky manner. It was also reassuring to read that modern adaptations of the Copenhagen Interpretation have updated the understanding of decoherence and have found it unnecessary to identify any actual “wave function collapse.” Those advances involve the application of the mathematical system of analysis of probabilities called “consistent histories.” Of course it was disappointing to learn at the same time that decoherence is so prevalent that it is exceedingly difficult to maintain any assemblage of entangled systems, and that therefore quantum computing may not be achieved.

Since 1935 a lot has happened in the field of particle physics and the analyses of quantum mechanics. The number of “elementary” particles theorized and “discovered” has grown considerably beyond the electron, proton and photon. The neutron and the neutrino were soon added, and eventually it was determined that protons and neutrons are not themselves fundamental particles, but are composed of “quarks,” as Murray Gell-Mann called them. On the other hand, Richard Feynman called them “partons,” and it seems that he took a bit of umbrage at the survival of Gell-Mann’s term, derived from James Joyce.

Whatever you call them, they are very strange particles. They are found only inside other particles: the proton contains two “up” quarks and one “down” quark; the neutron contains two down quarks and one up quark. The quarks have fractional ($1/3$ or $2/3$) electrical charge, some positive (plus), some negative (minus). When you add up the charges, the proton turns out to have plus 1 and the neutron to have zero. There are actually four other kinds

of quarks according to theory. Some of them occur in mesons, but those are particles that exist only for a tiny fraction of a second.

Eventually the physicists devised what they call the Standard Model of particles. Besides the six quarks there are three types of neutrinos, and the electron itself along with two other types related to it, called “muon” and “tau.” All together, those twelve particles are the “fermions,” named for Enrico Fermi, whose contributions to physics will be considered again below. The Standard Model also contains “bosons,” named for Satyendra Nath Bose, a nobel laureate who worked with Einstein, which are “force-carrying” particles, or those that are said to “mediate” forces acting on fermions. The four bosons in the Standard Model are the gluon, the W boson and the Z boson, each dealing with a different kind of energy mediation.

To complicate matters, for every particle there is an “antiparticle.” An electron has a negative electric charge (-1) and its antiparticle, called a positron, has a positive electric charge (+1). The proton (+1) has an antiproton (-1). The neutron has an antineutron, both electrically neutral. And there are antiquarks for each of the six standard quarks, and antis for the neutrino and electron types of fermions. When it comes to bosons, the photon is its own antiparticle, the W boson comes in + and - forms, being antiparticles, and the Z boson is also its own antiparticle. Some of these antiparticles were theorized to exist long ago, and some have been identified and generated in laboratory experiments. The antiproton has been used for atom smashing, and the positron is the basis of the Positron Emission Tomography, or the PET Scan, used for medical diagnosis.

As noted above, the quarks are very strange particles. They are said to exist only “inside” other particles, such as the three of them inside a proton or neutron. One extant theory says that they cannot exist separately, but others say that the LHC might possibly break one out.⁹ So far, the LHC discerns their existence by measuring the spray of tracks that are left when protons are smashed. The theorists of the Big Bang conceive of a plasma of energy and matter in which free quarks existed for a small fraction of a second — until the temperature dropped ever so slightly and the quarks were bound together by gluons.

Now if quarks are weird, gluons are even more so! A gluon is said to be the particle that “mediates” the “strong force.” The mediation is described in terms of an “exchange” particles. Quarks are bound together by gluons, having an exceedingly short range of effect, and the protons and neutrons they form are held together in an atomic nucleus by a “residual effect” of that strong force. That is an aspect of “quantum electrodynamics,” referred to below.

Before turning to that subject, let us consider the fact that, notwithstanding the strong force or its residual effect, the nuclei of atoms can in fact be split. Selecting a few significant points in a complicated and fascinating

history,¹⁰ begin with the discovery of the neutron by James Chadwick in England in 1932, the experimental bombardment of uranium atoms with neutrons by Enrico Fermi in Italy in 1934, the award of the Nobel prize to Fermi in 1938 and his then immediate emigration to the United States. In December 1938 the German chemist, Otto Hahn, and his associates, Lisa Meitner and Fritz Strassmann, repeated Fermi's experiments, and reported that the element barium appeared in the results. Hahn could find no chemical explanation for this, but Lisa Meitner, learning of it in Sweden where she had fled, immediately recognized it as nuclear fission. She told Neils Bohr, who departed from Denmark in January 1939 to lecture at Princeton, and there he excitedly told several colleagues, including some from Columbia, who passed the word along to Fermi, then at Columbia. Also at Columbia at that time was Leo Szilárd, a Hungarian who had emigrated to the United States and had predicted the possibility of a chain reaction.

Perceiving the possibility of development of a weapon with huge explosive power, and fearing its production by the Nazis, Szilárd drafted a letter to President Roosevelt in August 1939 and persuaded Einstein to sign it. A few months later that produced the first steps towards the Manhattan Project which eventually led to the development of the atom bomb. Fermi and Szilárd teamed up in the design of a nuclear reactor — or “atomic pile” — and built the first one in a squash court under the bleachers at the stadium of the University of Chicago. The Soviets were of course interested in what was going on and their agents were said to have reported that the Americans were conducting experiments in — suffering a bit of a translation problem — a “pumpkin field.”

The squash court reactor produced the first (humanly generated) nuclear chain reaction in history on December 2, 1942. After that the military took over. Fermi attended the test at Alamogordo on July 16, 1945. He later opposed the development of the hydrogen bomb. Leo Szilárd took a stronger stand, openly opposing the use of the atom bomb except as a demonstration, and later joining an organization promoting disarmament and elimination of nuclear weapons.

Now back to quantum electrodynamics, sometimes called QED, and referred to by Richard Feynman as “the jewel of physics.” The term quantum electrodynamics refers to the theoretical coordination of electrodynamics (roughly the actions of electrons in electric and magnetic fields) and the actions of quanta of energy, i.e., photons, in a relativistic field, i.e., one in which time and space are co-variants. While all aspects of those terms are matters of “theory,” to the physicists espousing the theory they represent a reality of nature. It has long been apparent that we cannot talk about physical reality without facing up to some very odd and esoteric concepts, and also to the mathematics supporting the concepts.

In the 1930s Paul Dirac had devised a formula aimed at coordinating quantum phenomena with special relativity. Several of the physicists named above, as well as others, carried this quest forward. However, the solutions were beset with the appearance of “infinities,” making their relationship to physical reality more than dubious. In 1947 Hans Bethe devised a mathematical way out of the infinities problem, called “renormalization.” Bethe had left Germany in 1933, spent the rest of his life as a professor at Cornell, worked on the Manhattan Project, received a Nobel prize in 1967, and, incidentally, joined several initiatives in opposition to development of weaponry.

Based in part on Bethe’s ideas, Sin-Itiro Tomonaga in Japan and Julian Schwinger in the US developed mathematical analyses coordinating quantum aspects of electromagnetic fields with the space-time co-variables of special relativity. During the same years Richard Feynman worked on the same issues, using both the calculus of “path integrals” and then a new system of presentation of his own invention, now widely used and called Feynman Diagrams.

While Feynman recognized the utility of renormalization, he was wary of its mathematical validity and called it “hocus pocus.” On the other hand, Schwinger insisted on a more traditional approach and thought of the Feynman Diagrams as useful for popularization, but not for serious students of physics. In a paper published in 1949 Freeman Dyson showed that renormalization and the Feynman Diagrams were equivalent routes to the same solutions. In any event Tomonaga, Schwinger and Feynman were jointly awarded the Nobel prize in physics in 1965.

Quantum electrodynamics is now firmly established. It is regarded as a highly successful theory for several reasons: It has enabled the computation of the actual values of many physical phenomena, including particles and forces, and has been confirmed by many empirical findings. It has led to the development of remarkably efficient and capable electronic systems in computers, communication systems and medical devices. And since the days of the famous physicists herein named, many others have made further advances, won Nobel prizes, and brought the minute quanta and the vast cosmos closer together.

Nevertheless, whether or not all of that has brought us closer to a true understanding of reality is still subject to debate. Is it not true that the *ontological* conclusion that a particle does not *have* a simultaneous position and momentum is only a *mathematical* conclusion, and is not compelled by the epistemic measurement problem? Why then are we bound to accept the mathematical conclusions even if they are irrefutably sound as a matter of mathematics?

In light of all this I will of course continue to use the marvelous electronic devices that the physicists and engineers have produced, but I am still entitled to my doubts and am free, if not obliged, to question and to criticize. The

ability of these many brilliant scientists to manipulate photons, electrons, and other particles, and to “explain” them with mind-boggling formulae and algorithms, does not indicate that they understand what is fundamentally true and what isn’t. In view of the patent fact that there are diametrically opposite “principles,” and that there are huge gaps in knowledge, the findings of science, however advanced, should not be presented as truth, or anything like it. The achievements of science have certainly come a long way in the past two thousand years, and particularly in the past one hundred years, but the assertions of today still cannot claim to be true and may in fact turn out in some respects to be quite false.

NOTES

1. After being condemned for heresy because of his contention that the Earth moves, Galileo was reported to have said: *Eppur si muove*, translated as And yet it moves. Possibly he really said it, but surely he believed it.

2. In a letter to Willem deSitter in 1931 Hubble referred to “apparent velocities.” In *Edwin Hubble 1889-1953*, by Alan Sandage in The Journal of the Royal Astronomical Society of Canada, Vol.83, No.6, Sandage said that Hubble continued to hold that “no true expansion exists,” and that the redshift “represents a hitherto unrecognized principle of nature.”

3. In 1931 Ernest O. Lawrence fired up the first Cyclotron at the University of California.

4. See *The Inflation Debate* by Paul J. Steinhardt, Scientific American, April 2011.

5. NASA plans to launch the Webb Space Telescope as a successor to Hubble in 2018. The European Space Agency aims at launching the GAIA probe in 2013 and the Euclid Space Telescope in 2020. A huge advance in land-based telescopes will come with the Large Synoptic Survey Telescope proposed to become operable in Chile in about 2022.

6. Albert Einstein, Boris Podolsky and Nathan Rosen, “*Can Quantum-Mechanical Description of Physical Reality be Considered Complete?*,” Physical Review 47 (10): 777–780.

7. Erwin Schrödinger, “*Die gegenwärtige Situation in der Quantenmechanik*” (The present situation in quantum mechanics), Naturwissenschaften 23, 1935.

8. “Classical” physics is deterministic: the form, locations and other characteristics of material objects are as perceptible to our senses and measurable.

9. See *The Universe is a Complex and Intricate Place* by Don Lincoln, Scientific American, November 2012.

10. Besides being fascinating in itself, the story is historically and socially important. An important lesson is that most of the physicists who helped develop the atom bomb because of their dread and loathing of fascist and nazi ideas were also appalled at the potential and use of such weapons.

Chapter Seven

Biology and Mystery

THE BASICS OF EVOLUTION

The basics of biological evolution are well established.¹ What Charles Darwin called natural selection is an undeniable phenomenon of living things. Five years after *The Origin of Species* was published Herbert Spencer coined the term “survival of the fittest” and equated it with Darwin’s “natural selection.” While neither term is very apt and both are subject to semantic and logical objection, the phenomenon itself is clear and readily explained. The terms mean that when there is a population of organisms of a particular kind, those ones of the organisms that happen to have variant traits which — at the time and in their environment — make it more likely that they will survive and reproduce, will do so, and their particular variations will therefore be carried forward to future generations.

Every organism possesses multiple variant traits, and the environments in which they live are both varied and changeable. Consequently, the particular variations that appear in successive generations and meet the tests of survival and reproduction may logically be expected to be different than those of their immediate or remote ancestors. Furthermore, the numbers and types of variant traits in any organism is determined by its genome, and changes in the genomes of organisms are effected by mutations in DNA.

These processes have been shown to have been occurring on this planet for about three and a half billion years, and there are therefore many hundreds of millions of succeeding generations. In view of the very great changes in the environments of the earth throughout those eons, and the multiple modes of adaptation thereto that are demonstrated by widely variant species of organisms, it is not at all surprising that the huge diversity of

genotypes that now appears did come to be by the simple processes of natural selection or survival of the fittest.

There are of course other aspects of evolution, and many issues that must be considered and explained. Darwin himself pointed to a number of them, beginning with the observations that what is called natural selection is not the only cause or driver of the evolution of species, and that the available fossil record was quite scant. He also pointed out that natural selection, being responsive to environmental conditions, is essentially isotropic with changing conditions, and is not chronologically consistent. In addition he acknowledged that when he wrote there was no scientific explanation of heredity, yet he recognized that there appeared to be a relationship between ontogeny and phylogeny.

Since Darwin's day there has been a great amount of research, study, analysis, and development of the science of evolution in all respects by many very skilled scientists. The identification of DNA in the middle of the 20th century and the great ramification of understanding of its implications since then has brought the science to high levels of insight, particularly perhaps with respect to the ontogeny of species. There is a huge library of books and websites available on these subjects, and they are well worth studying.

The aim of the following essays, however, is not to review the entire science of evolution (an enterprise of which I am certainly incapable in any event), but to consider a few of the still hotly debated issues. In doing so, it is perhaps pertinent that my introduction to the science of evolution and my principal source of information about it was, and has always been, the late Stephen Jay Gould. My admiration of both his scholarship and his literary style has never waned, but as you will see, I find that I do not always agree with him.



Illustration 7.1. Stephen Jay Gould. Photograph by, and reproduced by permission and courtesy of, Jon Chase, Harvard Staff Photographer.

THE BURGESS SHALE

Stephen Jay Gould was always strongly opposed to the anthropic bias that he perceived to be rampant in philosophy and science. That led to his steady insistence on the isotropy of natural selection and the extreme contingency of the evolution of complex creatures, particularly humans.

It is true that the natural philosophers who preceded Darwin in espousing evolution (without explanation) often thought of it as a natural progression from “lower” forms to mankind as obviously the “highest” form of life (other than the divine, of course). What passed for them as a theory was the concept (sometimes religiously inspired and sometimes distinctly anticlerical) that it was in the nature of things (according to God’s will, or not) that species should and do *progress* from lower forms to mankind (created in God’s image, or even without or above that). Progress itself was taken to be an activating principle.

The German scientist, Ernst Haeckel, was deep in the “culture of progress” that characterized the Bismarck era. He was convinced of evolution and was inspired by Darwin’s treatise, but espoused a Lamarckian concept of the effect of acquired characteristics, and did not accept Darwin’s natural selection. Haeckel came up with the idea that “ontogeny replicates phylogeny,” a catchy phrase which, being an artist as well, he illustrated with drawings of embryonic development.² The drawings compared developmental stages of the embryo of fish, salamander, turtle, bird, mammal and human — and showed a common sequential pattern. Haeckel’s aim was to support his conclusion that the evolutionary sequence of phyla, of ever increasing complexity, is the basis or actual cause of the sequential development of every creature, including humans.

That idea did not sit well with some other scientists, who promptly criticized it. Then it was revealed that the drawings themselves had been fudged; the forms of various embryos having been modified, or “idealized,” to fit the pattern. Haeckel faced a storm of professional protest, but essentially stuck by his guns until his death in 1919. By then, however, the doctrine that ontogeny replicates phylogeny had been rather thoroughly repudiated by the scientific community at large.

That is not to say that there is no relationship between ontogeny and phylogeny; there surely is. One of Stephen Jay Gould’s great books is entitled *Ontogeny and Phylogeny*,³ in which he thoroughly repudiated the replication idea and castigated the fudging of scientific data, but he also inspired further study in the field that has come to be known as evolutionary developmental biology, or “EvoDevo,” which has risen to the cutting edge of today’s sciences of genetics and evolution.

Being a paleontologist by trade, Gould was naturally very involved in analysis of the actual fossil record, which had been expanded many fold

since Darwin's day. Darwin had expected that when such a record became known, it would reveal many "missing links" and would show a gradual progression of speciation. However, Gould and his colleague Niles Eldredge found that neither was so, and they developed a theory of "punctuated equilibrium." The essence of the concept is that species do not as a rule evolve gradually from similar ancestral species (called anagenesis), but rather often result from the branching or splitting of species into two or more new species (called cladogenesis.) Furthermore, Gould and Eldredge found that species often lasted for a long time without any appreciable change (stasis), and that changes occurred in distinct intervals rather than in small imperceptible steps.

When Gould and Eldredge proposed that theory, some scientists demurred and regarded it as somehow anti-Darwinian. The epithet applied to it (still worth repeating) was that it was "evolution by jerks," to which Gould replied that it was better than "evolution by creeps." Since then evolutionary biologists have identified examples of both types of evolution, as was recognized by Gould in his magnum opus, *The Structure of Evolutionary Theory*.⁴

The philosophical points — on which Gould never yielded — are that conclusions of "progress," or a steady progression of natural selection events, are neither sacrosanct nor warranted, and that scientists should derive their conclusions from what the record shows. He had articulated those points in his book entitled *Full House*⁵ (referred to further below), in which he particularly emphasized the biological dominance of simple bacteria and derided the appearance of "complexity," i.e. more complex organisms, as constituting any indication of a direction (or progress) inherent in evolution.

Then came the Burgess Shale. The remarkable aggregation of fossils at that location in the Canadian Rockies was discovered in 1909 by the American geologist/paleontologist Charles Walcott, who spent the next eighteen years excavating, analyzing and classifying them. These fossils dated from roughly 520 to 530 million years ago; that is, in the period of what is now called the Cambrian explosion. Many of the fossils had never before been seen and were very unusual, even weird, in form. Nevertheless, Walcott found it appropriate to classify most of them into already identified phyla. Keep in mind, incidentally, that these were all sea creatures, existing long before life first appeared on land.

The numerous and odd organisms found by Walcott were long ignored as curiosities. Some reexamination began in the 1960s, which led to new studies in the Burgess Shale through the 1970s by a team headed by the British paleontologist Harry Blackmore Whittington. His studies, revealing a great, and fairly sudden in terms of geologic time, diversification of complex organisms, produced heightened interest in the Cambrian explosion as an unexplained phenomenon in evolutionary theory. Whittington's team concluded that some of the fossils differed so greatly from any known types that they

could not properly be placed into established phyla, and must represent wholly extinct phyla.

Then in 1989 Stephen Jay Gould jumped in with both feet in his book entitled *Wonderful Life*.⁶ He concurred with the Whittington group's conclusions that many of these creatures were not ancestral to modern phyla, but belonged to other, now extinct phyla. One of them, *Opabinia*, had five eyes on stalks and a snout!

Gould lambasted Walcott for having tried to "shoehorn" the creatures into modern phyla. He pointed out that these weird creatures seemed to be quite well-adapted to their then environment, but still became extinct, while some surviving creatures are less well adapted to the prevailing environment. This suggested not only "punctuation" of evolution, but also that adaptation by means of the process of natural selection was far from being the controlling element. To Gould this confirmed his concept that chance reigned supreme.

While it is undeniable that a large measure of chance is involved in the survival of every individual organism, and certainly in its reproduction and transmission of variant traits, Gould seems to have gone overboard on the subject. Natural selection itself is surely very chancy, but is it not clear that the rates of survival and reproduction are greater for those organisms that fit their environmental niche than those who do not? Gould contended that if we could "rewind the tape of life" and "rerun the tape" (presumably from the Cambrian era), we would necessarily wind up with a wholly different set of creatures than we have now. Well, if pure chance reigned, that might be so, but there is no evidence to support that conclusion. It seems to me in essence a rejection of the observed and well-documented *effect* of natural selection in this world.

Among Whittington's helpers in the 1970s reexamination of the Burgess Shale was Simon Conway Morris, then a graduate student. He later became a professor at Cambridge and a member of the Royal Society. In 1998 he published a book entitled *The Crucible of Creation: The Burgess Shale and the Rise of Animal*.⁷ One of the aims of the book was to contest Gould's assertions, and Conway Morris (as he is called) did criticize Gould's "interpretations" in several respects. He said that Gould's view of the "sudden" appearance of numerous complex species in the Cambrian era evinced a belief in an "unusual genetic happenstance gone wild." He also disagreed with Gould's idea that if we "reran the tape" we would have very different creatures, and probably no intelligent creatures at all. That last point will be returned to below.

More interestingly from the actual biological and evolutionary standpoint, Conway Morris specifically reversed a number of the conclusions of the Whittington team in which he had participated. To be specific, he said that several of the weird creatures that Whittington (and he himself) had previously thought to be representatives of extinct phyla had been further analyzed and

were now seen to be possible precursors in existing phyla. These updated versions came from the later discovery of fossils of the same or similar forms in China and Greenland, and from advances in molecular biology. He refers to particulars, such as “chitinous bristles,” and relationships between “halkieriids,” “brachiopods” and “annelids.” He also referred to the principle of evolutionary “convergence” in which similar features are developed through different lines of development. And he referred to the evolutionary principle that body types, once formed, act as a constraint on further morphological change. All good points.

Gould responded,⁸ somewhat peevishly as to criticisms he saw as personal. He said he had distinguished between nature’s preCambrian “experiments” in a then “uniquely empty ecological barrel” and postCambrian developments in which “Darwinian forces” imposed “definite patterns,” and that he had emphasized a focus on the latter. Consequently, he objected to the suggestion that he had proposed any “unusual genetic happenstance gone wild.” Nevertheless, he did not at all back off from his denigration of “cultural preferences for progress” or his thesis of “rerunning the tape” and the “luck of the draw” as to the forms of life that might have developed.

Furthermore, Gould did not accept Conway Morris’s new taxonomic conclusions, but charged that some of those proposed “linkages to modern groups remain fanciful at best.” With respect to Conway Morris’s reversal of his own previous views Gould cited a British colleague as charging Conway Morris with “selective amnesia.” And as to convergence, Gould accepted it as a “striking phenomenon,” but held that “we often overestimate its sway.” As an example of convergence, Conway Morris had cited the appearance of “intelligence” arising in both humans and the octopus, but Gould was not impressed. He did not perceive “any higher mental functioning” in the octopus, and asserted that human “conceptual abstraction” evolved only once in a small lineage of a small phylum that itself “prevailed by contingent good fortune from the Burgess draw.”

Gould did readily acknowledge the role of his own “personal credo,” and faulted Conway Morris for failing to recognize his own. The difference is epitomized by Gould’s insistence that the occurrence of selfconsciousness was extremely improbable and Conway Morris’s view that it was wellnigh inevitable. What accounts for this difference, and why is human intelligence the touchstone? It seems to me that Gould was, as usual, expressing disdain for the idea of “progress” and particularly the role of anthropic bias in supporting that idea. Gould was not, I think, espousing any antireligious concept; it is well known that he referred to science and religion as comprising two separate “magesteria.” Conway Morris, on the other hand, is known as a Christian who has been active in promoting religion and strongly critical of Richard Dawkins and other atheists. In 2003 he published a book entitled

*Life's Solution: Inevitable Humans in a Lonely Universe*⁹ which asserted his emphasis on the importance of evolutionary convergence.

CONSCIOUSNESS

Another opportunity for Gould to express and press his views arose in a special issue of the magazine *Scientific American*, devoted to Life in the Universe.¹⁰ A series of articles described cosmological origins from the big bang, the formation of particles, atoms, molecules, galaxies and stars, the consolidation of the earth, and the chemical and physical processes by which self-reproducing molecules were formed and then life ensued. All of that, the scientists seem to agree, was largely deterministic, a necessary consequence of the nature of energy and matter.

Then came the article on The Evolution of Life on the Earth by Stephen Jay Gould. It did not take him long to assert that “. . . theory can predict certain general aspects of life's geological pattern. But the actual pathway is strongly under-determined by our general theory of life's evolution.” And then that “Humans arose . . . as a fortuitous and contingent outcome of thousands of linked events, any one of which could have occurred differently and sent history on an alternative pathway that would not have led to consciousness.” In this article (as in many of Gould's other writings, as noted above) the main theme was refutation of the “conventional deterministic models of Western science and [of] the deepest social traditions and psychological hopes of Western culture for a history culminating in humans as life's highest expression and intended planetary steward.” In his writings he did a thorough and admirable job of it. Nevertheless, we may still question the conclusion that, but for chance, life would not have given rise to mind.

A key element of Gould's thesis is the dominant role of bacteria. Life arose 3.5 billion years ago in the form of simple prokaryotic cells and remained largely that way until 600 million years ago when multicelled eukaryotic fauna appeared. The Cambrian explosion of 530 million years ago established the phyla and architecture of substantially all currently existing animals, yet bacteria continued to flourish in numbers and complexity. Humans along with other modern species are but a small twig on the “bush of life” or the “right tail” of the chart of increasing complexity, as shown in the diagram and recital attached to Gould's article. The diagram shows a large and ever-increasing mass of bacterial life at the low end of a range of complexity and a steadily decreasing occurrence of more complex types of organisms, ending with humans, at the “right tail.”

The thesis had been elaborated by Gould in his book *Full House*, referred to above. In it he said: “The claim that a conscious creature like us must evolve because we can predict the development of an expanding right tail for

all of life represents a classic “category mistake” — in this case, the false inference of a particular from a valid generality. The right tail did predictably arise (if only as a passive consequence), but any individual creature on the right tail of earthly life at this particular time represents a fortuitous and improbable result, one actualization among a hundred million unrealized alternatives. Wind back the tape of life to the origin of modern multicellular animals in the Cambrian explosion, let the tape play again from this identical starting point, and the replay will populate the earth (and generate a tail of life) with a radically different set of creatures. The chance that this alternative set will contain anything remotely like a human being must be effectively nil, while the probability of any kind of creature endowed with self-consciousness must be extremely small.”

Among those who disagreed with Gould’s conclusion was Christian deDuve, a Nobel laureate in medicine and author of several books on evolution, who died in 2013. In an essay in *Scientific American* entitled *The Constraints of Chance*,¹¹ deDuve observed that “It has become fashionable for biologists to emphasize the role of contingency in the origin and evolution of life on the earth, including the advent of humankind and the development of mind. Those momentous events are said to be products of highly improbable combinations of chance occurrences.” The burden of his essay is that that “majority opinion” is essentially incorrect. Having briefly set forth his reasons, he concluded that “Life and mind appear as cosmic imperatives, written into the fabric of the universe. Given the opportunity, matter must give rise to life, and life to mind.”

It is true that in most contemporary treatises on evolution the emphasis on the role of contingency is not just a fashionable fad; it is more like an indisputable certainty. The relationships of chance and necessity and the distinctions between them have been favorite topics of philosophers since ancient times, and the subject is often addressed in scientific literature. But when it comes to biological evolution, chance, or contingency, reigns supreme and necessity, or determinism, is largely ruled out.



Illustration 7.2. Christian deDuve. Photo reproduced by permission of deDuve Institute & Université catholique de Louvain, Brussels, Belgium.

But let us consider deDuve's contentions. He began with the assertion that "The thesis that the origin of life was highly improbable is demonstrably false." He said "it must have followed a very long succession of chemical steps leading to the formation of increasingly complex molecular assemblages. Being chemical, those steps must have been strongly deterministic and reproducible, imposed by the physical and chemical conditions under which they took place." That is of course wholly consistent with the articles referred to above about the cosmological developments leading to complex molecules on earth. There is no reason to think that Gould disagreed with that at all.

Then the crunch. DeDuve said the majority (nearly universal) opinion "that every evolutionary step starts with a fortuitous heritable change, the outcome of which is then tested by natural selection" is "justified," but, as he politely opined, "in need of qualification." His first qualification was that "Chance does not exclude inevitability. Of critical importance are the constraints within which chance operates. One is the number of options."

Applying that to mutations, he asserted that "Their number is not only limited, it is not even extremely large, relatively speaking." In corroboration he cited the appearance within a few decades of "[a]ntibiotic-resistant bacteria, chloroquine-resistant malarial parasites, DDT-resistant mosquitoes and herbicide-resistant weeds." These mutations were, he said, not "flukes," but "banal," and were "selected" simply because they were effective.

Then a key conclusion: "If wide-ranging changes of this kind can take place in such a short span, evolutionary times of millions of years are likely to allow for almost every useful eventuality." Would Gould disagree? In his 1994 *Scientific American* article he spoke of "the single actualized version among millions of plausible alternatives that happened not to occur" (escalat-

ed in *Full House* to “a hundred million”). But is not deDuve correct in pointing out that of the possible millions those few mutations that did occur and succeed were selected because of benefit to the organism? And did not the millions of possibilities become only a few favoring the continuation of the variant when spread over billions of years? Is that not particularly so when each year includes numerous generations of organisms with reproductive life spans measured in months, weeks, days or less?

In deDuve’s brief 1996 essay his final qualification was that existing body plans impose constraints on evolution. He said (as I paraphrase) that homeotic genes, controlling development of an organism, restrict modifications to those that accord with reproductive success. In “horizontal” evolution basic body plans persist, but great diversity, such as the millions of species of insects, arises by contingent interaction with environmental conditions. However, changes that significantly increase the complexity of the body plans (“vertical” evolution) are far more constrained. That does not preclude “developments that failed to happen on the earth but could happen.” Yet deDuve asserts that “some directions could be compelling.” His example is that: “Once neurons emerged and started interconnecting, life progressed toward the formation of increasingly complex networks, no doubt furthered by the associated selective advantages.”

Gould would no doubt have bristled at the idea of “compelling directions” and particularly at the assertion of “progress.” But leaving that aside, Gould and deDuve would surely have agreed that there were at play millions of options among billions of opportunities for selection. If only one variant in a thousand were selected (that is, survived to produce more of its kind), that variant would have advantages over its unselected cognates. We may even accept Gould’s dictum that a replay of the tape of life would result in “a radically different set of creatures,” but does the adjective “radically” (if taken in its vernacular sense rather than in reference to roots) exclude neurological development? The unrealized alternatives are those that were not advantageous. The realized development of vertebrate neural systems indicates their advantage. The root of the process is natural selection itself.

The replay set of creatures would have the same root; they might be “radically” different only in the sense of having morphology not “remotely like a human being.” But elephants and whales, and even octopuses, also have large brains, larger than they seem to “need” for survival in their environs. That their cortical functions do not match those of humans may correspond to their lack of hands and speech. But those features in humans correspond to an erect posture which freed the forelimbs and stretched the pharynx, permitting more complex phonemes. Thus it appears that the complexity of our big brains (beyond that of pachyderm, cetacean and octopoda brains) became likely when hominins stood upright.

In the “replay” it is of course possible that no primate organism would ever evolve, but that alone does not preclude neurological development. The test always lies in natural selection, and particularly in branching. The bush of life has myriad twigs, but the number is finite, measured in millions against the many billions of opportunities for anagenetic and cladogenetic alternatives. As Gould has eloquently explained (in *The Structure of Evolutionary Theory*, referred to above), the chance in evolution lies in the non-directional (and essentially isotropic) nature of variations; the determinism comes from natural selection, that is, the adaptational fit of living organisms to external conditions.

On this Earth the conditions have permitted, perhaps favored, the evolution of human beings. Yes, the paleontological record shows numerous failed lineages, reversals and re-reversals of form and several mass extinctions. But here we are. The origin of life depends on formation of complex molecules and their survival in a relatively stable environment. There are very few places in the universe where that prevails. (It may be millions; the universe is a big place.) The presence of liquid water (a small range on the cosmological temperature scale) is a starting point.

Once life starts, it is sure to evolve and, as Gould agreed, to become more complex than simple prokaryotic cells. Was it inevitable, or at least very likely, that some such simple prokaryote would evolve (albeit by a barely understood series of steps of selection, as described by deDuve in another article in *Scientific American*, *The Birth of Complex Cells*),¹² into a eukaryotic phagocyte? Gould seems to agree that at least that step of complexification, or something very much like it, was in fact inevitable. The degree of likelihood of each of innumerable subsequent steps, both anagenetic and cladogenetic, also bears analysis.

Gould’s hypothetical “replay” begins with the Cambrian explosion. In his 1994 *Scientific American* article he declared that “the subsequent history of animal life amounts to little more than variations on anatomical themes established during the Cambrian explosion within five million years.” This “most remarkable and puzzling event” might be explained in part as a sort of filling of the “ecological barrel,” by which chance variations provided an organism for each available niche. But also it “seems necessary,” he said, to accept that the earlier “flexibility for genetic change and embryological transformation . . . became greatly reduced as organisms “locked in” to a set of stable and successful designs.” That sounds very much like deDuve’s assertion of constraints imposed by body plans. Gould has in fact written elsewhere about the constraints of *baupläne* (as he calls them) and of the persistence of traits passed down cladogenetically.

Returning to Gould’s thesis that humans, or consciousness itself, arose fortuitously, the examples he cited of “linked events” which “could have occurred differently,” bear some analysis. The first is that chordate species

are rare among Cambrian fossils. But rarity does not detract from selective success. The second is that without lobe-finned fishes which evolved strong fin bones, vertebrates might not have become terrestrial. But were there not many other skeletal developments that might have led to the same result? The third is that but for a meteorite “dinosaurs would still be dominant and mammals insignificant.” But is that not a conjecture as uncertain as the meteorite? And fourth is that if a small lineage of primates had not evolved upright posture, our ancestry might have ended with apes. But upright posture surely had selective advantages.

To be sure, Gould properly asserted that these are only a few among a multitude of such fortuitous events, and evolution certainly did involve a multitude of contingencies. The essence of Gould’s argument seems to lie in his assertion (in *Full House*, referred to above) that “radical contingency is a fractal principle, prevailing at all scales with great force. At any of a hundred thousand steps in the particular sequence that actually led to modern humans, a tiny and perfectly plausible variation would have produced a different outcome, making history cascade down another pathway that could never have led to *homo sapiens*, or to any self-conscious creature.”

The application of fractal principles to molecular biology may certainly be worthy of further study, but it seemed to me not to have been yet ready for dogmatic assertion. Every one of those tiny variations may be “perfectly plausible,” but that does not make them equally probable. Probability is measured by natural selection, the matching of a plausible variant with an environmental niche. Surely contingency played a large role, but selection is not random in the mathematical sense; it selects what works at the moment. To say that the development of organisms that exist (or existed) is or was probable (or not improbable, to hedge with a useful solecism) is not to say that they were predictable, and does not imply or suggest direction by some internal principle or force. It is not a sneak attack of orthogenesis and it does not involve a “category mistake.”

HUMANS AND ANIMALS

The unique qualities of the human mind are often brought into play in studies of possibly alternate evolutionary scenarios. That inevitably demands inquiry into the nature of the human mind and its relationship to the human brain. That subject is addressed by neuroscientists and will be considered below, but it calls for at least a bit of analysis in relation to evolutionary considerations.

In an article in the September 2009 issue of *Scientific American* entitled The Origin of Mind, Marc Hauser (at that time a Harvard professor¹³)

asserted that the human mind is distinct in essence from the mind of any animal, and in support referred to “our distinctive genome.”

Our genome is the body of genetic information carried in the DNA and RNA of our cells, particularly those involved in reproduction. Evolution depends on the hereditary transmission of genetic information, including variants, which result from DNA splicing, mutations, genetic drift and perhaps other mechanisms. The prevailing view of biologists, supported by detailed studies, is that RNA (from which DNA evolved) provided the code of replication in the earliest organisms to appear on the Earth and that RNA and DNA have continued to play that role ever since, carrying variants forward, throughout the evolutionary process. In short, genomics is an historical science.

Did Hauser mean to suggest that at some point in that history there were some special, defining, hereditary events or series of occurrences? That there was a line drawn? Well, yes, almost, but not quite. He said that “a major transformation occurred during a relatively brief period of evolutionary history, starting approximately 800,000 years ago in the Paleolithic era and crescendoing around 45,000 to 50,000 years ago,” and he calls that an “evolutionary eyeblink.”

The elements of “transformation” he refers to in that period include tools, musical instruments, burial practices, cave paintings and fire. And most significantly to his thesis, he embellishes each of those. Tools are “multipart;” musical instruments have been “fashioned” from animal bones; burials include “accoutrements suggesting beliefs about aesthetics and the afterlife;” cave paintings are “in exquisite detail” depicting the past and “the perceived future;” and fire provided not just warmth and cooking, but was a “technology” of “our folk physics and psychology.”

However, the evidences of transformation he adduces are essentially cultural. The paleontologists have identified hominids from six million years ago and members of the genus *Homo* from nearly two million years ago. Thus there were “humans” of some sort for over a million years before the Paleolithic era, and there is no basis or reason to assume that both their brains and their minds had not developed further during that period. In short, a semblance of a culture based on some level of mental acuity had long existed, and it is not at all surprising that *cultural* achievements accumulated and accelerated (as they usually do) during the 750,000 year period to which Hauser refers.

It is worthy of note that evolution in those periods involved the development of an upright stance which freed the hands for tool making and stretched the pharynx which permitted more complex phonemes. It might also be noted that those touted “transformations” proceeded and succeeded by gradual steps during that period, and some were achieved by species of the genus *Homo* that are now extinct; our own species, *Homo Sapiens*, being

probably not much more than 200,000 years old. Hauser concedes only that “anthropologists disagree about exactly when the modern human mind took shape,” and that the “evolutionary origins of our cognitive abilities thus remain rather hazy.”

There is of course no doubt that humans have evolved brains that are in many respects superior to those of other animals, but Hauser does not sustain his thesis that the brains of humans are different in kind from those of animals. He acknowledged Darwin’s assertion that the difference between human and nonhuman minds is “one of degree and not of kind,” and that “Scholars have long upheld that view.” But he rejected it, and asserted that “mounting evidence indicates that . . . a profound gap separates our intellect from the animal kind.” Nevertheless, the “four ingredients of humaniqueness” that he asserts to distinguish humans from animals are rather clearly cultural in nature, and do not indicate a fundamental biological or evolutionary distinction.

The four elements Hauser listed, as well as most of the examples he cited, are all based essentially on human linguistic abilities. “Generative computation” covers creation of “words, concepts and things.” “Combination of ideas” covers “mingling of different domains of knowledge,” the mingling of which depends on language. “Mental symbols” are of course the very tools of language. And “Abstract thought,” defined in terms of “contemplation of things beyond what we can see, hear, touch, taste or smell,” does involve the articulation of ideas derived from things that have at one time or another impinged on our senses.

While Hauser seemed to recognize that language itself accounts for the great gap between human and animal mental performance, he did not discuss the evolutionary bases of the development of language. He asserted rather that evolution “created a brain” in humans “with four special properties,” being the elements he calls “humaniqueness.” And then he seems to regard language as a property, result or consequence of the specified elements. That is, I submit, a mistaken reversal of evolutionary history; without language there was very little that could be called ideas, computation, concepts, knowledge, or thought, however they are later characterized and described.

To support his thesis Hauser said that the cave paintings at Lascaux indicate that “our ancestors understood” that pictures are both objects in themselves and references to objects and events. But that assertion is unsupported, and he promptly conceded that there may have been no linguistic expression of esthetics involved. Similarly with respect to ancient flutes he conceded that they tell us nothing about “recursive” mental abilities.

Yet he made the astoundingly dogmatic — and patently false — statement that “we can say with utmost confidence . . . that all people, from the hunter-gatherers on the African savanna to the traders on Wall Street, are born with the four ingredients of humaniqueness.”

Personally, I have my doubts with respect to some of those “traders,” and anyway I find nothing in the literature of evolutionary anthropology that would suggest the existence of those qualities in hominids, nor even in the early members of the species *Homo Sapiens*. Humans developed those qualities later, some humans to a considerably greater capacity than others.

In furtherance of his thesis of the uniqueness of humans Hauser necessarily compared human abilities with those of “lower” animals. Those comparisons themselves indicate the absence of any evolutionary breaking point or sharp biological distinctions, and also heighten the significance of linguistic abilities. He pointed out that many animals communicate with sounds and that some “appear to represent more than their emotions, conveying information about objects and events such as food, sex and predators.” The “dance of honeybees” points to food sources; the “alarm calls” of monkeys differentiate among predators.

And going beyond communications, he pointed out that bowerbirds construct displays to attract females, crows carve fishing sticks for catching insects, chimpanzees use wooden spears to impale bushbabies, meerkats teach their pups, a variety of animals show support for fair food sharing, and some monkeys display counting abilities. He referred to these as “sophisticated behaviors that appear to presage some of our capabilities,” and that some of them show an ability “to generalize beyond their direct experience to create novel solutions.”

Is not all of that indicative of differences of *degree*, rather than *essence*? But Hauser dismissed that reaction as a mere *frisson*, and insisted that the “gap” is “cavernous.” He declared that “The roots of our cognitive abilities remain largely unknown,” but made a few comments about the brain itself that do not jibe with the analyses of distinguished neuroscientists.

In fact, in his book *Human -The Science Behind What Makes Your Brain Unique* ¹⁴ Michael Gazzaniga analyzes, carefully and in detail, the actual differences between human and chimpanzee brains and the evolutionary history of those differences. In applying the term “unique” to the human brain he does not disparage that of the chimpanzee nor posit novel evolutionary histories. His answer to the question “Would a Chimp Make a Good Date?” is that it would be “very interesting, but for the long term, I prefer more culture. Make my date a *Homo sapiens*.”

In short, the difference is in culture, which derives from mind, but the limited cultural attributes of chimpanzees and other animals do not indicate an *absence* of mind. ¹⁵

THE ORIGIN OF LIFE

One of the remaining debated points about evolution precedes all issues and disputes as to the details of the processes by which the great variety of life forms on Earth came to be. That is of course: How did life begin?

In the *Origin of Species* Darwin did not answer the question, nor actually broach it at all. His closing comment suggested only that “life” had been “originally breathed by the Creator into a few forms or into one.” He did say specifically that he did not regard “beings” (meaning organisms of various types) as “special creations,” but rather as “lineal descendants of some of the few beings which lived long before the first bed of the Cambrian system was deposited.”

The question of whether all life evolved from “one” or “a few” forms has not been resolved, but that is not an important distinction. There are undoubtedly some people who would not accept any explanation other than divine breath, but the thinkers and leaders of most of the world’s great religious institutions now generally accept that species did not arise from separate “special creations,” and further seem to accept the possibility that life itself has (or may have) a chemical origin.

In any case all living things are made of cells, and life had to start with at least one cell, and there had to be suitable conditions for a cell to form. The conditions had to consist of the presence of at least some of the molecules that make up the constituents of a cell. The current thrust of scientific inquiry is therefore into explanation of the formation of cells and of the complex molecules that are observed to be present in, and evidently required for, all forms of life.

Cells now come in many forms. Some are single cells without a nucleus, called prokaryotes, such as bacteria and the related form, archaea. Some are single cells with a nucleus, called eukaryotes, such as paramecia and amoeba. All of the more complex organisms are composed of aggregations of eukaryotic cells which have not only combined, but have developed separate specializations, contributing to the integrity and functioning of the organism. Cell specialization itself accounts for vast differences among prokaryotic bacteria, as well as among multi-celled eukaryotic protists, fungi, plants and animals, and within the many genera of each.

But before all that diversity was achieved by evolution, it had to start somewhere. There had to be at least one cell that could reproduce itself, and it may be assumed that it was a cell of the simplest type. What is the simplest type?

To be a “cell” it has to have an enclosing membrane to separate what is inside from what is outside.¹⁶ The membrane of most existing cells is made up of lipids, a fatty sort of substance, and more particularly of what are called phospholipids. Those are molecules made up of phosphorus, carbon, oxygen

and hydrogen, and have the important property of repelling water at one end and accepting water at the other. When molecules of that type encounter water, they form a sheet that is two molecules thick, with the hydrophilic (water accepting) ends on both sides. With the hydrophobic (water resistant) ends in the middle of the sheet, this membrane can then prevent passage through it of certain chemical forms, and accept others. That is of course an important property for a cell membrane to have.

A little sphere of such a membrane enclosing nothing other than a bit of the aqueous solution in which it is located is called a liposome. Liposomes can be formed out of existing living organisms, and they can be useful as medical transports of drugs injected into them. They also serve as a sort of model in the quest to create an artificial cell, but they do not yet have the capability of reproducing themselves.

In order to be capable of life, there are other requirements for the first cell, sometimes called a "protocell" and sometimes referred to as "the last universal common ancestor" or "LUCA." There must be something inside the enclosing membrane that will lead to the cell's reproduction. For starters, it needs to have some means of metabolism; that is the acquisition of chemical substances and transformation of them into other chemical forms that contribute to the survival, growth and then reproduction of the cell. A phospholipid cell membrane, formed in a suitable environment, would pass through those substances that were useful and exclude those that were harmful.

It is usually assumed that the protocell was formed in some sort of aqueous solution; that is, water in which there were dissolved chemicals and probably also some chemicals not soluble in water; a shallow pool at the edge of the sea being seen as a likely spot. There were a great variety of chemicals in that soup, including molecules composed of carbon, hydrogen and oxygen. The nearly universal agent of metabolism in living cells today is a rather complex molecule called adenosine triphosphate, or ATP. For the protocell, however, there are other and simpler chemical structures that might have served metabolic processes. The investigation of such chemical structures and the ways in which they may have formed and acted in a protocell is part of the ongoing search for understanding of the origins of life.

In all living things today it is DNA inside the cells that transfers information in cell reproduction (or coding of proteins) so that the "offspring" are almost the same as the parent (subject of course to variants of details.) The process of that transfer is effected by RNA, another, somewhat simpler, nucleic acid. Current research indicates that RNA came first and that DNA was later formed from and by it. Thus it is thought that the protocell (or LUCA) probably contained a "proto" form of RNA, serving as a catalyst of both proteins and DNA. If so, that would certainly serve as a starting point: a selective membrane enclosing some metabolic agent and a bit of such RNA.

Such a cell would almost surely grow and divide, producing successive generations displaying “descent with change,” as Darwin called it, effected by “natural selection,” or preferential survival of cells better matched to the environment of the soup in which they lived.

However, RNA is itself a rather complex structure, a macromolecule composed of several different molecular substructures. No one has yet assembled RNA out of the raw chemical constituents, and it is difficult to see, and is yet unproved, how “nature” could do that by itself. Consequently, there are some members of the scientific community who espouse a “metabolism first” theory instead of the prevailing “RNA first” theory. Of course the molecules considered in support of the metabolism theory are themselves quite large and complicated, and their production in nature is also unproved. It is interesting to note that the ATP molecule consists essentially of the RNA nucleotide, adenine, plus two phosphate molecules.

The different manners in which complex precursor molecules could have been formed is the grist of the ongoing studies of the origin of life. The possible steps as well as the chemical components are very intricate, and involve analyses of the fundamental nature of valence and chemical bonding. It has, however, long been clear that when there is a “soup” containing hydrogen, oxygen, nitrogen, carbon, and other common elements, and energy in some form is applied to it, then molecules do form.

Among the molecules that have been shown to be formed by “nature” itself; that is, out of raw chemicals exposed to electromagnetic energy and pressure, are amino acids. Composed basically of carbon, hydrogen, oxygen and nitrogen, amino acids come in many different configurations, and with many different exposures to attachment of other chemicals in what are called side groups. When amino acids are linked together in chains, they form polypeptides and proteins — and thus we come to the real building blocks of life.

The natural processes by which all of that occurs are far from simple, and there are many steps along the way that have not yet been demonstrated or reproduced in a laboratory. But the scientists are getting close, and no one should be surprised or shocked when it is finally announced that “life” has been produced artificially. After all, life *is* a phenomenon of the organization of atoms into molecules which are assembled into forms capable of acquiring nutriment, of growing, and of reproducing themselves into nearly similar copies. (If I have just coined a new definition of life, I apologize.) Or, if such a physical, chemical, definition is rejected, then life must be itself an essence, a vital force, or somehow otherwise, a phenomenon that is outside or separate from the operations of matter and energy that are observable to the human senses. I cannot accept that alternative, but I would not despise or denigrate you if you do.

While I could not accept a “divine breath” explanation, and I have no qualification to choose between the RNA first and Metabolism first alternatives, I invite your consideration with me of some other proposed alternatives, some of which I regard as rather bizarre.

To begin, instead of the pool at the edge of the sea, some scientists have suggested that molecules formed into life forms either deep in the earth, under thermal pressures, or deep in the sea, in warm volcanic spurts. Maybe. When it comes to formation of complex molecules, some scientists have suggested autocatalysis, or self-replication. And some have suggested formation of organic forms by impress upon mineral, principally silicon, crystalline substrates. But how? And then some have suggested that life came from sources outside the Earth, maybe Mars, maybe beyond. And the final concept, espoused by even such a distinguished scientist as Sir Francis Crick, is panspermia, the idea that life is everywhere in the universe and not at all limited to Earth-bound processes. Well, show me!

The latter concepts, while I mock them, are supported by the mere fact that so-called organic molecules have been observed to exist “in space;” that is, in clouds of dust floating in intragalactic space. It seems to me that that fact indicates, and very much supports, the conclusion that the formation of complex molecules is inherent in the nature of matter, and that the ultimate development of biological molecules on a planet like the Earth, with an abundance of liquid water, is more or less inevitable. That leads to a conclusion (in a universe of billions of planets) that life probably exists elsewhere. Yes, I think it probably does. But I also think that (in view of the size of the universe) it is unlikely that we will find it (except possibly elsewhere within our own solar system.) When it comes to truth — and to falsehood — we have to accept that some of it is available to us and some is not.

In May 2010 a team at the Craig Venter Institute reconstructed a simple bacterium by removing part of its DNA and replacing that with sets of new base-pairs which they had designed and synthesized in their laboratory.¹⁷ The modified cell was capable of reproducing itself and the synthetic DNA. This was widely touted as the first “synthetic life,” but some scientists and some theologian disputed that characterization.

In December 2011 a group of university chemists created an artificial phospholipid cell membrane out of chemicals, not other living organisms.¹⁸ Each step in the synthesizing of the complex molecules which make up a living organism has proved to be very difficult, time-consuming and expensive. But, as said above, don’t be surprised if scientists do put all the steps together and someday announce the actual creation of life from chemical constituents. It behooves us all to be prepared *when* they do it. There surely are practical and ethical questions involved.

NOTES

1. See Chapter Four, and particularly note 3 thereof.
2. See Scott F Gilbert, "*Ernst Haeckel and the Biogenetic Law*," *Developmental Biology*, 8th edition. Sinauer Associates, 2006.
3. Stephen Jay Gould, *Ontogeny and Phylogeny*, Belknap Press, 1977.
4. Stephen Jay Gould, *The Structure of Evolutionary Theory*, Belknap Press, 2002.
5. Stephen Jay Gould, *Full House*, Harmony Books, 1996.
6. Stephen Jay Gould, *Wonderful Life*, W. W. Norton, 1989.
7. Simon Conway Morris, *The Crucible of Creation: The Burgess Shale and the Rise of Animals*, Oxford University Press, 1998.
8. The whole "debate" is interestingly reviewed in the "SJG Archive" under the title "Showdown on the Burgess Shale;" www.stephenjaygould.org/library/naturalhistory_cambrian.html.
9. Simon Conway Morris, *Life's Solution: Inevitable Humans in a Lonely Universe*, Cambridge University Press, 2003.
10. Scientific American, October 1994.
11. Christian deDuve, *The Constraints of Chance*, Scientific American, January 1996.
12. Christian deDuve, *The Birth of Complex Cells*, Scientific American, April 1996.
13. Hauser left Harvard in 2011 and has been charged with improper origination and use of data (Boston Globe, September 6, 2012). I do not know if any scientific misconduct affected the article here discussed; I disagree with the conclusions therein expressed.
14. Michael Gazzaniga, *Human-The Science Behind What Makes Your Brain Unique*, Harper Perennial, 2009.
15. Note particularly the description of "core consciousness" in some animals by Antonio Damasio in *Self Comes to Mind* (Chapter Seven, note 14) pp 171-172. See also *The Social Genius of Animals* by Katherine Harmon in the November/December issue of Scientific American Mind.
16. Sources on cells and the origin of life include: Wikipedia sites on: Cell (Biology), Cell membrane, Vesicle (Biology), Lipid bilayer, model lipid bilayer, Abiogenesis; Cellupedia.com; article by Christian deDuve entitled *The Beginnings of Life on Earth*, American Scientist, October 1995; Article entitled *Life on Earth* by Alonso Ricardo and Jack W. Szostak, Scientific American, September 2009.
17. See article in The Christian Science Monitor, May 21, 2010; www.csmonitor.com/science.
18. See Itay Budin and Neal K. Devaraj, *Membrane Assembly Driven by a Biomimetic Coupling Reaction*, Journal of the American Chemical Society 134, December 2011.

Chapter Eight

Mind

THE AWESOME BRAIN

If you are ever “in awe” of anything (it is somewhat like being “in love”), then you should be in awe of the human brain. Cosmologists encourage us to be in awe of the universe with its hundreds of billions of galaxies and stars. Yes, that’s awesome, as is the process by which a star fuses hydrogen and releases energy. But right here, on one planet orbiting one of those uncountable stars, right here, in one brain, your own brain — there are over one hundred billion cells and many trillions of connections among them. That is awesome in itself, but it is not just the numbers, it is the process by which those neurons and synaptic connections produce your mind that is truly awesome. The complexity of that process is far beyond the workings of the atoms inside a star.

Mind. That word alone provokes not only awe but also wonder. What *is* mind? You have thoughts and ideas, you know that you can see, hear, smell, touch things, you know what and where they are, and you can describe them and share your thoughts and ideas about them with other people, who, you therefore assume, also have minds. But you cannot perceive, or contact with your senses themselves, either your own mind or anyone else’s mind. It is surely there — but where? If you cut yourself, you can see your blood and you know that it is a thing, a substance, that is within your body. But, no matter how you cut or intricately examine your body, you cannot find your mind in it, can you?

That awareness, that thought, led to a conclusion that mind is not a physical part of the body, is not a physical thing at all, but is rather an essence, an immaterial something that somehow belongs to you, is part of you, but is not part of your corporeal self.

That idea has prevailed from ancient times. It is at the root of the concept of the soul and the concept of God as a universal incorporeal mind. According to Plato, Socrates sharply distinguished between “the soul” and “the body.” He equated the soul with the quest for knowledge and truth, and he asserted that “to consider anything in company with the body she [the soul] is obviously deceived.” In Plato’s Dialogue of Phaedo¹ (supposed to be Socrates’ last discussion before his death) the idea is carried further:

“And thought is best when the mind is gathered into herself and none of these things trouble her — neither sounds nor sights nor pain nor any pleasure — when she has as little as possible to do with the body, and has no bodily sense or feeling, but is aspiring after being.” “And in this the philosopher dishonors the body; his soul runs away from the body and desires to be alone and by herself.”

This bald assertion that the mind is not only separate from the body, but is inhibited and even tainted by the body, found manifestation in some future religious tenets. Furthermore, the conception of mind as independent of brain continued with remarkable persistence in philosophical thought, reaching perhaps its peak in the discredited concepts of Descartes. Even today, in the age of neuroscience, one can readily find philosophical writings which treat mind as a separate entity, akin to a Platonic Form or at least as a hypostatized concept. Among the many philosophers who are now aware of the advances in neurological science, there are still some who insist on pointing out that science has not specifically identified the nature or origin of “mind,” and that its dualistic existence must therefore not be excluded from possibility. And finally, there are the neuroscientists themselves, who generally agree, as good scientists always do, that there are still uncertainties, but that it is clear that what we call “mind” is in fact a function of the brain.

Furthermore, besides making it clear that mind derives from the brain, the neuroscientists adduce evidence to show that the processes by which the brain forms mind involve, necessarily and assuredly, the rest of the central nervous system and other parts and organs of the body. The intimacy and interplay of all of those elements, and of the separate and identifiable parts of the brain itself, are the subjects of modern neuroscience. The word “mind” is often associated with “consciousness” or more particularly “self-consciousness,” and there are ongoing studies seeking to determine precisely how that comes about.

Besides producing conscious thoughts, the central nervous system serves other purposes that are essential to life, but are not consciously controlled, such as the beating of the heart, the breathing of the lungs, responses to injury and pain, and many others. Also, it is obvious that animals other than humans have brains and central nervous systems, some of which are very similar to ours. Since the “unconscious” functions in those animals can be determined to operate in their bodies almost exactly as in ours, that poses the

question of whether, or to what extent, their brains may also produce “mind,” or something like it.

For many centuries it was only “philosophers” who considered such subjects, focussed on their own thoughts and on what they deemed to be “reason.” They had very little understanding, if any at all, of the brain as a functioning organ involved in thought. They even sometimes mistook the location of mental activity in the body; the comment that “I know in my heart” is still popular, if only to support a belief that is firmly held but not rationally supported. Much later came the psychoanalysts and psychiatrists, who began to recognize mental aberrations and some relationships and distinctions between cognition and emotion. Then came the era of medical attention to trauma, the actual dissection of brains, and the beginnings of understanding of the structure and functioning of areas of the brain.

And today we have true neuroscience. This encompasses examination of actual neurons with electron microscopes, probing of sections of the living brain by means of molecular magnetic resonance (functional MRI), analyses of the very chemicals and electric charges that pass signals from one neuron to another, diagrams of the intricate “wiring” and interrelationships of neural systems, and libraries of data from studies of brains of traumatically injured and deceased subjects. The knowledge of the brain and of how it works is extensive and detailed, though of course incomplete; those billions of neurons and trillions of interconnections do pose a considerable complexity to the analysis.

Neuroscience is a complicated subject, as are the other subjects previously discussed in this book, such as cosmology, quantum physics, and perhaps even theology. Nevertheless, I suggest again that the seeking of knowledge is the essence of the existence of mind, and is not only the bread, but the joy of life. In that I may agree with Plato. I further suggest, as I think Plato did, that the acquisition of some knowledge in all of these fields is essential to the preservation of orderly society. But at that point I depart from Plato and repeat my assertions that his *conclusions* are not the basis for the propagation of order, sanity and survival in the world today, but are a hindrance. It is undeniable that Plato (and his contemporaries and successors) knew very little about material reality and were usually wrong. It is also not easily refutable (and at least arguable) that his conclusions about human nature and spirituality were equally wrong.

FREE WILL AND FOOLISHNESS

Nevertheless, even modern philosophers, and some scientists, seem to be unable to separate themselves from ancient concepts. Are brain and mind two separate things? Is consciousness a great mystery? Is free will possible?

Well, there are still some philosophers who think that those questions are subject to debate.

In 2004 the magazine *Scientific American Mind* published a special edition captioned: *The Brain: A Look Inside*. It included articles under the rubric of “The Puzzle of Consciousness.” One article, by Gerhard Roth,² head of the Brain Research Institute at the University of Bremen, in Germany, analyzed brain function, and pointed to “the synchronization of the billions of cortical nerve cells with the trillions of synapses — which are all the while under the influence of the reticular formation, thalamus, hippocampus and limbic systems” as a “good candidate explanation” of how consciousness occurs. In good scientific form he pointed out that “no definitive explanations exist,” but asserted “that is not likely to remain true forever” because “at least some of the mysteries that surround it should nonetheless — eventually — fall away in the face of persistent scientific inquiry.”

Another article was by Michael Pauen,³ professor of philosophy at Otto von Guericke University in Magdeburg, Germany. Pauen did not buy Roth’s suggestion at all. In his article Pauen expressed doubt that a “comprehensive explanation of consciousness will ever develop,” and he went on to say that we could not accept a brain-function explanation of consciousness “as truth” unless we “empirically prove” the existence of “a conscious mental field.” Those statements, coupled with the very title of Pauen’s article: *Does Free Will Arise Freely?* triggered the science vs. philosophy synapses that are, for better or for worse, readily activated in my brain.⁴

Now in the first place, Pauen’s very title struck me as a self-contradictory pleonasm. Pauen surely knew that the very term “free will” is a philosopher’s toy and that its distinction from plain “will,” unmodified, is semantic. He did not attempt to define “will,” free or otherwise, and offered only trivial, superficial examples that were meant to evoke the lay reader’s conception of free will. Further, the demand for “comprehensive” explanation and his requirement that “truth” be “empirically proved” struck me as salient examples of “unscientific” thinking.

Possibly Pauen is right that, as he claimed, philosophers have wrestled for more than two centuries with such simple questions as why a Mr. P would choose to walk rather than ride on a sunny day, but if so, they have, I submit, wasted their time. His explanation that “no one knows the exact connection between simple neuron activity, our subjective response to it and the exercise of our free will” is no explanation at all, but only more tautology. What he meant was epitomized by the question posed in his next paragraph: “Are the brain and mind the same or different entities?” That is, of course, the question to which some philosophers, particularly those of a theological bent, have often answered, and still do answer: Different.

The scientific answer is obvious: mind occurs in and derives from brain, a living brain. There is no evidence whatsoever to the contrary, and there is a

great amount of empirical and analytical elucidation of the brain processes by which consciousness is effected. That data was set forth in Gerhard Roth's article entitled *The Quest to Find Consciousness*, and in other articles in the magazine. Understanding of the structural, biological, chemical, electrical, etc., workings of the brain had then already come a long way, and have since then reached even deeper levels. Doubts about current understandings or about the methods or progress of further inquiry were then and are still certainly welcome, but does it matter that human comprehension may never be "comprehensive" or final?

After coolly reciting differing views of dualists and monists, Pauen tipped his hand by saying that before we accept the monist view "as truth we must at least empirically prove the existence of the interaction — that a conscious mental field can be found and defined." Excuse me, but I call that Hogwash! Acceptance of the "truth" of the monist view does not demand empirical proof any more (or less) than the dualist view does. It is obvious to any thinking person (whatever his "personal philosophy" may be) that all available empirical evidence supports the monist view, and that there is no empirical evidence at all in support of the dualist view.

Then Pauen forthrightly asserted his "philosopher" bias. He said: "A philosopher would attempt to formulate this problem a bit more clearly. What is important is the difference between a mere determination that consciousness becomes involved under certain neuronal circumstances and our ability to explain why this occurs." The key word is "why," a favorite of philosophers; it is often not a question, but an assertion of a teleological premise — that there must be a purpose.

In light of that, consider Pauen's examples of "two famous thought experiments." The first is that of blind Mary "who knows everything there is to know about human color perception." The question posed is whether her "perfect knowledge" enables her to "know what it is like to perceive color?" The stock answer is no; if she could see color, "she would experience something completely new." Well, maybe, even probably so. That conclusion is vernacularly plausible, but not proved, nor is there even an attempt to support it. Next he cited Thomas Nagel for the idea that even if "we know absolutely everything about the physical processes in the brains of bats," we would still not know "what it's like to be a bat."

Well yes, I hope not. But how, pray tell (and Pauen doesn't), do those examples support or even permit a conclusion that "neurobiology knowledge cannot supply us with any firm conclusions regarding processes in our consciousness" or that "it is extremely unlikely that we will ever find an explanation for the relation between the brain and consciousness." It seems to me that the examples indicate only that poor Mary's consciousness may be impaired or incomplete compared to that of a sighted person, and that bat consciousness may be beyond our ken.

Pauen said that: "In both examples, we lack the necessary explanation. We can accept the determination that certain neuronal processes are linked to specific mental processes. But we do not understand why those processes are present and others are not, and we do not know what would occur subjectively if the neuronal processes were to change." He did not specify the explanation he deemed necessary or why it is necessary. To a considerable extent neurologists do know why identified processes, not others, are present: they arise from specific molecular structures, dependent on imperatives of chemistry and the nature of matter and energy acting within the body. Current understandings of neuronal processes may still be incomplete; there are no doubt "others" not yet understood. But it is meaningless to assert that we do not know "what would occur subjectively" if neuronal processes "were to change." What "change" was Pauen referring to? Mutation, species drift, evolutionary adaptation? What relationship does this have to "subjective" perception today?

Pauen said: "Thus, we do not know if bats — or lizards or earthworms — possess a consciousness." The conclusion of ignorance is clear, but is it "Thus"? Our ignorance of consciousness in bats, lizards and earthworms rests partly on their inability to communicate and partly on analysis of their neuronal structures. But as a human being I experience self-consciousness, and I accept that of other humans because they communicate it to me. My acceptance is very substantially affirmed by the current empirical knowledge of neuronal activity. I perceive differing degrees or levels of consciousness in other humans, and in myself when I drowse or dream, or if I am intoxicated. The explications of neuronal activity, and the similarity thereof in all (at least vertebrate) animals, suggests the possibility of some level of "consciousness" in animals other than humans. That possibility is shown by both behavioral and neurological studies to rise to probability in some species. It is a mistake to hypostatize "consciousness" into a thing, rather than to analyze it as a variant, empirically tractable phenomenon.

Finally coming to "free will," Pauen opined that: "If our mental activities equated with processes in the brain that followed predictable rules of nature, then we could not claim to have freedom of will." While "predictable" is a loaded word, the stated dogma still depends on a philosopher's definition of "free will." Then, at last, Pauen tried to take the edge off the dogma by equating "freedom" with "self-determination" of an individual "self," defined as the "fundamental personality traits and convictions that define a human being." However, he failed to recognize that that last phrase is a description of the culturally acquired attributes of individual persons. He described personality in terms of pilfering from a grocery store. Personally, I don't do that because I have (through neuronal programming, no doubt) learned not to. But it means nothing to say, as Pauen did, that "This action is a product of my free will, directed by my determination of myself."

That “our moral concepts and convictions are realized on a neuronal basis,” does not, Pauen agreed, endanger our “self-determination.” But it does, he said, put philosophers in the evidently uncomfortable position of being “unable to explain” human decisions. That task would, he said, pass to neuroscientists who would “have to ascertain whether individual actions really are determined by central personality traits or whether they are reliant on external factors.” Who says so? What is the source of the imperative to exclude “external factors”? Is it not enough to analyze the neuronal processes that generate personality traits and lead to decisions? Are not all of the functions of the body, and their neural interactions, themselves the principal “external factors” that form our “central personality traits”?

Why, in fact, are “external factors” mentioned at all? Is there anything in this more than a lingering dualistic premise? The essence of his contention is that since scientists cannot comprehensively describe the neuronal functions and activities comprised in self-awareness and thus in individual choice, the possibility remains open that mind is an “autonomous entity.”

That thought may lie behind Pauen’s assertion of the dubious contention that inability to define consciousness in absolute terms makes it “difficult” to determine at what point “we claim that a foetus possesses a consciousness and, therefore, should be regarded as an individual, capable of experiencing pain.” In the ever-raging debates over abortion, absolutists of one stripe may regard a fertilized egg as being a human and those of the opposite extreme may find a human to exist only when the baby leaves the womb and breathes. The medical profession is of course ever solicitous of the foetus, and existing legal principles take into account trimesters and the viability of a foetus. Neuronal activity in a foetus is no doubt pertinent, but it is not by itself determinative of what “we claim” about a foetus being an “individual.”

In like vein Pauen ended by stating that: “Consciousness and self-determination also lie at the foundation of most basic legal and ethical questions, Our entire legal system is founded on the idea that we can be held accountable for our own actions. Should this assumption be proved false, we would be forced to make sweeping changes.” But that is as false as the suggestion that neuronically origins of decision processes makes us “puppets” devoid of “free will.” In our legal system subjective intent — *mens rea* in criminal matters — is determined from objectively proven actions. Jurisprudence does not purport to look into the mind. It is the actions for which we are accountable, regardless of our self-awareness. The law does sometimes recognize “insanity” (or other mental deficiency) as an excuse from accountability, and judicial practice in that area has surely been parlous and in need of scientific enlightenment.⁵

But if, as Pauen implies is possible, neurologic science may find us all to be mere automatons, wholly lacking in will, then law would not need “sweeping changes” — it would be extinct. I do not see that as a danger, and

I suggest that human beings will continue to be capable of making rational and independent decisions even if and when neurologists become capable of describing every last synaptic action involved (an unlikely achievement).

Before closing I must assert that I have no animus against Professor Pauen, nor against the philosophers who have for ages devoted such extensive efforts to the analysis of “free will,” though I do believe that they have wasted an enormous amount of time and intellectual talent. The “will” involved in human actions and the “freedom” thereof from the various limitations and constraints that have been considered are important subjects, but they cannot be resolved by “reasoning” about them or by philosophic or theological speculations. The route to understanding of human actions lies in studies of human behavior, human psychology, and the workings of the neurosystems in the human body.

When it comes to the *substance* of decisions, there is obviously much more involved. Using Pauen’s example, let us consider Mr. P and Mr. Q (whom we may even suppose to be identical twins). Why would one choose to walk and the other choose to ride on a sunny day? The brain structure and neuronal activity in the brains of Mr. P and Mr. Q are substantially the same, but they may come to different conclusions on that occasion, and that means there were *some* differences in the firing of *some* synapses in their brains at that time. Why? Well, we will never know for sure, but it could be as trivial a cause as a gust of wind on one’s face or a glimpse of a flower that caught one’s eye, or it could be that Mr. P had recently been considering buying a new car, or that Mr. Q had read an article about the effects of greenhouse gas emissions. Does that really have anything to do with “free will”? I think not.

Yet neither the subject nor the flimsy popularized treatment of it seem ready to go away. In the May/June 2012 issue of *Scientific American Mind* there is an article entitled “*Finding Free Will*” by Christof Koch, who is not only a professor of biology at CalTech but a noted specialist in brain science. Notwithstanding, the article rambles on, seemingly intended to titillate the reader, first with talk of romantic dalliance, Descartes theory of the soul, and Gandhi’s forbearance “for a higher ethical purpose,” and then with (unrelated) uncertainties of physics from Newton, Heisenberg, Einstein, and Edward Lorenz’s “butterfly effect.”

When he finally gets to the interesting brain experiments by Benjamin Libet, he cannot resist describing the observed effect with the declaration that: “The brain acts before the mind decides!” And following with brief mentions of tests by Wegner, Fried and others, involving physical manipulation and actual brain probes, he concludes with the odd statement that: “Their feelings arose from within, without any prompting by the examiner.” He finishes with reference to the Temple of Apollo at Delphi, advising us all to “know thyself.” Triviality all the way!

On page 1 of the magazine the Editor introduces Koch's article with speculation about her own commitment to engage in exercise, and asks: "Or are my thoughts and actions just a natural outcome of the laws of physics?" She also refers to "our unconscious mind" as "one of the vultures preying on our thoughts." Finally, following such egregious bunkum, I am sorry to report that the article is accompanied by a picture of a man on puppet strings! Shame!

While this hapless subject continues to demand attention, at least some authors approach it more sensibly. Michael Gazzaniga, a neuroscientist, wrote *Who's in Charge?: Free Will and the Science of the Brain*,⁶ and Robert Doyle, an astronomer with diverse interests, wrote *Free Will: The Scandal in Philosophy*.⁷

NEUROSCIENCE — NEW UNDERSTANDINGS

At this point I depart from criticisms and assertions of falsity, and focus on what I see as the possible route to ultimate eradication of falsities accepted as truths, and to the development of sound and reasonable understandings of human nature, intelligence, culture and society. That is of course the proper analysis of what modern neuroscience tells us about the brain and its functions and output. To begin to understand the findings and analyses of neuroscience, one should of course read and study the books of the great leaders in the field. Certainly among those are Eric Kandel, Antonio Damasio, Michael Gazzaniga and Joseph LeDoux.⁸ I can offer only a limited (and possibly distorted) glimpse into the field, and I venture to do so solely in the hope that I may make complicated subjects more available to the lay reader, and that I may induce you to undertake further study.

The first and essential point to be made is that cognition and emotion are a pair, a very close pair. They are never entirely separated and it may be said that they cannot live without each other. They live together in the house called The Brain and often join and move together through its corridors, though they may at times remain momentarily separated in its different rooms and passageways, each awaiting its own expression, usually moderated by the other.

There ends the metaphor, but the intimacy of the phenomena we call cognition and that we call emotion is very real, and does require some explanation. In his seminal work, *Descartes' Error*,⁹ Antonio Damasio said that: "The brain and the body are indissociably integrated by mutually targeted biochemical and neural circuits." In explanation he points out that the brain itself is one (or a collection of several) of the organs of the body, which include also organs involved in the circulatory system, the digestive system, muscular systems, endochrinatic systems, and various others. Besides the

central nervous system, generally called the brain, there are peripheral nerves that connect every other part and organ of the body with the brain. The connections are all two way streets, enabling the parts of the body to send signals to various parts of the brain, and the same to send signals to various parts of the body.

In *Synaptic Self*¹⁰ Joseph LeDoux also again emphasized (as he had in his earlier book, *The Emotional Brain*) the inseparability of emotion and cognition. He pointed out that studying the mind as a concert of interrelated neural processes is particularly useful because “It allows emotion and cognition to be treated the same (as unconscious processes that can but do not necessarily lead to conscious experiences), and it opens the door for the much needed integration of cognition and emotion . . .” and also motivation, referred to as the third element of the mental trilogy.

Many of these interactions we take for granted and do not ordinarily regard as either cognitive or emotional. Our hearts beat regularly, our lungs breathe in and out, we swallow food and water and excrete it, and we sleep at night and awake in the morning. While we call these “bodily functions” and there is to our way of thinking no cognition or emotion involved, it remains true that none of that could happen at all unless there were both a body and a brain and, most importantly, they were intimately interconnected.

It is also common for us to ignore the essential role of the brain in many of our reactions to stimuli that do not come from within our body but from the outside environment. If you step on a pebble with your bare foot, you wince; if you are caught out in the rain, you shiver; if the air temperature goes to 85, you perspire; if you see a car crash, your pulse goes up. In every case the body’s reaction involved, actually required, an exchange of signals with some part of the brain. And in such events you may well also experience an occurrence of actual cognition and emotion that derived from the experience. You may mentally chastise yourself for having forgotten to put on your sandals; you may feel disappointed at not having dressed to suit the weather; you may feel anger at the careless driver or sympathy for the person injured.

In other words, we might say that the differences between bodily functions and reactions on the one hand and mental functions on the other hand are verbal distinctions rather than functional ones. The body and the brain do always work together, never separately. But of course the explanation does not end there. There *is* such a thing as cognition and there *is* such a thing as emotion. There are signals exchanged among neurons that do lead to thoughts, conclusions and determinations, and signals so exchanged that do lead to feelings of anger, disgust, jealousy and hatred. In short, cognition and emotion occur in the brain along with, or on top of, those other actions that we call bodily functions and reactions.

The thesis of this essay, based entirely on the findings and insights of the great neuroscientists of today, is that, notwithstanding our traditional higher

regard for cognition, i.e. “thinking,” it is itself a result, a process, of the same interchange of neural signals throughout the body and the brain that produce not only the feelings indicating emotions, but also the “unconscious” bodily functions and reactions. In short, cognition is not a separate “thing” (the error of Plato and Descartes), but is a process manifestation of a brain working in a body.

The process — that is, “what happens” — in a being with a brain in a body begins with a stimulus. Sometimes the stimulus comes from within the body itself, but often it comes from outside. The outside sources are very important when we are talking about thinking and feeling. The outside sources reach us through our sense organs: we see, hear, smell, taste, touch and grasp. Beginning with the last, our kinesthetic sense may govern our golf swing (producing feelings of sorrow or pleasure), or help us indicate the size of an object by holding our thumb and finger apart. Our touch stimulates a nerve end which sends a signal to the brain, which may eventually tell us if the touched object is hot or cold, soft or hard. A molecule may fall on nerve endings in our tongue or on sensory nerves in our nose, and eventually our brain may tell us whether it is tart, sour or sweet. When a vibration in the air reaches our ear, the nerve endings in that organ forward signals to the brain, which may eventually determine whether it is noise, speech, or music, in tune or flat. And our eyes respond to photons of light falling on nerve ends in the retina which pass signals along that the brain ultimately forms into pictures or images in our mind.

The means by which a nerve ending that encounters a stimulus sends it along to the brain may seem like a subject to be confined to biology texts, but I think it is important for all of us to have at least a basic understanding of the process. As in my earlier discussions of such subjects as ontological reasoning, cosmology and quantum physics, the goal is not expertise (which of course I do not have), but rather to separate such subjects from the realms of “mystery” and to “demythologize” them and bring them into the language and the common understanding of all of us who are not experts in those fields, but are almost daily faced with social issues that are influenced by or even depend upon the assertions of those who are or purport to be experts in all of those fields.

In that vein, I present in illustrations 8.1 and 8.2 drawings of a neuron and of a synapse.¹¹

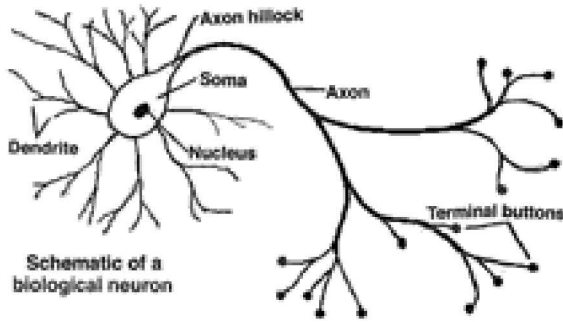


Illustration 8.1. Drawing of a Neuron. Reproduced by permission and courtesy of Neil Fraser, root@neil.fraser.name.

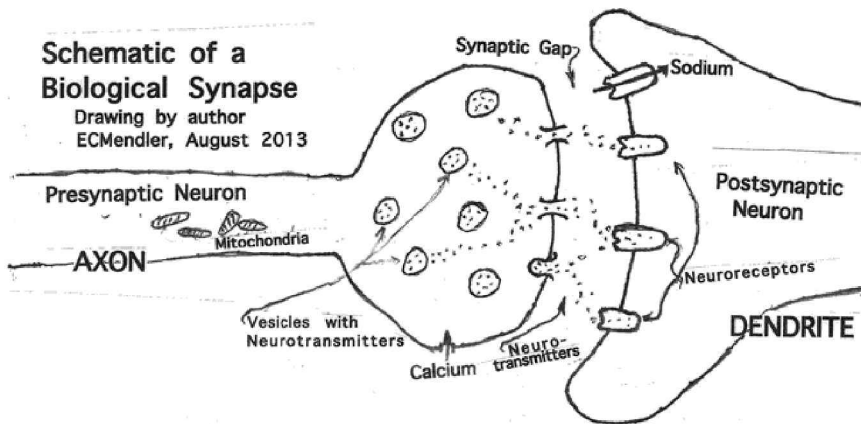


Illustration 8.2. Drawing of a Synapse. Drawn by the author, Edward C. Mandler.

The neuron has many dendrites projecting off the cell body or soma, and one axon (possibly divided into segments) ending in terminals. The terminals of the axon connect with “receptors” located on the dendrites of the next (or “postsynaptic”) neuron. The many dendrites and multiple axon terminals readily indicate that a very complex interconnection becomes possible. Thus a hundred billion neuron cells in your brain can easily account for trillions of synapses. Dendrites are ordinarily close to the cell soma, but axons generally extend for a few millimeters or even centimeters.

The connection of one neuron to another is a synapse. It is not a physical connection, but rather a tiny gap across which chemical molecules are passed. The principal molecules transmitted across synapses are glutamate, which incites action in the receptor, and gamma-aminobutyric acid (GABA), which inhibits or reduces the likelihood of action in the postsynaptic neuron. There are a number of other neuro-transmitter chemicals, including dopamine and other peptides, some of which perform special roles in synaptic

transmissions. These chemicals are generated in the brain stem and transmitted by long axons to other neurons as and where needed.

Upon receiving such chemical signals the dendrite in the postsynaptic neuron passes the signals along by chemical reactions of its own and sends the signals down its axon to the next recipient neuron. The transmission of a signal down an axon is effected by electric impulses generated by a series of chemical reactions. It is not like electricity passing down a wire at nearly the speed of light, but is much slower, measured by some neuroscientists to be about 40 miles per hour.¹² Nevertheless, even at that speed the transmission of signals through the myriad intersections in the brain is remarkably quick. It is true that there are measurable time gaps between your stubbing your toe and your mind thinking and your voice saying ouch and your feeling pain in the toe, but isn't it amazing that all that happens because of electrochemical reactions passing through the intricate networks of your central nervous system?

Before lapsing into a description of the workings of neurons and synapses I referred above to "what happens" in terms of the brain's "eventually" or "ultimately" providing a sort of "explanation" of the event. The way the brain does that involves many many more neuron-synapse signals passing through complex pathways and through different areas of the brain. The different areas of the brain are plotted out and numbered on what is called a Brodmann map, which roughly shows the cellular "architecture" of the brain.¹³ Some areas are specifically associated with particular sensory responses, such as sight, hearing, smell, etc., but brain *functions*, i.e., the integration of such sensory stimuli into conscious awareness of what is seen, heard or otherwise detected, are not confined to specific areas, and involve the interplay of exchange of signals among several different areas.

There is no one area for "emotions" in general, but there are different types or classes of emotion (such as fear, lust, anger) and there are different brain areas and networks that deal with each separately. Sometimes the signals through the several brain systems reach the prefrontal cortex areas where consciousness comes into play and we may have "feelings" and even "thoughts" about them. Nevertheless, most emotional reactions are in the "unconscious" brain. The signals pass through brain areas called the thalamus, the amygdala, the hippocampus and various types of cortex, all of which are present in the brains of nonhuman vertebrate animals, even those which lack a capability of what we call consciousness. These brain systems process the emotional stimuli received, and send appropriate signals back to other parts of the body, bringing about, for example, a muscular withdrawal, a pulse in the heart and flow of blood, a blush on the cheek, or a spurt of hormones. These are all unconscious reactions.

As Joseph LeDoux put it, "We have little direct control over our emotional reactions," but "While conscious control over emotions is weak, emotions

can flood consciousness.”¹⁴ The manner in which they do flood our consciousness is evident in our every moment of wakeful awareness. We are aware of, recognize, and discriminate among, our feelings of love and admiration, hatred and dislike, fear and wariness, or disgust and distaste. The expression and articulation of those feelings in our mind are cognitive manifestations. Our unconscious emotions have brought thoughts about them into our mind. The way that happens is of course by means of signals transmitted along axons and through synapses in myriad circuits eventually leading to the prefrontal cerebral cortex.

This interrelationship necessarily entails what we call memory. The stimulus of a neuron, whether from within the body or from the outside through one or more of our senses, produces a great cascading of synaptic firings. Because of the huge number of interconnections, there may be multiple firings of some synapses, either simultaneously or serially, and a stimulus today may reach some of the same synapses that were fired yesterday — or years ago — by a similar or related stimulus. Synapses so affected may become more prone to receive or accept later stimuli, either from within or without. Repeated use of a synapse (or a group of synapses constituting a “system” in the brain) is likely to develop strength and durability, somewhat like the repeated use and training of our muscles. That is, of course, a highly simplified description of the process, but the result in effect is that the brain makes “maps” and “images” of the objects and events that generated the stimuli.

In *Self Comes to Mind*¹⁵ Antonio Damasio describes the process in detail, and points out that the “maps” and “images” made by the brain are Not like pictures on film, but are records of the reactions of the body and the brain to the object or event that generated the stimuli. When we encounter an object or event, the entire body and brain *interact* with it, and we experience multiple consequences in our body and brain from that interaction. Among our reactions are what are called “sensorimotor patterns,” such as movements of eye, neck and body involved in viewing the object, touching and handling the object, previous memories related to the object, and triggering of emotions and feelings relative to the object. As Damasio puts it:

“What we normally refer to as the memory of an object is *the composite memory of the sensory and motor activities related to the interaction between the organism and the object* during a certain period of time. The range of the sensimotor activities varies with the value of the object and the circumstances, as does the retention of such activities. Our memories of certain objects are governed by our past knowledge of comparable objects or of situations similar to the one we are experiencing. Our memories are *prejudiced*, in the full sense of the term, by our past history and beliefs. Perfectly faithful memory is a myth, applicable only to trivial objects. The notion that the brain ever holds anything like an isolated “memory of the object” seems

untenable. The brain holds a memory of what went on during an interaction, and the interaction importantly includes our own past, and often the past of our biological species and our culture.”¹⁶

The statement that “Our memories are *prejudiced*, in the full sense of the term, by our past history and beliefs,” is among the *Premises* set forth at the beginning of this book. Damasio was describing how the brain works, but my purpose is of course to make a philosophical or epistemological point. In the last quoted sentence Damasio points out that our memories include “our own past” and that of “our culture.” It is to “our culture” and our “history and beliefs” that I would apply the word “prejudiced.”



Illustration 8.3. Antonio Damasio. Photo reproduced by permission and courtesy of Antonio Damasio, University of Southern California.

The point I wish to make is that our “thinking,” our assertions of what we “know,” or think we know, necessarily and inevitably include (and are consequently prejudiced by) “our own past” and “our culture.” The importance of our culture — meaning the accumulated sets of thoughts, ideas, concepts, determinations and conclusions which we carry with us in our minds — cannot be dismissed or overestimated. In other words, our culture itself is the most powerful and most persistent source of our thoughts and thus of our actions. As described in Chapter One of this book, each of us acquires our culture through societal means beginning in our earliest years. That is why the ontogeny of our minds is so important and why it is so important that education be focussed on opening the mind and not on indoctrinating it. That is particularly so if, as I contend, our culture includes a body of false premises and false understandings. The hope of ameliorating the condition of mankind then lies in opening the door to some new understandings, generating perhaps some new “memories” in future generations.

Returning to neuroscience itself, besides the formation and “storage” of maps and images of experienced events in memory, the neural processes

necessarily include the capability and process of recall or playback. Without this ability we would, as Damasio points out, not be able to recognize the things that come to our senses at present, or to think about objects or events that we have previously encountered, or even to imagine and plan for the unknown and the future. The neurological processes which account for our ability to retain and to recall memories — with varying degrees of distinctness and detail — are, as described by Damasio, involving brain systems of convergence and divergence of signals, fearsomely complex (and not yet wholly understood or deciphered.)

The recall of things remembered is quite varied, depending on whether we are recalling an object or an event and on the complexity of each, on how important (emotionally significant) it was to us when first remembered, on how long ago we stored the memory, on our current biological and emotional status, on our reason or purpose for the recall, and on other factors. Some neuroscientists and psychologists speak of long-term memory and short-term memory, the latter being sometimes called working memory. As an example, I would say that reading necessarily involves memory, that your reading this now involves working memory (my hope being that some of my words may be retained at least for a short term), but your ability to read, to visualize and understand letters and words in print depends on long-term memory; that is, the retention in your synaptic systems of the processes of reading.

While you read this book, you call up not only your “reading” memory, but surely many other memories associated with the subject matter, such as what you have learned in the past about, say, philosophy, religion, cosmology, quantum physics, psychology, and even neuroscience. Your brain is full of stuff! It is capable of rummaging around and finding a lot of data and ideas, some old, perhaps some new, as you go along. To accomplish that recall you may have to briefly interrupt your reading from time to time; there is evidently a sort of one-thought-at-a-time rule. While you are thinking your multiple thoughts there are also assuredly some feelings along with them. The feelings are mental expressions of underlying emotions, and may include dislike or anger, or (I hope) possibly pleasure, and maybe both at the same time, our complex brains being ever capable of serving up an olio.

In any event, the retention of language in our brain and the ability to integrate multiple recalls in verbal terms is at the root of our ability to think. It is, so far as we can tell, unique to humans; it involves the pre-frontal cortex which is much larger in humans than in the only other animals (primates) who possess this segment of the brain. Does that mean that only humans have “consciousness” in the broad sense? Well, no, not quite. It depends in part on what the word means, what one calls “consciousness.” But more significantly, it seems that there are kinds, or levels, of consciousness, and that animals with developed central nervous systems and brain structures must certainly possess some level of consciousness.

Professor Damasio examines these different levels in detail and refers to “the neurology of consciousness as organized around the brain structures involved in generating the lead triad of wakefulness, mind, and self.”¹⁷ He leads to that by saying that (for humans) “to get to a passing standard consciousness score, it is indispensable (1) to be awake; (2) to have an operational mind; and (3) to have, within that mind, an unprompted, undeduced sense of self as protagonist of the experience, no matter how subtle the self sense may be.”¹⁸ It is clear that his emphasis is on the *feeling of self* (which accounts for the title of the quoted book), but he points out that none or the elements, neither wakefulness, mind, nor self itself, are simple one-category, on or off, matters, but each involves differing examples, levels and ranges.

He defines types of consciousness within those ranges as *core* consciousness, involving primordial feelings and available (at various levels) to creatures with a central nervous system, and *extended* or *autobiographical* consciousness, available so far as we know only to humans. He explains and gives examples of the fluctuations of our everyday, ordinary human consciousness through the gamut of the levels and ranges suggested by those categories. Where our consciousness stands within that broad range at any moment depends on the circumstances of our momentary environment and activities. While enjoying scenery at the seaside, recalling the hole on which you broke par, or watching a humorous video, you may need and use little more than the “core” of your consciousness, but when you are asked to analyze a problem with multiple variables, to make a business decision, or to resolve whether or not Aunt Jane needs to be sent to see a psychiatrist, you will surely invoke more extended levels of consciousness and call upon autobiographical information stored in your long-term memory.

As Damasio says, “[t]he business of understanding how the brain makes a conscious mind remains unfinished,” and “[t]he idea that we have a firm grasp of what the brain is and what it does is pure folly,” but he points out that “we always know more than we did the year before and much, much more than one decade ago.”¹⁹

The point I want to make is that the new insights from recent years — that last decade and the years ahead — may be the key to the future. The understandings of human thoughts, feelings and motivations, and the actions resulting from them, were brought to the fore over a hundred years ago by various writers, including William James, whose contributions are still admired, and Sigmund Freud, whose contributions are now seen as more dubious. But neither of them knew how the brain works. Their ideas about thoughts, feelings, motivations and actions were derived from their observations of behavior and their own imaginations; they did not know, and had to surmise, what went on in a brain.

But now we have neuroscience; now we have detailed understanding of what happens inside a brain in a human body. We have a new, and well-

founded, understanding of the processes in our bodies that account for our having thoughts, feelings and motivations. Is it not possible that understanding of those origins and of the role of memory processes in embedding them in our culture will open our culture to new and more clear understandings of the *content* of our thoughts, feelings and motivations, and maybe thereby to ameliorization of our *actions*?

At the very least the understanding of mental processes surely has broad implications as to the methods and the effects of education.

NOTES

1. Plato, *Dialogue of Phaedo*, The Harvard Classics, Vol.2, P.F. Collier & Son, 1909; or <http://classics.mit.edu/Plato/phaedo.html>.

2. Gerhard Roth, *The Quest to Find Consciousness*, Scientific American Mind, January 2004.

3. Michael Pauen, *Does Free Will Arise Freely?*, Scientific American Mind, January 2004.

4. There is of course no such thing as "science vs. philosophy synapses." I was referring to my biases, possibly synaptically based.

5. See Michael S. Gazzaniga, *Neuroscience in the Courtroom*, Scientific American, April 2011.

6. Michael S. Gazzaniga, *Who's in Charge?: Free Will and the Science of the Brain*, Harper Collins Publishers, 2011.

7. Robert Doyle, *Free Will: The Scandal in Philosophy*, I-PhiPress, 2011, reviewed in Harvard Magazine, September 2011.

8. A very useful opening to the study of neuroscience is provided by The Brain Series, hosted by Charlie Rose and guided by Eric Kandel, including discussions with a number of distinguished neuroscientists. The series is available through www.charlierose.com.

9. Antonio Damasio, *Descartes' Error*, G.P. Putnam's Sons, 1994; Penguin Books, 2005.

10. Joseph LeDoux, *Synaptic Self*, Penguin Books, 2002; *The Emotional Brain*, Simon & Schuster Paperbacks, 1996.

11. By using Google one can find a great variety of depictions of neurons and synapses.

12. But the November/December 2012 issue of *Scientific American Mind*, page 80, gives the speed of a neural impulse as 220 mph, and, incidentally, states that the human brain contains 86 billion neurons and over 10 trillion synapses.

13. Depictions of the Broadman maps may be found on the Wikipedia site under Broadman Area.

14. Joseph LeDoux, *The Emotional Brain*, Simon & Schuster Paperbacks, 1996. It may be worth noting that in 1740 David Hume had observed in *A Treatise of Human Nature*, that "Reason is, and ought only to be the slave of the passions, and can never pretend to any other office than to serve and obey them."

15. Antonio Damasio, *Self Comes to Mind*, Pantheon Books, 2010.

16. *Ibid.* p 133.

17. *Ibid.* p 243.

18. *Ibid.* p 161.

19. *ibid.* pp 262, 263.

Chapter Nine

Equality, Democracy, and Freedom

EQUALITY

In the Declaration of Independence Thomas Jefferson said that all men are created “equal” and are endowed with “inalienable” rights including life and liberty, though he must have known that was (and is) false. The reference to their being so endowed “by their Creator” was of course a useful equivocation. At the time there was no extant theory of the commonality of all humans other than that of special creation by God, and that alone was a sufficient basis for him to assert equality and the inalienability of their endowment. In other words his statement asserted a prevailing religious concept and was not to any extent descriptive or analytical of the observed condition of individual humans or of society.

Jefferson certainly could not have asserted either equality or an inalienable right to liberty as descriptive of the human condition in the society in which he lived. He owned slaves, allowed them to be punished for their work lapses and to be pursued when they were fugitives. However much he deplored the institution of slavery, as reported by historians, he did little to eradicate it.¹ If in fact he believed that there was a God who had made all men equal and endowed them with an inalienable right to liberty, he was a hypocrite. My guess is that he was, like many of his thinking contemporaries and many of us today, rather unsure of and disturbed by all of those propositions, and to some extent emotionally torn as to how to think about or deal with them in light of the societal actualities that they faced then and we face today.²

Now we have a thoroughly developed and articulated theory of evolution, an analysis of the human genome sufficient to indicate variants, and an understanding of the workings of the central nervous system, all of which

necessarily put the questions of individual equality and of human rights in another light. Viewed from that standpoint the elements of the “creation” of a person might be said to comprise his genetic ancestry, the social and economic setting of his birth, and his developmental ontogeny. Since *homo sapiens* is a single species, there certainly is a basic commonality among humans, but none of us are identical, and our “equality” is, at most, only an after-the-fact construct. Some people are physically more sound and vigorous than others; some are born in circumstances that give them more or less opportunity for mental development; some no doubt have more or fewer neurons and synaptic connections than others; and of course some are male and some female. There is no equality in any of that.

Since individuals are in fact not equal, should we not recognize that and somehow accommodate it? If there is no divine or analytical basis to support the “inalienable” status of a right to life or liberty, why should our society support such rights? Those who believe that human beings are devoid of morality without a divine mandate or spark sometimes assert that those very questions prompt societal chaos, an unleashing of the worst instincts of man, leading to suppression of the weak and the assertion that only “might makes right.” I disagree.

The first answer is that the concept of divine origin of human equality and rights, though prevalent for ages and prized among the great majority of humans, has not provided actual equality among humans nor assured their life and liberty.³ While Jefferson’s phrase arose from a Christian context, it is undeniable that many Christians supported slavery as being consistent with God’s will. It is also true that many Christians support limitations of the “inalienability” of the right to life, effected by the doctrine of “just war” and approval of capital punishment for some crimes. In saying that I am not trying to be critical of Christianity; I am only suggesting that Christians, no matter how devout, are subject to and guided by human societal conclusions, whether or not they believe that those conclusions reflect the will of God.

The second point is that Christianity, as well as all other religions, do in fact recognize the inequality of humans, and in fact celebrate it with their doctrines of the duty of the strong and able to protect the weak, to assist the poor, to feed the hungry and to teach the ignorant. The need for and religious obligations to provide all sorts of social assistance are based upon recognition of inequality. The religious concept of equality speaks only of a putative spiritual equality, and not of temporal or material equality. If the latter were mandated by God, it is hard to see how there could be any sincere Christian who was richer — or otherwise more powerful or better off — than any other human.

With respect to the inalienability of rights to life and liberty, the question is a bit trickier. As noted above, the doctrine of “just war” and the acceptance of capital punishment for crime both acknowledge that life and liberty are

subject to temporal and societal limitations. If there is a “spiritual” or God-mandated basis for the inalienability (presumably equivalent to inviolability) of life and liberty, then the infliction of death — in war (particularly on an “innocent person,” no matter how “unintentional”), or as punishment (even of a guilty person, no matter how “just” in human analysis) — must surely be a violation. And is not imprisonment (or compulsory military service) a denial of liberty, and a refutation of its inalienability? There are of course now many people (including Christians, adherents of other religions, and atheists) who oppose capital punishment and seek its abolition, and there are pacifists and “conscientious objectors” who oppose war in principle, and many others who (for one reason or another) promote reductions in the offenses for which one may be imprisoned.

Besides those considerations, the assertion of a divine source of a right to life has come into conflict with the analytical arguments for human control of life in relationship to birth control and, rather oddly, with respect to stem cell research. I will not review nor wade into the arguments propounded in the birth control controversy, except to repeat two simple observations, often made by others: The way to reduce the incidence of abortion is to provide easy and effective means of contraception. The contention that contraception is contrary to a moral rule is misapprehended both theologically and anthropologically.

When it comes to stem cell research, I have previously waded into the controversy and cannot withdraw now.⁴ In the cited (Harvard Magazine, July-August 2004) debate on the use of embryonic stem-cells for research Professor Robert George, arguing against it, was quoted as saying that: “The great teaching of the Declaration of Independence is very valuable: that all of us — every human being — is created equal, and endowed by the creator with certain inalienable rights. We don’t get those rights from the state, and therefore the state can’t take them away. It’s the state’s obligation, rather, to respect and to protect those rights.” In short, George unabashedly asserted a divine origin of a right to life and, more surprisingly, that the state, i.e., a government established by men, is obliged to respect a principle of divinity that is not universally accepted by its citizens. I think that is not what Jefferson said and is opposite to his espousal of a wall of separation between church and state.⁵

It was of course not an interpretation of Jefferson’s meaning that was at the nub of the dispute, but rather a disagreement about the nature of an embryo. George continued to insist that a human embryo, even in the stage of its being a blastocyst containing only a few cells, “is not something distinct from a human being; it is a human being at the earliest stage of its development.” He insisted that the “potential” of such an embryo to become a human being entitles it to all the respect and rights to which a human being is entitled, whether inherently or by grant of the state. He asserts that as a

“scientific” conclusion, evidently on the basis that a blastocyst containing human DNA would, if all went well for it, become a human being.

Professor Michael Sandel on the other hand rejected such an all-or-nothing approach, saying that “You don’t have to regard an embryo as a full human person to believe it is due a certain respect,” and points out that: “The fact that all persons were once blastocysts does not prove that all blastocysts are persons. This is faulty reasoning.”

Many proponents of embryonic stem-cell research have pointed out that fertility clinics contain many human blastocysts that will in any event eventually be destroyed. Fortunately in my opinion, the true and correct scientific views have largely prevailed, and the suppression of stem-cell research on essentially (in my opinion, false) religious grounds has lost most of its thrust.

Returning to the main theme, the most important reason that it is both safe and sound to accept the inequality of humans and the societal basis of human rights is that human beings are by and large good fellows and know how to organize and conduct a society that will best serve their interests, survival and well-being. I do not base that contention on the arguments of Steven Pinker in his book, *The Better Angels of Our Nature*,⁶ but present it as a “philosophical” conclusion derived from my own personal observations and reasoning, much in the manner of Aristotle. I would suppose that I have observed human societies over a longer period and in more countries and cultures than did Aristotle, and I am quite sure that the studies, writings and observations of others available to me far outstrip those available to Aristotle. Nevertheless, I readily concede that my conclusion has no more epistemic validity than did Aristotle’s.

There are now many studies that indicate the presence of an innate tendency to empathy in human beings. Behavioral studies indicate the same tendency in some other animals, and I think that the scientific conclusion among evolutionists and neurologists is that the development and wiring of the central nervous system among those creatures with prefrontal cortical functions is very likely to produce, or at least involve and permit, empathetic feelings. As noted in the essays above on neuroscience, feelings are at the root of cognition, so feelings of empathy are likely to manifest themselves in human thoughts, motivations and actions. I really hope that some bright and knowledgeable people will before long develop that idea and carry it forward.

In any event I do heartily support the view that we all Should conduct our societies on the basis of affording equal status in most respects to all individuals, regardless of their individual inequalities, and on the basis that life and liberty should be regarded as fundamental rights. In those respects I am with Jefferson (disagreeing only with his citation of source), and I stoutly reject the contention of Aristotle that: “From the hour of their birth, some men are marked out for subjection, others for rule.”⁷

Besides biological traits that are rooted in the evolution of our species, a basic reason for concluding that we should deal with each other as essentially equal and entitled to our lives and freedom is that there are so many of us. If killing each other is fair game, everyone of us is at grave risk. If some of us deprive others of their liberty, the unfree will surely seek to oppose their oppressors, and strife will arise. If the able and talented take most of the resources and deprive the poor and weak of some share, that would also lead to strife. In short, some levels of equality and protection of life and liberty are essential to maintenance of a stable society. There is no new insight in that; societies were formed on that basis from the days of the earliest packs of hunter-gatherers.

Then came the division of labor, each person performing a task to which he or she seemed to be better suited, and receiving in return a “fair share” of the society’s resources and produce. We will come back later to the subject of economics, but the point here is that human societies require a division of labor, which is a recognition of the inequality of individuals. That very inequality and that very division undeniably present many questions that must be answered as to the structure of societies, particularly the relationships of unequal persons to one another and the relationships of everyone to those who govern.

It is perfectly clear that societal organization has throughout history favored the strong and oppressed the weak. The strong have taken most of the resources of the earth and the products of human endeavor, and allocated to the weak only as much as they deemed necessary to preserve a modicum of stability and protection of their power. The strong have assumed control of the governance of society and have thereby entrenched their power to control allocation of resources and products in their own favor.

Furthermore, the strong have adopted and embedded a “philosophy” that their power, their hegemony, their acquisition and control of material goods, was proper, inevitable, and in the end, decreed by God. Aristotle’s dictum that “some men are marked out for subjection, others for rule,” was in fact long taken as a tenet. The “divine right of kings” was taken as a tenet. The duties of serfs or peons to the Lord of the feudal fiefdom were enshrined in the law, and the Lords themselves were obliged to deliver a share of the usufruct to the sovereign king.

It is undeniable that the structure of societies was dominated by principles of that kind for many ages. But of course the question, the issue, of the stability of such societies was always there. There *were* unhappy, unsatisfied serfs and peons; there were risks of strife, and there were unpleasant uprisings.

Fortunately, there were also human feelings and thoughts. There were philosophers and theologians, as well as members of religious laity and religiously unaffiliated thinkers, who recognized the unfairness of the power

structure, the oppression of the weak, and sometimes the incompatibility of the existing structure of society with the prevailing religious concepts and principles of the universality of human beings as the creation and the children of a divine being.

Such ideas arose and were disseminated very gradually over the ages. The printing press, coupled with the Protestant Reformation, opened the possibility of access to philosophy and theology by persons who were not priests of the church. The new assertions about nature, beginning with the astronomy of Galileo, Brahe, Copernicus and Kepler, began to reach the broader community of thinking people. And of course that led to new ideas about the structure of society.

The era and the ideas that comprise and are called the Enlightenment were the outcome. The first four paragraphs of Jefferson's Declaration of Independence may well be considered as a succinct assertion of the new societal concepts that had been developed and articulated in England, France and elsewhere in that era. They were, however, only *ideas* about equality, liberty, and rights of the people, and their putative source in Laws of Nature was entirely speculative. When it came to actually forming a government, the divine status of equality and liberty fell to more practical human concepts of such things.

The Constitution itself recognized the existence of slavery in the careful wording in Article I as to counting "free Persons" and "three fifths of all other Persons," meaning slaves, and in Article IV about "delivering up" a "Person held to Service of Labour" "escaping" from one State into another. It also contemplated and limited dealings with Foreign Nations and Indian Tribes, and spoke of suppression of Insurrections and Rebellion. Nowhere is there any provision for equality of persons, and the only provisions relating to personal liberty are no more than limitation on suspension of the writ of habeas corpus, prohibition of bills of attainder, and protection of the "Privileges and Immunities" of Citizens of the several States.

The Bill of Rights did include provisions protecting liberty, but still made no provisions with respect to equality. The First Amendment protected freedoms of religion, speech, press, peaceable assembly, and petition of the government. The Fifth Amendment protected against deprivation of life, liberty and property without due process of law, and others of the ten amendments constituting the Bill of Rights protected other important personal rights, in each case, however, subject to limitations or exceptions. Substantially all of such rights and protections of liberty, and the conditions or limitations, including the meaning of "due process of law," have been subject to judicial review and interpretation. None of the rights can reasonably be characterized as absolutely "inalienable." Our government is one of laws, but the laws are made by and subject to interpretation by humans, not by divine fiat.

The civil war brought an end to slavery. The 13th Amendment provides that: "Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction." The phrasing is a bit peculiar: Could a court sentence a convict to slavery — to be a chattel slave?

The 14th amendment carried the "due process" clause forward as binding on the States as well as on the federal government, and that was later accepted by courts as having effectively imposed the other provisions of the Bill of Rights on the States. It did not, however, provide the "charity for all and malice toward none" that Lincoln had proposed, but made it clear that the States could deny the vote not only to those who had "participat[ed] in rebellion or other crime," but to other "male inhabitants" who were 21 or older, meaning of course former slaves, which some states proceeded to do. It obviously did not appear necessary to the framers to exclude females from the franchise, that being taken as a given.

The 14th Amendment did for the first time in our constitution make a specific provision in protection of personal equality; it prohibits every State to "deny to any person within its jurisdiction the equal protection of the laws." That provision, as often noted, applies to all *persons*, not just to citizens, but the applicable *laws* did not then provide the franchise to all persons. That construction of the clause is more than a legal quibble. Equal protection was provided as to the right to vote: for former slaves and blacks by the 15th amendment, for women by the 19th amendment, for residents of the District of Columbia by the 23rd amendment, for some poor people by the 24th amendment, and for those over 18 by the 26th amendment. But beyond the matter of voting rights, the meaning of the "equal protection" clause remains unresolved in some important respects, particularly today with respect to persons resident in the United States who are not citizens and who arrived here without compliance with immigration laws or without documentary evidence of their right to be here.

I argued above that "human beings are by and large good fellows and know how to organize and conduct a society that will best serve their interests, survival and well-being," and then followed with description of the generally oppressive nature of societal organization, mollified to some extent by the adoption and implementation of later legal precepts. Well, I think it is all true: Society has progressed as a result of cultural development of innate traits of empathetic feelings, but there are still overriding elements of oppression and unfairness in all of our societies throughout the world.

That poses of course the questions of whether, to what extent, and how, it may be possible for humanity to achieve societal organizations that do better serve the interests, survival and well-being of all of us, notwithstanding our individual inequalities. Those questions are not just matters for academic or

philosophical discussion, but are in fact the grist of public discussion today among governmental leaders, politicians, pundits, and the general public.

Across the spectrum of viewpoints almost every commentator begins with a concept of “human nature.” A prevalent view, frequently expressed in American politics (though usually softened or sugarcoated for effect), is that the inherent nature of humans is such that it is inevitable that human society be governed by competitive, self-serving, conflict between individuals and among all of us as individuals in a society. That idea is, in a nutshell, sometimes called “social Darwinism.” The term is still used and the concept still criticized by those who favor more direct, ameliorative intervention in society’s inequalities.⁸ The validity and the implications of that concept will be considered when we come to a discussion of economics.

It is worth noting here, however, that the concept is not Darwinian, but is more properly attributable to the ideas of Herbert Spencer, a leading philosopher and political theorist of the 19th century, known for support of free enterprise, unfettered by governmental restraints.⁹ Natural selection as described by Darwin does not (or only rarely) involve “struggle” or “competition,” and certainly not in terms of intention. But Darwin did use those terms (as metaphors) and he did adopt Spencer’s term “survival of the fittest.” In 1944 Richard Hofstadter published a widely-read thesis that was critical of free-enterprise capitalism and the socio-economic theories of Spencer, and unfortunately he called it *Social Darwinism in American Thought, 1860-1915*.¹⁰

The true and proper description of the characteristics that may be considered as constituting “human nature” will be left to psychologists, sociologists and neurologists, all of whom have come a long way since Darwin and Spencer wrote, to say nothing of Plato and Aristotle.

While many people in our society are certainly competitive, there are questions as to how much of that comes from nature and how much from nurture — or the cultural environment in which we have grown up. Our societal norms do honor and reward competitive success in almost all respects, including sports, elections, workplace compensation, international trade, invention, intellectual achievement, winning the fair lady, and even religious proselytization and recognition for doing good works.

It would be foolish to contend that competition has not advanced our well-being, economically and otherwise, or that “the rising tide” has not lifted the ships of many who were not themselves successful competitors. Yet any analysis of society will show that the strong, that is the successful competitors, have taken a larger share of the material well-being than is left to those who were not themselves successful competitors. That analysis, if conducted in sufficient detail and depth, would also likely show that participation in the competitive success group as contrasted with the less-rewarded group is not necessarily, not always, maybe not generally, based upon *indi-*

vidual merit, if merit is measured on any standards other than the success itself. It certainly would show a substantial deviation from anything like “equality,” and that some persons, regardless of their endowment of equality, by God or by law, were left out.

Among those who may be regarded as left out in America today are the millions of people resident in the country who arrived without going through immigration procedures. Our borders have been porous for decades. Very little was done by any governmental agency to keep them out, and in many instances they were in effect lured here to fill jobs that others did not want. Some of them have children who were born here and are therefore US citizens, and most of them have jobs and support their own families. Those facts alone make it grossly unfair to force them to leave. To label them as “illegal” or “undocumented,” or by some other denigratory epithet, and thereby to demand that they leave the country, is contrary to every principle of morality and ethics with which I am familiar, whether religious or humanist in origin.

Furthermore, forcing them to leave would be impractical and cause disruptions not only of societal but also of economic stability. The occurrence of an economic downturn, causing some of those people to lose their jobs and turn to governmental assistance does not change the moral principle. They are still human beings — persons — and if the laws of our society provide for “the general welfare,” as specified in the Preamble to the Constitution, and that all *persons* are entitled to equal protection of the laws, then it would be wrong to deport a person because he was out of work. The argument that allowing such persons to stay in the country is “unfair” to those who came here or are on waiting lists to enter “lawfully” is flimsy and does not meet logical and practical criteria.

The means and procedures for establishing the right of such persons to remain do of course call for careful planning and administration. While the United States has always shied away from requiring an “identity card” (in the European style) for every person, a first step in the reform would be to “document” all those who are currently in the status of undocumented aliens. In that process there might well be a procedure to identify persons who have committed crimes (other than illegal entry), and to deal with them accordingly, including in some cases, deportation.

Those who wish to stay and to become citizens may be required to show the sincerity of that intent by learning English, demonstrating familiarity with our Constitution and laws, keeping or seeking a job, paying taxes on a “Green Card” basis, and reporting regularly to immigration authorities on their activities, including personal matters such as residential moves, marriage, divorce, remittances abroad, and even minor police charges. It may seem to some civil libertarians that such requirements, if imposed on the native-born, would make them “second-class citizens.” My response is that those subject to such strictures while seeking citizenship would on the

contrary better be thought of as “first-class aliens.” We owe them humanity, but we do not yet owe them the full bounty of our societal and legal systems.

Another aspect of immigration reform must of course be more careful control of our borders. Entry without permission is already illegal, and governmental efforts in recent years have reduced illegal entry significantly. Once the above-proposed documentation is effected, it would become easier to spot a newly arrived “illegal.” That would be even more so if it were made an offense, subject to fine, to hire or pay anyone without evidence of citizenship or documented alien status. I would not regard that requirement as an unfair burden on American employers. Absolutely secure borders are probably impossible to achieve, and the contention that we must “seal” them before we do anything else is silly, and likely asserted as a bargaining ploy.

In any event immigration reform finally evokes some broader questions. How many immigrants do we want or are we willing to accept? Do the criteria include country of origin, ethnicity, education, talent or work skills, or total numbers? The laws governing such matters have changed over the years, and as the population of the country has passed 300 million and of the world 8 billion, there are some wholly new considerations. As population density increases elsewhere, how much pressure will that put on us to admit more foreigners to our open spaces? If sea level rises by 20 feet, where will the hundreds of millions who now live on lower lands go? Is it fair or moral for us to say as to our lands “pull up the ladder, I’m aboard”?

Those latter questions are no doubt premature, but thinking and planning ahead are almost always a good idea. The question of reform with respect to the millions of undocumented aliens now in the United States is, however, not a matter for the future; it is overdue of resolution. Furthermore, it is now possible of resolution. Some solution along the general lines I outlined has been supported by leaders of both the major parties. Certainly there are differences of view as to how tough we should be and about the procedures, but there is no excuse whatsoever for Congress to fail to act on the matter. In light of legislation pending in Congress in the spring of 2013 and the extensive debates about it, all of my foregoing comments on the subject may, by the time this is published, be “old hat” or “too little and too late.”

Related to such immigration reform is the matter of integration of persons with variant cultural backgrounds into American society. There *is* an American culture and it remains important that it be both preserved and developed. As Arthur Schlesinger pointed out over twenty years ago,¹¹ the United States long took pride in being a “melting pot” in which people of diverse cultural backgrounds came together, enriched each other’s outlooks — their psyches and souls, if you will — and joined in a society bound together mainly by *common* elements. However, some groups assimilated better than others, and those that did not readily “melt” into the commonality began to assert the importance of their very separateness.

The scars of slavery persisted and the most salient cultural separateness was that sought and endorsed by dark-skinned people and by those who did not want to accept them as equal. While today almost all black Americans are culturally indistinguishable from their white compatriots, a separateness still persists, principally as a matter of economic status. Yet some black Americans, as well as those with other ancestries, whether Mexican, Chinese, Polish, AmerIndian, or what have you, continue to assert and to insist upon the necessity and value of their separate identities. Furthermore, they have been, and still are, encouraged by some social analysts and activists who find the highest values in diversity itself, and seek to preserve separate cultures in as nearly as possible their original, distinctive forms.

I disagree; I am of the integrationist view. I would not for a minute denigrate, say, a Chinese New Year's parade or a Polish wedding festival, but would feel enriched by association with such an event and the people involved in it. Nor would I take issue with the teaching of Hebrew in a Jewish temple or schul, nor with persons speaking, say, Spanish, Russian or Japanese at home in order to perpetuate the memory and knowledge of ancestral homelands, but would rather admire their abilities and hope that they might assist more of their fellow citizens to learn of other languages and customs. Nor in fact do I find fault with the use of "ethnic-label" American as a useful descriptive term, nor with the existence of organizations formed to promote such identities, so long as they do not assert their separateness from the rest of us.

There is, however, one example or instance of separateness that I regard as inexcusable: the segregation of American Indians on "Reservations," which are largely centers of poverty with poor schools and little chance for advancement. The Indians are a noble people with a true cultural history of their own that deserves to be honored and recognized. Our European ancestors did great and unjust harm to the ancestors of today's Indians, and it is high time that we ended the Reservation system once and for all and brought our Indian citizens into the main stream of American society.

In short, I value diversity, but I do not think that America will or can be held together as a nation unless there are strong common threads binding us up despite our diversities. One such thread is the English language. All Americans should acquire reasonable proficiency and literacy in English. Our governmental offices and courts can, and should, provide accommodation and assistance to those who are not yet able to deal in English, but the process of learning must be pressed forward. Familiarity with our systems of government and law is also an essential. The degree to which our schools have fallen short in that respect is appalling, and as said above, any route to citizenship should require learning and understanding of the basic structures and principles.

As a final note in this section on Equality, it needs to be noted that the spread in the levels of income and possession of assets between “the rich” and “the poor” has increased rather dramatically in recent decades. Is that an inequality about which we need to be concerned? Since the emphasis of this section has been on the fundamental inequality of individual human beings, it will come as no surprise that there are income and asset inequalities. The question is how much? Do there need to be limits in a democratic society? If so, is it possible to reduce the spread without impairing our essential freedoms? How?

DEMOCRACY

Democracy has always been in general disrepute among philosophers. Plato and Aristotle rejected direct control by the people as a sort of majoritarian dictatorship. Aristotle objected that it would constitute rule by the poor or needy, who were of course the majority; and we can’t have That! Well, ignoring my snide comment, it was true then as it is now that the poor and needy majority are less likely to be educated and thus less aware of the high-minded goals of those who are; that is, the privileged elite. Consequently, Plato opted for a government of a selected group of the elite, usually referred to as “philosopher kings.”

He recognized of course that philosopher kings were few and far between, and were not characteristic of the prevailing elite, even in ancient Athens. He observed that the leading citizens who were about to condemn Socrates were more interested in acquiring money and prestige than they were in “virtue.”¹²

With that thought in mind we may now fast-forward to the societal and governmental developments of the Enlightenment and beyond, discussed in the foregoing sections of this chapter. Now we recognize that the pursuit of self interest is inevitable, and the best protection against its becoming too destructive of society is to spread the power around and to dedicate our governments to the general well-being of the people. That is what is now called Democracy.

Almost all governments call or characterize themselves as “democratic,” whatever organizational structure they may have. These include Parliamentary Democracy, Constitutional Democracy, People’s Democracy, Socialist Democracy, and perhaps Islamic Democracy. But the pundits of “The West” usually sneer at some of those uses of the term, and assert that only “we” know and understand what democracy means and how it must be constituted. Of course there are differences of approach, style, structure, practice and details among the nations, some of which such commentators are willing to acknowledge as “truly” democratic.

Variant forms are commonly regarded by the more broad-minded commentators as acceptable if they meet certain basic criteria, including popular election of governmental officials, limited corruption or self-serving among governmental officials, responsiveness of government to the needs and desires of the people at large, some level of freedom of individual choices as to life style and economic activity, and a degree of independence of a legal system or judiciary sufficient to give credibility, if not assurance, of the foregoing. Each of such criteria covers a very wide range of variants, the characteristics and suitability of which are debated not only among nations but by and among factions and groups within nations. They are subjects to be considered in a bit more detail below.

None of that has much to do with democracy as such. Direct conduct of government by the people is quite impractical and is nowhere practiced.¹³ In short, “democracy” has become only a slogan. In fact many today are careful to describe our system in the United States as a “republic” and not a “democracy,” pointing out that the Constitution does not use the latter word and assures our States a “republican” form of government. The distinction is usually made for partisan purposes — in light of the names of our major political parties — but it serves at least as a touchstone for our ongoing debates — across partisan lines — about the ways in which our government, or the policies of one or another administration, are or are not “democratic.”

While it would seem that equality of individuals, so highly touted in the Declaration of Independence, would be an important element in the evaluation of the “democratic” quality of our government and its policies, there is very little of it involved. The claims of and calls for “equality” have become also little more than slogans. As noted above, universal suffrage was long in coming, and there are distinct inequalities in its exercise. In recent years many states have tightened up their rules for voter registration, proof of registration and identity at the polling booth, and early and absentee ballot voting. While elimination of voting fraud is certainly a proper goal, the net effect of such laws seems to have been exclusion of some honest votes.

More to the point, our federal structure makes voting equality a mockery. The Senate, notoriously, was not designed to be a body representing the people, but to represent the states. California, with a population of over 37 million, has two Senators, as does Wyoming, with a population of about 564,000. The House of Representatives, on the other hand, was supposed to be more aligned with voting population. With a national population of over 309 million and 435 seats in the House, it takes close to 711,000 people on average to account for one Representative seat. However, Montana, with a population of over 994,000 gets one seat, Wyoming, mentioned above, gets one, and Rhode Island with a little over 1,055,000 people gets two seats. That is the luck of the draw, inevitable in our system, but why would anyone call that “representative democracy”?

The more fundamental test is the extent to which the government meets and fulfills the will of the people. Due in large part to the constitutionally mandated legislative disproportions referred to above, Congress does not — in any balanced or “democratic” sense — do so. The nine most populous states account for more than half of the population of the country, they have more than half the Representatives in Congress and their delegations are very nearly balanced between Republicans and Democrats. Do they govern — that is, control; over the remaining minority? No, they do not. I picked the nine most populous states because I knew they represented a partisan split. (California is heavily Democratic; Texas heavily Republican.) I was a bit surprised to find that the Congressional delegations of the nine came out very nearly equal in partisan split. It would be easy to pick and choose a small group of states with a Democratic party majority, or another group with a Republican party majority, and show that, in each case, they represent a majority of American voters and that their views and actions are nevertheless sharply divided along partisan lines.

My points are simply that balancing of partisan views does not — by itself or in most instances — achieve results serving the best interests of the majority of the people, and that, conversely, what is called balance or compromise more often produces results that satisfy neither view, does not further the general good, and serves mainly to harden the lines of disagreement.

Is there any way out — any solution to this dilemma? Well, maybe. We will consider that below. But first we should consider the undesirable alternative: totalitarianism. The term was first applied to Benito Mussolini’s proposals to effect a complete reform of Italian society in all respects. That had to fail for the simple reason that governments, no matter how authoritarian, cannot readily change what is embedded in the minds and hearts of the people. In the terms of modern neuroscience as referred to in a previous chapter, we are all prejudiced and bound by our history and beliefs, by our culture. Our individual personalities are formed in the synapses of our brain, driven by emotional stimuli. Since Italians are perhaps less stolid than many others of us, they would seem to have been a poor target for instant societal reform. The very resistance to such personality reform (even if to some extent benevolently intended) led rapidly to harsh authoritarianism. Recognizing the difficulty of changing embedded culture, the Nazi regime in Germany began to focus on doctrinaire control of education of the youth of the nation, and the “cultural revolution” in China aimed at long-term reform. All of such efforts failed because they were pressed with such harsh authoritarianism and coupled with wholly false theories, racial or other. Yet the concept of reforming the world by reforming individual personalities is not new,¹⁴ and seems to be still with us in the goals of some religious groups.

Totalitarian fantasy has largely wafted away and authoritarian regimes have mostly disappeared.¹⁵ The remaining authoritarians who still rule, as

well as those who would like to rule, are now pretty well constrained by the knowledge that people do have independent personalities, harbor feelings and desires of individual freedom and are wont to resist coercion. In other words our societies — even in countries where to some extent authoritarianism lingers — are, using the current term, pluralistic.

The term suggests that the governance of one's feelings, thoughts, associations, whereabouts and actions come from many sources of which organized government is only one, and not necessarily the dominant one. The other sources surely include religion, and there are of course some societies or groups within societies who hold that their particular religious beliefs are and must be the primary governance of the society and the individuals in it, superior to any other governmental structure. We will soon return to the effect of such a view on the concept of pluralism itself.

Other sources include family and clan, ethnic history and affiliation and geographic origins associated therewith. Those concepts in the United States setting have been briefly touched upon in the foregoing section on Society, and will not be considered further here. However, they may well be, and probably are, of substantial importance to our understanding of other societies — in Asia, Africa and Latin America — and should not be discounted as valuable and important elements of pluralistic impediments to authoritarian resurgence in any of those areas.

The prevailing source of commitment to pluralism in the United States (and, it would seem, in many other countries today) lies in our culture, and may be said to be intellectually based. We are driven by goals of "freedom," a concept deeply embedded in the psyches of most citizens, however abstract and undefined it may be. The concept includes very large measures of freedom *from* governmental coercion of any and all kinds. At the same time we insist that our government itself protect and guarantee our freedoms, and that of course poses a series of dilemmas.

With respect to freedom of religion the lines are well drawn. The American Civil Liberties Union (ACLU) and Americans United for Separation of Church and State (AUSCS) are substantial NGOs (a useful abbreviation for "non-governmental organizations"¹⁶) that work hard to serve both ends. That is, they fight (by propaganda and law suits) to see to it that (a) religious views and activities are not impinged upon by governmental actions, and (b) that governmental actions themselves do not promote religious views of any kind. In both cases the term "religious views" sometimes includes "anti" views, encompassing humanism, anticlericalism, agnosticism and atheism. It is of course essential that such nonreligious or antireligious views be protected on the same basis and for the same reasons as religious views. It seems that there are many citizens who fail to understand that simple proposition, and consequently criticize judges of courts who do.

Similar ends are pursued in other contexts and partly for other purposes by such organizations as the Southern Christian Leadership Council (SCLC), the Southern Poverty Law Center (SPLC), and no doubt others groups. There are also of course important and effective organizations speaking more particularly for the role and protection in American society of Jews, Muslims, Buddhists, Sikhs, Baha'is, and other non-Christian groups.

On the other hand, there are spokesmen in some NGOs, including religious organizations, who continue to attack all efforts of the kind referred to in clause (b) above as being (inexplicably) destructive of religious freedom itself. Even in 2013 an organization calling itself Alliance Defending Freedom (For Faith For Justice) has disseminated propaganda asserting that the ACLU is opposing "religious freedom," conducting "anti-Christian litigation," and working against America's "core values." The falsity of such assertions is obvious, but the disturbing allegation is that the ACLU's activities are contrary to America's "Judeo-Christian moorings." Are the authors of those statements unaware of the origins of the First Amendment, the statements of our founding fathers about them, and the long history of interpretation and application thereof by many learned justices over the years? Are they opposed to pluralism itself and advocating totalitarian imposition of their views? One may hope that such errors arise from ignorance and not malice or vindictiveness; ignorance is more easily overcome.

FREEDOM

The desire for freedom from governmental coercion paired with the insistence that government protect "our freedom" creates of course basic conflicts in many respects. Those conflicts have been apparent to philosophers since the time of Plato and became more clearly defined and articulated during and following the Enlightenment. Let us consider some of the conflicts in modern terms, and particularly in the context of the politics of the United States.

While neither the authors of the Constitution nor most people who read it today find any conflict between securing "the blessings of liberty" and insuring "domestic tranquility," examples of possible dissension readily come to mind. If some citizens feel so strongly that their liberty is being imposed upon adversely by governmental actions that they assemble loud and unruly groups to protest in public squares, is that a violation of domestic tranquility warranting governmental intervention? Does the First Amendment right of "the people peaceably to assemble" come into play? The obvious answer is that we have courts to resolve such issues, and that the rule of law must prevail in any rationally organized society. Nevertheless, judicial determinations and their enforcement are *per se* coercive acts of government, and there are sure to be some citizens who wind up feeling that their personal liberty

has been denied — either because the assembly was barred or because it was allowed and was untranquil or unpeaceful, and perhaps violated their property rights.

Incidentally, the federal Constitution does not protect property rights, but only bars their deprivation without due process of law. It was assumed that property rights were protected by the States, as indeed they are.¹⁷

Another constitutional goal is that of providing for “the common defence,” which inevitably suggests that citizens may be called to military service, involving undeniably some limitation of their liberty. More prevalent in the popular disputes in the United States is the relationship of military and war powers between Congressional authority and that of the President, named as “Commander in Chief.”¹⁸

Beyond such ephemeral (though important) issues as the foregoing, the conflicts that most directly effect us all today are those arising with respect to another goal specified in the Preamble: to “promote the general welfare.” The very term has prompted a pejorative castigation as a “Welfare State” of almost any governmental administration that emphasizes broad popular welfare, and expenditures for that purpose. In the minds of some the very provision of social welfare conflicts with valid goals such as lowering taxes, reduction of governmental debt, development of industry, protection of property, and furtherance of military security, and assertedly involves governmental judgments that are contrary to the very principles of freedom. Those subjects will be addressed again in the next Chapter.

The contentions about such subjects have become increasingly vociferous, contentious, partisan and divergent, and usually focussed on a few “issues of the day” emanating from one political faction or another. The issues of the day are often taken in isolation, ignoring their relationship to each other, much less to constitutional analysis and history. The views of many proponents — of one side or another — are often cast as if they were plain truths — which would be readily apparent to the other fellows if only they would, say, study the subject, think carefully about the long-term consequences, recognize the ways in which a “free society” has to be organized and to work in view of “human nature.”

As said earlier in this book, we will have to leave the explanation of human nature and its formative elements to the psychiatrists and neurologists, but one cannot escape observing a lot of it (human nature, that is) in various manifestations among the many outspoken declarants. At the same time one need not shy away from posing a few of the underlying questions.

To start with, when the Preamble speaks both of “common defence” and “general welfare,” is one more important than the other? If our common defense (today’s spelling) were insufficient and we were ruled or enslaved by outsiders, we would surely have lost both our liberty and our welfare. On the other hand if our people did not have general welfare, what is it that we

would be defending? Can “the Blessings of Liberty” (the last item listed in the Preamble) prevail without the welfare of the people? I doubt it. It seems obvious that neither defense nor welfare can be left wholly to private sources or enterprises and that both do require, as the Preamble recognized, some level of governmental involvement. It is also obvious that both demand revenue, that is, taxes. Well, how much for each?

As to defense, it makes sense to appraise the risks, the likelihood of foreign attacks on our land, our people, our welfare, and to evaluate the ability of enemies so to harm us. We should also examine all possible preventive measures, including diplomacy, economic aid or retaliation, alliances, and probably threats. Then, yes then, we could begin to consider how much and for what we need to raise taxes to fund our military forces, and at what level of alert. Every one of those evaluations and steps is of course very complex. We don’t want to take too many risks. But above all, we do not want to actually engage in military actions — to put our young men and women in peril, as the current phrase goes — unless it becomes unavoidable.

I use the “editorial” pronoun “we,” but who in fact makes such decisions? The President, Secretary of State and Secretary of Defense, and their advisory staffs, to begin with. Are they qualified to do so? Well, we can only hope so — and we can be sure that their conclusions are backed up with vast amounts of intelligence and analysis. Then, when it comes to funding, and in some respects to approval of Presidential decisions, the power turns to Congress. Are the members of Congress generally qualified to evaluate and pass on such subjects? Alas, the answer has to be No. Very few members of Congress have the training, the background, the experience, the information, or the inclination, to be qualified to pass on complex matters of military and diplomatic policy, or even on the financial aspects thereof.

It is, therefore, important for us all to ask our President and his Cabinet officers to explain their policies in detail — and important for the news media to get those explanations to us in accessible form. And when our Congressmen vote for or against an appropriation, or related proposal, we should ask them to explain why they did so, giving reasons, not partisan positions. It seems clear that those votes often derive from little more than a partisan position or a desire to keep military funding, along with the jobs it provides, in the Congressman’s District. If it is jobs provided by military suppliers that account for the huge military expenditures of the United States, we need to know that. We need to know the extent and the effect of the “military-industrial complex,” which, as Dwight Eisenhower warned, had and has the power to “endanger our liberties or democratic processes.”

President Eisenhower’s statement in his Farewell Address on January 17, 1961, has been too often ignored or forgotten, and cannot ever be too often repeated:

A vital element in keeping the peace is our military establishment. Our arms must be mighty, ready for instant action, so that no potential aggressor may be tempted to risk his own destruction...

This conjunction of an immense military establishment and a large arms industry is new in the American experience. The total influence — economic, political, even spiritual — is felt in every city, every statehouse, every office of the federal government. We recognize the imperative need for this development. Yet we must not fail to comprehend its grave implications. Our toil, resources and livelihood are all involved; so is the very structure of our society. In the councils of government, we must guard against the acquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex. The potential for the disastrous rise of misplaced power exists, and will persist.

We must never let the weight of this combination endanger our liberties or democratic processes. We should take nothing for granted. Only an alert and knowledgeable citizenry can compel the proper meshing of the huge industrial and military machinery of defense with our peaceful methods and goals so that security and liberty may prosper together.

NOTES

1. See *Master of Monticello* by Henry Wiencek in the October 2012 issue of Smithsonian magazine.

2. In *Thomas Jefferson, The Art of Power*, John Meacham, Random House, 2012, the author comments that “Slavery was the rare subject where Jefferson’s sense of realism kept him from marshaling his sense of hope in the service of the cause of reform.”

3. Some Christians may, alas, argue that only Jesus is the true source; that He overthrew the idea of a vengeful God and that neither Judaism nor Islam does so. I think that wrongfully berates and misconstrues both Judaism and Islam, but that is not the subject of this book; and see the following sentences in the text.

4. The July-August 2004 issue of Harvard Magazine contained a lengthy article entitled *Stem-Cell Science*, favorably describing the procedures and prospects, but also including a sub-article on *Debating the Moral Status of the Embryo* in which Robert George, professor of jurisprudence at Princeton, and Michael Sandel, professor of government at Harvard, were the debaters. The September-October issue of the magazine contained several letters, including mine, criticizing George’s arguments. The November-December issue then contained a letter from Professor George, responding to and criticising the critics. I then wrote directly to Professor George asserting points to which he had not (and has not since) responded.

5. In the Declaration of Independence Jefferson said that “Governments are instituted among Men” “to secure these rights,” supporting George’s contention, but he added: “deriving their just powers from the consent of the governed,” supporting my contention. (I’ll bet that Professor George might argue that “just” powers still supports his view. But how does he (or anyone) know what powers are in fact “just.”)

6. Steven Pinker, *The Better Angels of Our Nature: Why Violence Has Declined*, Viking Books, 2011. I have not actually read the book, but having read extensive reviews of it, I have no basis for disagreeing.

7. As quoted in the article cited in note 1 of this chapter, in which article it is said that Aristotle’s view “governed human affairs until 1776,” which is of course a bit of rhetorical exaggeration.

8. At one point in the Presidential campaign in 2012 President Obama expressed disdain for “Social Darwinism.”

9. See Herbert Spencer, *Social Statics; Principles of Biology; Principles of Psychology*; and the multi-volume *System of Synthetic Philosophy*; all available online through The Online Library of Liberty, oll.libertyfund.org.

10. Richard Hofstadter, *Social Darwinism in American Thought, 1860-1915*, University of Pennsylvania Press, 1944. Hofstadter did not originate the term “social Darwinism,” but it was little used before his work appeared.

11. Arthur M. Schlesinger, Jr., *The Disuniting of America: Reflections on a Multicultural Society*, Whittle Books, 1991. Revised/expanded edition W. W. Norton & Company, 1998.

12. In *The Apology of Socrates* we find him declaring: “O my friend, why do you who are a citizen of the great and mighty and wise city of Athens, care so much about laying up the greatest amount of money and honor and reputation, and so little about wisdom and truth and the greatest improvement of the soul, which you never regard or heed at all? Are you not ashamed of this? . . . I tell you that virtue is not given by money, but that from virtue come money and every other good of man, public as private.

13. In an open town meeting in the New England style all eligible voters do constitute the legislature, but only a fraction of the voters attends, and the laws they adopt are quite limited by state law, and the town government is administered by elected and appointed officials. Perhaps democracy is still practiced in the few hunter-gatherer bands still existing.

14. See H.G. Wells, *The Time Machine*, 1895, featuring Eloi and Morlocks.

15. While I make a distinction, I recognize that the terms “totalitarian” and “authoritarian” are commonly used interchangeably. I do not doubt that totalitarian ideas historically and analytically lead to authoritarianism.

16. In my observation NGO’s may well be the key, the *sine qua non*, of pluralism itself, and consequently of the advance of human societies toward a rational future. The course of development of NGOs, particularly information media in modern Russia and China, so far hazardous, needs to be observed carefully.

17. For example, Article CVI of the Amendments of the Massachusetts Constitution includes among the “inalienable rights” of the people that of “acquiring, possessing and protecting property.”

18. Presidential power has been asserted by almost all occupants of that office, and widely supported. This author has disagreed: see Edward C. Mendler, *Policies for a President*, Xlibris, 2007.

Chapter Ten

Enterprise, Planning, Freedom, and Welfare

THE BASICS OF ECONOMICS

The purpose of enterprise, or economic activity in general, is to provide goods and services that are needed and desired for the survival and well-being of individuals in a society. The basic needs in origin were water, food, shelter and protection from dangers occurring in the natural surroundings, including severe weather and predatory animals.

As noted above, individuals not being equal in their abilities to provide such goods and services, the division of labor was inevitable, and it proved as well to be beneficial to societies and individuals in societies. That division and the differential abilities of individuals, along with innate biological tendencies and urges (the creativeness of the human mind being salient among them), brought about varieties in all such goods and services. It was long ago that some people came to eat better foods and quaff more interesting beverages than others, to live in more secure and elaborate dwellings than others, and to be better protected than others against the perils of nature. The exchange of goods and services led eventually to the invention and use of money, and to the existence of markets in which one could exchange money for the goods and services one needed and desired.

As the goods and services made available became more diverse and complex, so of course did the needs and desires perceived to be necessary to survival and well-being itself. In most societies of the world today, many people feel that they *need*, that their *well-being* requires, or even that the survival of their *individuality*, depends upon their having — well — a nice, warm, dwelling; tasty, hearty meals, with appealing beverages; entertainments such as sports, books, television; communication with others through

publications, radio, and the internet; and the mobility afforded by bus, rail and air lines, and often a private automobile.

All of those things, and many more goods and services available in the world today, come in great varieties of style, elaborateness, and luxury. Everyone knows that, everyone sees others who have more or better examples or choices of such things, and everyone knows that the difference lies in cost, and finally that the ability to bear a higher cost depends upon the acquisition and possession of money.

Setting forth the foregoing capsule description of the history of economic activity was necessary for several reasons. The first is to emphasize that the *purpose* of economic activity is *still* to provide goods and services that are *needed* and *desired*. The second is to point out that what are deemed to be needs and desires today are creations of human society and culture. And the third is that economic activity itself, being a product and function of human society and culture, does by itself play a large roll in the formation of developing and changing perceptions of needs and desires. In other words, economic systems of the world today are self-generative: they are not only the means of providing goods and services, they also have a lot to do with establishing what goods and services are generally deemed to be needed and desired. Another way to say that — in economic terms — is that the *supplier* creates the *demand*.¹

Those statements are again only capsules, but they indicate the questions about the modern economy that seem to me to call for analysis and study. To discuss “economics” as a discipline susceptible to orderly analysis and explanation, it is customary, if not inevitable, to begin with Adam Smith and particularly his work on *The Wealth of Nations*, published in 1776. He was certainly preceded and influenced by David Hume, who died in that year, and perhaps others.² Among the well-known writers on economics who followed Smith in essentially the same era were David Ricardo, John Stuart Mill, Jean-Baptiste Say and Thomas Malthus,³ all of whom, and quite a few others, added new interpretations and refinements to the theories.

It is important to observe that the era in which all of those wrote was that of the Industrial Revolution, usually described as occurring principally in the hundred years from 1750 to 1850, and particularly developed in England. It is also essential to note that the philosophical and social context was that of The Enlightenment, the hallmarks of which include reasoned analysis of social phenomena, the hope and promise of individual freedom, and a deep belief in the inevitability of progress.

By the time Smith wrote, economic systems had come a long way. Money had become the primary means of exchange and had acquired a value of its own. There were international banking arrangements, however incomplete. The mercantile system, supported by governments, promoted high tariffs, military adventurism and colonialism. The feudal system was gone in Eng-

land and dying in Europe, resulting in more widespread ownership of land among the upper classes. The great masses of peasants were ready to become workers in the new and growing industrial towns, and to be hired and to acquire new job skills. Some may have come eagerly to that status, but for others, forced off their land by the trend to “enclosure” in the 17th century, there was little choice — except for emigration to America.

Many of Smith’s observations have become rules of thumb for description of the fundamentals of economics. He saw the division of labor as a result of individual self-interest. The bow and arrow maker finds that he can get more meat by trading bows and arrows for it than he can by hunting. Society thus divides, Smith observed, into professions based upon what each person is good at. The value of specialization arises in populated places more than in rural areas. The labor of manufacture produces more value than the labor of agriculture.

The value of a commodity is measured by the amount of labor required to produce it and bring it to market, or perhaps the potential value of one’s labor that a purchaser is willing to give up to acquire the commodity. Access to markets is vital. The availability of water transport, being cheaper than land transport, was seen by Smith to be quite important. The price of a commodity in a market comprises the sum of wages paid to the workers, the rent for the land on which it was produced, and the “profit” of “stock,” which means in effect (as later defined) the return on capital placed at risk.

Then of course there is competition among several producers of a commodity seeking to sell it in the same markets. When demand for the commodity exceeds the available supply, the price will go up, but when supply exceeds demand, the price will go down. What could be more familiar than that? But is it true? Do today’s markets for most commodities really conform with that pattern? We will come back to that question, but let us first note that Smith pointed out the advantage to the producer of limiting supply. That might be accomplished, he observed, by control of a “secret supply” of a scarce, unique, or perhaps innovative, commodity, by deliberate withholding of the commodity from the market, or by monopoly protected by ruling authorities.

Labor itself was regarded in effect as a sort of commodity available in a market. Wages paid for labor were described as dependent on the available supply of labor and based upon competition between laborers and masters. The profits of an enterprise were of course higher when wages were lower. The general levels of wages were therefore dependent upon the availability of labor, the costs of rent of land and of stock (or capital), and of course upon realization of a suitable profit, without which the entrepreneur would not employ or risk his capital. That is all perfectly reasonable analytically, isn’t it?

Well, in that era in England, the law and the rulers protected the ownership of property, and also encouraged trade syndicates and the use and application of capital in profitable enterprises. But the law harshly limited any syndication by workers; labor organizations were not tolerated. Smith's focus was on the wealth of *nations*. As noted above, feudalism and mercantilism were dead or dying, but colonialism was growing apace. Smith pointed out that when land and resources were abundant, and therefore cheaper, in the colonies, then higher wages could be paid, as he noted they were in America. We need not review here the opposition of Americans to English laws protecting the homeland economy by restricting both purchase and sale of goods by the colonists, and the objection of the colonists to taxation without representation.

It is interesting to note that in some respects Smith was quite critical of economic practices he observed. He found the performance of professors and clergy in Scotland to be much superior to that of their correlates in England who were, he suggested, overpaid and idled thereby. During his stay in France he criticized the conspicuous consumption by the nobility and church leaders of goods and services which he perceived to be of no economic contribution, but of "unproductive labor." He greatly admired the economist, Francois Quesnay.⁴ It was, incidentally, from his group, called the Physiocrats, that came the phrase *Laissez Faire*, the full expression being: *Laissez faire et laissez passez, le monde va de lui même!* (Let do and let pass, the world goes on by itself!).

Well, while the world was indeed going on by itself, and nations, landowners, industrialists and tradesmen were increasing their wealth, not everyone was satisfied. The growth and dispersion of personal wealth brought with it an increase in the spread of wealth between those who gained and those who did not, the latter being the much larger group, that is, the workers. They were, however, consistently frustrated by legal bans on labor organizations, effectively preventing collective bargaining of wage rates until well into the 20th century.

Some of the thinkers who sympathized with the workers proposed in effect that society itself should take over and operate all means of production, an idea that became known as "socialism." Karl Marx, collaborating with Friedrich Engels, became involved in radical groups supporting socialism and, having been forced to leave Germany, then France and then Belgium, wound up in 1849 in London, where the concepts of liberty, or liberalism as it was called, were in fact practiced. He and Engels having already produced the *Communist Manifesto* in 1848, Marx then sat down in the British Museum to study the economics of capitalism, and to come up with his own version, called *Das Kapital*.⁵

I have no intention of reviewing any of the theories of Socialism, nor of Communism, nor the history or reasons leading to the phenomenal collapse

of nationalized industrial systems. My aim is to continue to analyze the system we know as free enterprise capitalism and to find therein the ways in which it does (or does not) serve the best interests of our society. While ignoring, and rejecting, “socialism,” I do earnestly insist that to be valid an economic system needs to serve its basic “social” purposes — that is, the material needs and desires of society at large.

ENTERPRISE AND PLANNING

While Marx, Engels and others were occupying themselves with “socialism,” far more effective in the mid-19th century were the promotions of the concepts of “sociology” by Herbert Spencer. The term sociology had been coined by Auguste Comte, whose ideas Spencer adopted and adapted to his own conceptions of “natural laws” guiding everything — in physics, biology, and human culture and society — ever onward and upward in progress towards an ultimate natural perfection. This is not the place to review the multifaceted aspects of Spencer’s philosophical writings, but it is important to consider the economic views that arose from them, or along with them, from various sources.

Starting with a utilitarian view that society properly would and should serve the interests of the greatest number of its members, Spencer supported individual liberty to the maximum extent consistent with the observed limitations of human morality, as he saw them. As he saw it, that liberty comprised the absence of governmental coercion to the extent that he opposed both the waging of war and colonialism, and he forecast (anomalously perhaps in light of the Marxian equivalent) that the state, not being essential to society, would eventually decay when voluntary economic systems replaced the need for coercive restraint.

More significantly he opposed governmental actions to assist public education, regulate work safety, promote temperance, and otherwise provide welfare improvements, calling them “socialist” and inconsistent with the tenets of liberal economics, free markets and free trade, or in some respects inconsistent with the individual right to private property. In his book, *Social Statics*,⁶ Spencer declared that to those choices of free enterprise: “There is No Alternative,” a phrase of later fame, as referred to below.

Spencer’s views had a deep and lasting effect on many future philosophers of society and economics, and on those who relied and thrived on the prevailing industrial and commercial systems. Proposals for governmental welfare programs were (and often still are) vociferously opposed by members of the business community and their political allies, and laws were struck down as violating the “liberty” assertedly implicit in enterprise (and protected by the due process clauses of the Constitution.) In 1905 the Su-

preme Court struck down a law of New York limiting the hours of work for bakers on the ground that it impaired the “liberty of the individual to contract.” Four Justices dissented, including Oliver Wendell Holmes, who said that: “The Fourteenth Amendment does not enact Mr. Herbert Spencer’s *Social Statics*.”⁷ However, the majority view prevailed, at least until 1937 when a statute providing for minimum wages was first upheld.⁸ As noted above, labor unions were not judicially recognized as constitutionally valid in the United States until 1937, nor labor standards until 1941.⁹

Among the followers of Spencer one of the most prominent was William Graham Sumner. He was the first to hold a professorship in “sociology” at Yale, and his course concentrated on the teachings of Auguste Comte and Herbert Spencer. He staunchly supported classical liberalism, laissez-faire economics, and free trade, and opposed all forms of socialism. His teachings and writings reached large audiences, and his works continue to be published by the Liberty Fund.¹⁰ Spencer and Sumner are often referred to as the precursors of modern-day libertarianism.

That brings us to Friedrich Hayek. He was born in Vienna in 1899, became a British subject and lived for many years in the United States. His writings and his views gained great prominence among economists and politicians in both Britain and the US, and evidently elsewhere. When Margaret Thatcher became Prime Minister in 1979 she made it very clear that Spencer’s and Hayek’s views were the foundation of her policies. Epitomizing her support of free enterprise economics, Thatcher adopted Herbert Spencer’s phrase “There Is No Alternative,” and she was then dubbed “TINA.” President Ronald Reagan also lauded Hayek and invited him to the White House.

Hayek’s 1944 book, *The Road to Serfdom*, published in Britain and the US, had been serialized in abbreviated form by the *Readers Digest* magazine, and thus reached a wide audience, followed by his 1945 article on *The Use of Knowledge in Society*.¹¹ His comprehensive work in 1960, called *The Constitution of Liberty*, more thoroughly set forth his ideas.¹²

Hayek’s writings are complex, and a useful analysis is available online.¹³ In capsule form, I would venture to say first that Hayek was a classical liberal economist in the Adam Smith mold. He called himself a “liberal” (in the John Stuart Mill sense) and not a “conservative,” and was disdainful of the term “libertarian.” By the era of Thatcher and Reagan, however, the term “liberal” had come to be used as a pejorative, and Hayek’s strongest supporters were, and still are, among those who nowadays call themselves conservatives. Hayek seemed to believe that a free market system in which every participant served his own self interest was a natural outcome of human nature and society, that by itself (the “unseen hand” perceived by Adam Smith) such a system would benefit everyone, and that attempts to control or regulate the system risked impairment not only of economic production and progress, but also of individual freedom itself.

The main assertions of *The Road to Serfdom* are that governmental efforts towards planning of the economy to achieve social ends are likely to lead to governmental ownership or direct control of the means of production, and that socialism, however well intended, is likely to lead to suppression of personal liberty, and possibly even to the totalitarian horrors of the fascism, nazism and communism of the era in which he wrote. He did not declare those results to be “inevitable,” and objected strongly when accused of that. He did, however, point to a number of economic proposals and governmental actions in Britain in the 1930s (which he characterized generically as “planning”) that were “coercive” and did limit entrepreneurial freedom. And he did couple his condemnation of “socialism” in any form with criticisms of practically every governmental program aimed at social welfare or amelioration or improvement of social conditions, finding in each some degree of “coercion” inimical to individual liberty.

He refers to competition in free markets as a guiding or essential “principle of social organization,” and describes in considerable detail the ways in which “planning,” or various particular governmental programs, interfere with the workings of competition in free markets. While he decries “economic planning” as “the prime instrument of socialist reform,” he concedes that planning itself is a requisite of a rational world, saying that: “‘Planning’ owes its popularity largely to the fact that everybody desires, of course, that we should handle our common problems as rationally as possible and that, in so doing, we should use as much foresight as we can command. In this sense everybody who is not a complete fatalist is a planner, every political act is (or ought to be) an act of planning, and there can be differences only between good and bad, between wise and foresighted and foolish and shortsighted planning. An economist, whose whole task is the study of how men actually do and how they might plan their affairs, is the last person who could object to planning in this general sense.”

Furthermore, he acknowledges that there are circumstances in which the market price system does not work. Quoting Adam Smith to the effect that such circumstances provide “a wide and unquestioned field for state activity,” Hayek expands and updates the observation, saying that, when: “it is impracticable to make the enjoyment of certain services dependent on the payment of a price, competition will not produce the services; and the price system becomes similarly ineffective when the damage caused to others by certain uses of property cannot be effectively charged to the owner of that property. In all these instances there is a divergence between the items which enter into private calculation and those which affect social welfare; and, whenever this divergence becomes important, some method other than competition may have to be found to supply the services in question. Thus neither the provision of signposts on the roads nor, in most circumstances, that of the roads themselves can be paid for by every individual user. Nor can certain

harmful effects of deforestation, of some methods of farming, or of the smoke and noise of factories be confined to the owner of the property in question or to those who are willing to submit to the damage for an agreed compensation. In such instances we must find some substitute for the regulation by the price mechanism.”

In *The Constitution of Liberty* (pp 332-341) he expands upon, explains, and propounds limits to, actions in the economic field which he regards as appropriate for governments to undertake and are not coercive or destructive of private enterprise.

In 1974 Hayek and Gunnar Myrdal were jointly awarded the Nobel Prize in economics, and it pleased neither to be associated with the other. Myrdal supported the Swedish welfare state and was a social activist, while Hayek asserted that even the granting of such an award to any economist effected an improper interference with economic liberty.¹⁴ That contrast was sharpened by the growing reaction during the Thatcher/Reagan era (and since) to the theories and policies known as Keynesian Economics that had been at least partially adopted and successfully employed by substantially all western capitalist nations.

At the end of World War I John Maynard Keynes argued (in the anti-intervention tradition of laissez faire economists) against the imposition of a heavy reparations burden on Germany, which he presciently forecast would destroy Germany's economy and likely result in further political convulsions. He lost that battle at Versailles, but it may have served as a seed to his developing concept that governmental intervention would be desirable and helpful to counter some occurrences of economic slowdown.

His book, *The Means to Prosperity*,¹⁵ was published in 1933 and promptly reached not only his British audience but also leaders of other industrialized nations, including Franklin Roosevelt. Keynes followed with *The General Theory of Employment, Interest and Money*¹⁶ in 1936, in which he forthrightly challenged some of the long-standing tenets of “classical” economics. The details are complex, but the practical result suggested lies in the possibility of regulating the business cycle, or particularly in boosting the economy out of a slump, by governmental action, particularly government spending. The actual application of Keynes ideas has been at best sporadic, and has been influenced by “monetarists” who perceive the overall supply of money to be the most important factor influencing the level of economic activity.

Long before Keynes appeared on the scene the United States had established the Federal Reserve System which regulates private banking systems in various ways. The Federal Reserve Act of 1913 set its goals as maintaining full employment, and stabilizing prices and interest rates. The FRB controls the money supply by several means of regulating interbank interest rates and reserve requirements, and now more broadly administers a national monetary

policy. In the exercise of those powers there is often a balance or even a conflict between stimulating employment and checking inflation. The Federal Reserve system and its member banks have been described, and held by courts, to be in some respects governmental agencies and in some respects to be private economic entities. The Securities Exchange Commission and other agencies are also involved in regulating some of the ways in which businesses are conducted, particularly as to the financial aspects. Some agencies are temporary, such as the Reconstruction Finance Corporation created in the Hoover administration and continued through the New Deal years. Another was the Resolution Trust Corporation, formed in 1989 to deal with the extensive fraud and failures in the savings and loan association industry, following federal deregulation.

Beyond banking and monetary controls a truly Keynesian approach involves more direct governmental action to stimulate employment. In the 1930s the NRA for a while (before being held in violation of the constitutional separation of powers¹⁷) did in fact set wages and prices. The WPA did employ many workers on public works projects, and the Wagner Act and the Fair Labor Standards Act were implemented and upheld (note 9).

When the housing bubble, risky mortgage loans and the securitization of such loans (all following the 1999 repeal of Glass-Steagall¹⁸) combined to produce an economic crisis in 2008, the US government responded both through the Federal Reserve and by congressional actions, including the adoption of the Dodd-Frank Act.¹⁹ More directly Keynesian actions were the American Recovery and Reinvestment Act of 2009 (Pub.L 111-5, called ARRA), providing over \$800 billion of stimulus funds for various programs, the provision of over \$400 billion for the Troubled Asset Relief Program (TARP), the auto industry bailout, and a new program of bond purchases announced by the FRB in 2012.

The Keynesians (usually liberals in today's American lexicon) generally support both the FRB actions and the stimulus funding, while those of the Hayek school (conservatives) seem to deplore any and all federal actions affecting private enterprise and the economy. The Presidential election of 2012 did not enlighten us with any discussion or debate about the respective merits or demerits of the Keynesian or Hayekian theories, but the sharp divergence of the two viewpoints certainly presented itself. Obama and Biden made no bones about supporting federal action to stimulate employment and to regulate the financial industry, while Romney and Ryan repeatedly criticized those proposals. Mr. Ryan made a point of supporting views like those of Hayek, which he seems to have adopted, rather oddly, from a popular novel.²⁰

In all of that are there any truths and any falsities? Yes, plenty of each. To sort them out it must first be observed that economics, considered as a science, is more descriptive than prescriptive. Adam Smith described the ways

in which entrepreneurs, and workers employed by them, made decisions in the contexts in which they lived and sought to satisfy their needs and desires. As noted above, the context was a transitional era, differing and developing, as Smith noted, from the ancient Greek and Roman forms and from the more recent and familiar feudal forms. He observed that in his time and among small discrete enterprises the economic choices that were made often seemed to produce positive though unintended results, as if they were guided by an “unseen hand.” At most that was a rule of thumb, and Smith certainly did not intend it to be a philosophical dictum of the inevitable nature of society.

On the contrary Smith recognized that there were many variables involved in all economic activities. They included of course the scarcity of resources, the access to markets of material supply and the sale of product, the degree and nature of competition in the particular field, the interposition of governmental actions and taxation, and the availability and talents of workers.

Almost all of these variables depend to some extent on intent, desire, ambition, and other facets of human psychology. Just as all philosophers before him had relied primarily, if not exclusively, on their own observations of behavior, Smith relied on his predecessors and on his own observations to form judgments about individual intentions. His parable about the bowman’s perceiving advantage in selling bows over hunting with them can hardly be refuted, but it has no bearing whatsoever on a possible choice today of, say, a high school teacher to become an auto worker or a bank teller. Intent and choice (as Smith no doubt knew) depend upon the circumstances in which they are made, and, as we now know and Smith did not, upon the biases that have been implanted and developed in the individual’s long-term memory and have come to form the culture of his society.²¹

The *laissez faire* that Adam Smith espoused was a practical choice. If there were free and equal access to resources, free and equal markets for products, and free choice of workers to accept or reject wages offered, then those things would all balance out and everyone would be better off. Well, almost everyone. If one producer of nails made slightly better ones or at a slightly lower cost, then he would sell more and his competitor sell less. That would not benefit the losing competitor or his workers, but, Smith concluded, the losing entrepreneur and his workers would need to find a way to *compete* — to put themselves back into the available market — and that would eventually benefit them and everyone else. Thus it is the combination of *freedom* of access by entrepreneurs to markets of resources and sales and *competition* among them that create economic progress and wealth for all.

All perfectly true. But Smith knew that access to goods and markets was not equally open to all, that technological advances (even in nail making) affected the markets, that greed, gluttony and cheating were possible, that unpaid (or underpaid) workers posed practical and human problems, and that

governments would tax and otherwise interfere.²² He hoped that mercantilist hoarding of money and foreign aggression would give way to open and free trade among nations, and thus produce the anticipated munificence. But he did not foresee the world or the economy of the world as it came to be over 200 years after he wrote, and he did not declare it to be an eternal or self-evident truth that any attempt to manage or manipulate the economy (by any hand other than the unseen one) was inherently a curtailment of freedom.

Furthermore, Adam Smith's analyses of practical economic realities were not swallowed whole by any of his successors. Every one of Say, Ricardo, Mill, Malthus (and other later commentators) had different spins on many of the details of Smith's pronouncements. As a disciplinary class economists have not agreed and still do not agree among themselves. Besides lacking normative stature, as noted above, it does seem that economics is a "dismal science," as Thomas Carlyle called it long ago. Among the dismal aspects is the vituperative form in which their disagreements are often cast.²³

Those of us who are not economists by training or trade have little interest in the fine points of dispute and do not welcome assertions that our very well-being and freedom depend upon one view or its opposite. How free and accessible in fact are the markets that most of us face today? We may find that one grocery chain has lower prices than another, but driving to the cheaper one costs more for gasoline — and how much choice do we have in that price? When we bought the car, did we shop for fuel economy, hauling capacity, road safety — or were we more likely influenced by advertising claims that may or may not have been accurate? And if we shopped for a mortgage, did we get terms that were really suitable for our own personal economic situation or prospects?

Or are those pertinent markets at all? Would an economist insist that the important freedoms lie in the markets in which the grocery chains buy from farm producers, auto manufactures buy from steel producers, or in which mortgage lenders get the best return for securitization of their portfolios? Is the "freedom" in those markets all that counts, regardless of the effects on those of us who are mere consumers? When the investment in securitized mortgages (of dubious and unanalyzed payment risk) brought on the failure of huge investment enterprises, and that triggered a spate of foreclosures that would otherwise not have occurred or come over a longer span of years, are we obliged to shrug it off as an unfortunate consequence of "free markets"?

One cannot read a newspaper today without becoming aware that millions of people around the world, including some in the United States, are lacking food, shelter and medical care. Is that not enough to indicate that *something* is wrong with our economic systems? In the same paper one is likely to find analyses of economic advances in some countries and sectors (even socialist ones) and recessions in others (even free enterprise ones), while the political partisans and their favored economists insist that the differences and discrep-

ancies are due to the adherence to or violation of their particular theories or formulations. There is no alternative (to use a familiar phrase) to declaring that *some* of the asserted “truths” are indeed false.

However the economic system is structured, it cannot fulfill the basic goal (of providing goods and services that are needed and desired for the survival and well-being of individuals in a society) unless it provides the opportunity to all able people to earn or gain enough money to be able to buy such goods and services. For most people that means jobs — with pay rates sufficient to enable purchase of at least a bit more than bare survival necessities. Private enterprise has done just that for hundreds of years, and has time and again demonstrated its ability to do that far better than any governmentally operated enterprise.

But economic enterprise does somehow experience cycles, and the needs and demands for particular job skills do change, and in today’s world the skills and wage rates of workers in one country unavoidably affect those in other countries. When those factors lead to high rates of unemployment, and the resources of the unemployed to tide over wane, then it is time for government to do something about it.

The labeling of any particular governmental intervention in our nation’s economic systems as Keynesian, political, opportunist or even socialist, does not make it invalid or unuseful; it still needs to be considered in light of the need for it and its effects. The economic effects should, I suggest, be evaluated on the utilitarian basis that has largely dominated free-enterprise economics since the days of John Stuart Mill. Depending on the causes and the extent of rising unemployment, governmental action may include monetary and fiscal action to encourage enterprise, subsidizing private industry to stimulate employment, creation of governmental work projects, unemployment compensation or other dole, and job retraining.

Whenever the government becomes so involved in our society’s economic activities and life, there are no doubt possible collateral effects that need to be considered, including the impairment of freedom. There are of course impairments of the broad prerogatives we all enjoy to make choices, and also the possible discouragement of incentives and limitations of innovation. We may also understand the concerns of Friedrich Hayek and others who observed the workings of totalitarianism in the 20th century and do not want to risk even starting down that road, but the conclusion that any governmental intervention in economic affairs is inherently or necessarily a “road to serfdom” is patently false (and is not what Hayek said.) The role of self interest in economic activity is of the highest importance, but the concept that its wholly unfettered pursuit is an essential element of human freedom is, I submit, obviously false.

WELFARE AND GRIDLOCK

The elephant in the parlor is of course the “general welfare.” The meaning of that term is even more abstruse than “common defence,” and consequently leads to much more public debate, particularly with respect to the nature and costs of federal programs aimed at fulfilling the constitutional mandate to “promote the general welfare.” In the 20th and 21st centuries it has appeared that, in accordance with the popular will expressed through Congressional majorities, the term includes fair labor standards, openness to unionization and collective bargaining, some protection from unemployment resulting from economic downturns, the protection of income in retirement (Social Security), provision of health care to the elderly and the poor (Medicare and Medicaid) and, finally, universal access to medical services (Obamacare), properly called the Patient Protection and Affordable Care Act, or PPACA.

Just as with respect to provisions for our common defense, I am not prepared or qualified to evaluate each (or any) of the particular general welfare provisions, and my focus is on the criteria and means by which they are and should be evaluated. We start, as before, with the Presidents and their cabinet officers and staffs who first proposed them. This goes back to the administration of Franklin Roosevelt in the 1930s, and in some respects to earlier administrations and sources.²⁴ Then we come to Congress, and that brings us to the continuing and recurring processes of establishing annual budgets for the federal government. That involves determinations and choices as to both revenues and expenditures. Revenues come from taxes and borrowing, and expenditures have to be determined by the needs of all governmental programs and allocated among them.

There may of course be sound and sensible disagreements as to such allocations and as to the total amount of all expenditures, and consequently as to the amounts to be raised by taxation and borrowing. The expression of such disagreements and the reasons behind them are just what we need and expect from our Congress, along with, ultimately, a resolution of the disagreements and determination of all aspects and elements of the annual budget. As the early proponents of *laissez faire* noted, “the world goes on by itself,” and we — who pay the taxes, benefit from our common defense and our general welfare, enjoy the blessings of liberty — and elect the members of Congress — need to know; we do go on with our lives.

What we need to know are not only the conclusions of each Congressman and the degree of commitment to his party’s precepts, but also the information on which he relied, his analysis thereof, and the bases on which he made choices between countervailing considerations. That is a tall demand, and as noted above, few members of Congress are really up to the task. If our news media report to us that a Congressman consistently votes in lockstep with his party’s platform or caucus, or to support particular campaign donors or in-

dustries in his District, or in keeping with some socio-political or religious precept or slogan, and rarely explains his thinking beyond those levels, then he has failed us. If our elected representatives do not try to elucidate their thoughts, conclusions and determinations to us, if they do not try to educate us about our government and its actions, then how can we say to ourselves that we are participants in a self-governing society?

Granted that freedom from governmental actions that are authoritarian, overbearing, excessive, coercive (or however else one might castigate them) is an important element of our pluralistic society, where and how do we draw the line — without abandoning or imperiling our goals of fulfilling all the aims of our society as expressed in the Constitution? If we cut back our military forces and capabilities, are we at risk of losing our freedom to foreigners? If we allow religious organizations to control matters of marriage and reproductive policy, will those of us who have other views not have lost our freedoms? If we do not fund and support our courts even when we regard their decisions as wrong or harmful, can we still expect justice to prevail in any matters? If we cut back or abandon labor protections, or Social Security, Medicare/Medicaid or Obamacare, are we not losing the benefits of general welfare that have been afforded and valued over so many decades?

Some, perhaps all, of those questions may be overblown, or perhaps even dismissed as rhetorical. Nevertheless, it remains important, I suggest, to think about them. It is most important that we try to answer each of them, and each element therein, analytically. The analyses needs to be based on reliable data, and definitely not on allegations, unsupported assertions, partisan opposition or supposed advantage, or on conclusions based or drawn upon psychological or philosophical precepts that are themselves unfounded in reasoned analysis. In short, we need to be wary of and to reject False Truths. We need to be sure that all of our analyses are based upon sound epistemological principles.

In that light, let us consider the question that has been forced to the top of the agenda in the USA today: If we do not cut back on the massive expenditures involved in all of the governmental activities referred to above, will we go broke? That question boils down to several subsidiary questions, and the answers to them depend on proper analysis, and not upon assumptions that are propounded by some advocates, but are not nearly as self-evident as they suggest.

To start with, there is the question of the US debt, largely held, it is reported, by China. Is the US debt in fact excessive in relation to our GNP, needs, and ability to pay? Is it harmful that so much of it is held by China? Or does that phenomenon perhaps itself serve to deter international conflict? Would not reducing our debt, when we can, enable us to borrow anew (ala Keynes) when rainy days come? Is the time to do that now?

Then, if, and as we begin to pay off and reduce the national debt in part, do we do that by raising revenue or by reducing expenditures, or both? Doing both would seem to be sensible and most likely.

To start with raising revenue, what tax increases would involve the least burden, the least adverse effect? That poses many other questions relating to income taxes on individuals and corporations. Are such things as Laffer curves, no-tax pledges, allegations that increased taxes on high incomes deters economic activity, etc., at all pertinent to the analysis? Should dividends and capital gains be taxed to individuals at all, and if so, at what rates, and are the rates properly dependent on income level, or age of the taxpayer, or holding period of the security? What deductions should be allowed for, say, mortgage interest or charitable gifts, and what effects would changing the existing rules have on the economy at large? And there are myriad other questions — about tax-exempt bonds, farm subsidies, fossil fuel subsidies or so-called tax expenditures, and of course the hidden and partly indeterminate costs, which could potentially be taxed, of what are called “externalities” (or indirect consequences) of economic activities which in effect impose costs on others or on the public at large. Many of those relate directly and demonstrably to billions of dollars of potential revenue.

Every one of the issues needs to be analyzed and debated. Too many years have gone by without their being seriously considered, without Congress having come to grips with the structure and incidence of taxation — that is, with tax policy at large. Among the reasons for that failure are the extreme complexity of the subject, and the unfamiliarity of many Congressmen with the elements of tax policy, or with economics in general. Congress needs to form and consult appropriate groups of knowledgeable people from business, industry, the financial sector in particular, and academia, where most professional economists will be found.

The other route to debt reduction, presumably and preferably paired with increased revenue, is through reduction of expenditures. American industry has for long been very adept and successful at reducing the costs of production of goods and services by often simple and sometimes sophisticated means of efficiency. Time-motion studies, technology, consolidation of overlapping jobs and responsibilities, reduced packaging, less costly transportation and other reductions of energy costs, and various other advances, have saved a lot of money for many businesses, large and small. To anyone who has observed a governmental agency or a military unit at work (as I have), it seems obvious that efficiencies of those kinds are much needed and not terribly difficult of achievement. Every governmental agency, including the military, should be working on that sort of thing every day. From Cabinet offices on down there should be mandates of achievement in those respects. And Congress in exercise of its funding and oversight roles should see to it that efficiency is achieved and waste of public funds is eliminated.

Yet efficiencies are probably not enough; some costs just need to be cut. What costs? The first target that occurs to most people is the military. That is so because the last thing most of us want is to see our country face another war. Yet the United States expenditures for military and veterans affairs have grown from around \$300 billion in 2001 to well over \$600 billion today. Those figures do not even include the direct costs of our participation in wars in Iraq and Afghanistan, nor the costs of nuclear weapons. In the same era China has prospered and now accounts for over 8% of the worldwide expenditures for military purposes, but the US still accounts for some 41% of the world total. The analysts show Russia at 4.1% and the whole Middle East (including nations we regard and friendly and unfriendly) at a total of about 7%.

As many commentators have observed, military threats to the United States of the kind we faced in WW II and before are now quite unlikely, and the actual threats to our nation and people arise from what are called terrorist actions. They remain real, but it is far from clear that our huge military expenditures have any actual or direct relation to our protection from terrorist attacks. Of course it is hard to deny that our extensive military presence around the world and obvious dominance of power does not have a significant deterrent effect on putative or would-be aggressors.

The figures show that (at a 2011 level) the military, veteran and related costs account for about 39% of the federal budget, and that “welfare” costs of various kinds account for nearly the same percentage. Imagine that military, etc., costs could be cut by just, say, 5%; that would free up some \$30 billion that could then be applied to debt reduction! Of course excluding \$30 billion from the military budget would have an effect on the US economy: fewer jobs on military contracts, and perhaps former soldiers looking for work. If we pare our economy that way, we surely need to bolster it somehow else, very likely by increased governmental activity in areas that fall under the “welfare” rubric. Generally, expenditures in the “welfare” area do not seem to have as direct a positive effect on the economy. But maybe they could: rebuilding of “infrastructure,” i.e., roads, bridges, power distribution systems, school buildings, etc., would stimulate the construction industry and provide a lot of new jobs. Alternatively, further domestic development of energy supplies might reemploy many of the former military workers. And to the extent that energy development included fossil fuel sources, such as fracking of natural gas, many more workers could be employed in furthering environmentally protective procedures or controls. All of those wage-earners would be consumers, further driving economic activity. Even half of a \$30 billion cut in military expenditures, that is, \$15 billion, could go a long way down the new-job path, with the other \$15 billion going to debt reduction.

Yet there is a palpable concern among many in the Congress — and evidently among some in the electorate, Republicans in particular, that bud-

get cuts and new tax revenues would not be applied to debt reduction, but would only spur new welfare spending. That is the origin of the “starve the beast” approach that was initiated in the Reagan administration, continued under George W. Bush, and is evidently still alive as I write in 2013. The aim was to cut taxes and reduce revenues to the point at which existing welfare spending would result in a deficit, and thus induce reductions in welfare spending. However, even conservative economists adduced statistical data showing that it didn’t and wouldn’t work that way.

There is still a problem that Congress must sooner or later face and try to resolve: Social Security and Medicare/Medicaid are strongly supported by a substantial majority of the American people, but demographic change, to wit, an aging population, is leading to higher payouts and lower worker contributions that will eventually cause the programs to run out of funds. The possible solutions are either to cut payouts or to inject more funding, either by higher taxes or by reducing other governmental costs, principally military costs, as discussed above. If the national debt were paid down, a reduction in interest cost would help.

That is precisely the kind of problem that we should expect our Congress to come to grips with, and to find some satisfactory set of solutions. But will it? As suggested above, balancing and compromise are usually not solutions to issues of that kind. When there are partisan commitments to opposite views, they cannot be compromised, but only traded off for something else that can be offered to the other side. I do not have in mind, nor is it my aim to propose any such trades, but I did suggest above that there might be some solutions to the dilemma of partisan gridlock.

The approach I would suggest lies first of all in procedural reforms. Congress should be allowed to vote on proposals. The Speaker of the House should not have power to withhold proposals from debate on the floor of the House and ultimate vote thereon. A simple majority should suffice to bring a matter to the floor. The Senate should not permit the “silent filibuster” by which 41 Senators can bar debate or vote on any matter simply by declaration of intent to filibuster without having to speak at all. Again, a simple majority should suffice to bring a matter to the floor, and once it has been debated for some specified reasonable amount of time, the vote for cloture should be reduced from 60 to, say 55 or less.

If those reforms were adopted, there might well still be proposals that could not achieve majority vote, and thus still unresolved issues of great importance. But then the public would know what proposals had been voted on and which members of the House and Senate had voted for and against them, and the reasons they had given in debate. Without such reforms we, the public at large, will remain where we are now — in the dark, unenlightened on the specifics of anyone’s proposed solutions, and presented only with partisan press releases asserting sloganized positions and shibboleths, and

analyses of journalists and pundits, most of whom would also be decried as partisan by those who disagreed with them. Openness and exposure to the public of all of the details of governmental proposals and actions is, I suggest, close to the heart of what we may fairly call democracy.

Another suggestion, frequently made and as obviously important to democracy as openness, is that we should get money out of politics as much as possible. It would be much better if all campaigns for legislative office, particularly biennial runs for the House, were publicly funded, and that other fund raising was barred. Unless and until that is accomplished our elected officials will continue to be money grubbers. Even the millionaires in Congress feel obliged to conduct fund-raisers. Election campaigns are expensive — considering the costs of postage, travel, television spots, internet access, etc. — and the need of each Congressman to reach over a half-million voters and each Senator many more. In face of those costs and two-year terms, every Congressman is obliged to spend far too much of his time and efforts on fund raising and not on meeting the needs of legislation. Also, alas, many Congressmen then feel a duty, even if not binding, to give the views of his financial supporters a fair shake, if not preference, even over his constituents who did not fund, or even opposed, his candidacy. Is that any way to conduct a democracy? No, certainly and obviously not.

We could wholly bar private contributions to any and all campaigns for office, and provide public funding of the necessary costs. There are of course difficulties in any such approach. We might need to specify and limit the amounts of mailing, the TV access, and other costly items. We would have to fund challengers as well as incumbents. And it is undeniable that some limitations of public expression would be involved. Does that mean that any and all efforts to exclude or limit private funding of election campaigns is doomed because it would violate the First Amendment? No, I don't think so. I think the decision of the Supreme Court in the *Citizens United* case was very unfortunate, but it is not the end of the road. While there are proposals and ongoing efforts to get that decision reversed by constitutional amendment, the door may still be open to reinterpretation by the Court itself.

In any event, the essence of the democratic concept is that the will of the majority should prevail. The concerns (of Plato, Aristotle, and many philosophers of later years) about asserting that proposition as an absolute remain fully valid. The response has always been that the will of the majority should not ever or to any extent be allowed to infringe or limit the rights of the minority. The problem, the issue, even in majoritarian dictatorial societies, has always been in defining the rights of the minority. That is a difficult task, and that is why an empowered and independent judiciary, composed of jurists whose personal integrity and separation from majoritarian bias, as well as intellectual and analytical capability, is always essential to human liberty.

The question then is whether the First Amendment imposes a right of the minority, or of each person who might be deemed to be a member of a minority, to expend and apply the assets and powers available to that person to express himself on any subject, by any means, and in any forum that person wishes. Anyone who has studied the history of First Amendment jurisprudence knows that that is not true. The Court has recognized limitations, and some limitations on campaign spending, properly devised by Congress, may yet prevail.

NOTES

1. That is hardly a new idea; it is known as Say's Law, enunciated in a somewhat different form, by Jean-Baptiste Say in 1803. Of course production or supply does not always produce demand, and the monetary and fiscal complications have long been and are still debated by economists.

2. Hume's *A Treatise of Human Nature* appeared in 1740. Adam Smith and he worked together in Edinburgh, and Smith wrote *The Theory of Moral Sentiments* in 1759. See below as to Francois Quesnay.

3. Their notable works include: David Ricardo, *Principles of Political Economy and Taxation*, 1817; John Stuart Mill contributed to the work of his father, James Mill, *Elements of Political Economy*, 1821, and himself wrote *The Principles of Political Economy*, 1848, *On Liberty*, 1859, and *Utilitarianism*, 1862; Jean-Baptiste Say, *Traité d'économie politique*, 1803, (translated in 1871 as *Treatise on Political Economy*); Thomas Malthus, *An Essay on the Principle of Population*, 1st ed. 1798, 6th ed. 1826, *Inquiry into the Nature and Progress of Rent*, 1815.

4. The Economic Table (*Tableau économique*) published in 1758 by Quesnay was, though abstract and obscure, regarded as the first try at explaining economics analytically. His group, known as Physiocrats, regarded productive labor as the source of wealth and emphasized the importance of land to production. They also supported the motivation of self-interest, the protection of property rights, and the minimization of governmental interference.

5. *Das Kapital*, called Capital in English, consists of Volume I, published by Marx in 1867, and Volumes II and III, completed by Engels from Marx's notes and published in 1885 and 1894.

6. Herbert Spencer, *Social Statics: or, The Conditions Essential to Human Happiness Specified, and the First of Them Developed* (1851).

7. *Lochner v. New York*, 198 US 45 (1905).

8. *West Coast Hotel Co. v. Parrish*, 300 U.S. 379 (1937).

9. *National Labor Relations Board v. Jones & Laughlin Steel Corporation*, 301 US 1 (1937), upholding the Wagner Act, and *United States v. Darby*, 312 US 100 (1941), upholding the Fair Labor Standards Act.

10. The Liberty Fund is a private organization, based in Indianapolis, with the stated aim "to encourage the study of the ideal of a society of free and responsible individuals." The works are available through oll.libertyfund.org.

11. *The Road to Serfdom*, Routledge Press (UK), Univ. of Chicago Press (US) 1944; *The Use of Knowledge in Society*, *The American Economic Review*, Sept. 1945. Incidentally, Hayek sparsely (if at all) cites Spencer or Graham, and refers to Auguste Comte as "that nineteenth century totalitarian"! The sources that Hayek cites in his books are heavily German, with an admixture of British, French and American sources, and of course Austrian, particularly Ludwig von Mises, Hayek's mentor. Of further note is that John Maynard Keynes wrote to Hayek promptly after publication of *The Road to Serfdom*, praising the book, which greatly pleased Hayek. In 1931 Hayek had written a critical review of Keynes new book, *A Treatise on Money*, and Keynes had objected.

12. *The Constitution of Liberty*, Univ. of Chicago Press, 1960; now available in “The Definitive Edition,” edited by Ronald Hamowy, University of Chicago Press, 2011.2.

13. Schmidt, David, “Friedrich Hayek,” *The Stanford Encyclopedia of Philosophy* (Fall 2012 Edition), Edward N. Zalta (ed.), <http://plato.stanford.edu/archives/fall2012/entries/friedrich-hayek/>.

14. The differences in viewpoint are made very clear in their respective acceptance speeches, available at http://www.nobelprize.org/nobel_prizes/economics/laureates/1974/hayek_speech.html, and http://www.nobelprize.org/nobel_prizes/economics/laureates/1974/myrdal-lecture.html.

15. John Maynard Keynes, *The Means to Prosperity*, Macmillan, London, 1933.

16. John Maynard Keynes, *The General Theory of Employment, Interest and Money*, Palgrave Macmillan (uk), 1936.

17. *Schechter Poultry Corp. v. United States*, 295 US 495 (1935).

18. Glass-Steagall is the popular name of the Banking Act of 1933 (Pub.L 73-66). Its many provisions regulating the banking industry and separating banking from the investment industry were eroded and “loopholed” over the decades by new and ingenious banking, investment and legal techniques, impaired and weakened by foreign competition, and it was finally repealed (in most respects) in 1999.

19. Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub.L 111-203 (2010).

20. He boasted of his devotion to and distribution of copies of “*Atlas Shrugged*” by Ayn Rand, Random House, 1957.

21. I refer to the section in Chapter Seven on Neutoscience — New Understandings, and particularly to the discussion of *Self Comes to Mind* by Antonio Damasio.

22. Smith wrote that: “The necessities of life occasion the great expense of the poor. They find it difficult to get food, and the greater part of their little revenue is spent in getting it. The luxuries and vanities of life occasion the principal expense of the rich, and a magnificent house embellishes and sets off to the best advantage all the other luxuries and vanities which they possess. A tax upon house-rents, therefore, would in general fall heaviest upon the rich; and in this sort of inequality there would not, perhaps, be anything very unreasonable. It is not very unreasonable that the rich should contribute to the public expense, not only in proportion to their revenue, but something more than in that proportion.”

23. An example is the *The Failure of the “New Economics” An Analysis of the Keynesian Fallacies*, Henry Hazlitt, D. Van Nostrand Company, 1959. The tenor is nasty, often snide and petty, and in my opinion quite unpersuasive. That is not to say that some of the criticisms of Keynes views are not warranted, but the book is mostly spin. Other examples, reported by Hayek’s editors, are vituperative criticisms of *The Road to Serfdom*.

24. The eras of Theodore Roosevelt and Woodrow Wilson brought anti-trust laws and perhaps other advances of the type that may be considered to be in the area of “welfare,” and are surely castigated by opponents as interference with economic liberty. In his 1941 State of the Union address FDR introduced the Four Freedoms, including “freedom from want.” The San Min Chu-i, or “three principles of the people,” derived by SunYatSen (founder of the Chinese republic in 1912) from American and European sources, include “welfare” or Minsheng. I note that Hayek favorably quotes a commentator who referred to Roosevelt’s “freedom from want” as a “noble pun.” I also note that SunYatSen was reported to have said that the SanMinChu-i was a “friend to Marxism,” or something of the sort.

Chapter Eleven

Conclusions

The very title of this book may seem to most of you to be a contradiction. If something is true, how can it be false? Well, if you have come this far with me, you know that my point is that many things that are thought to be true are not true — or at least are probably not true, or may not be true, or are no more than partly true, or tentatively true. It is necessary to append all those hedges for several reasons.

The first and basic reason is that I doubt that “truth” exists. But again I must hedge; I surely do not wish to suggest that there are no such things as honesty, genuineness, sincerity, legitimacy, trustworthiness, faithfulness, constancy — or other fine and beneficent qualities that one may find in a thesaurus as defining “truth.” What I doubt is that any of those things — or truth — comes in a form that is absolute, unequivocal, beyond doubt, or beyond question.

The second reason is that most, practically all, of the asserted truths that I denigrate or reject as false were propounded by authorities, and my second point, which the subcaption of this book makes clear, is that I think it is an error to rely on authority. Once more, I must hedge. On the contrary, we must of course look to persons with authoritative standing to guide our learning and thinking; it would make no sense to rely on sources devoid of any such status. What I assert to be an error is the acceptance of the pronouncements or the conclusions of authorities, no matter how erudite and respected they may be, as absolutes, beyond doubt or question.

The third reason for hedging about my assertions of “truths” that I doubt or reject as false is that I am *not* an authority. I do not ask you to accept *my* doubts or *my* rejections. I ask only that you join me in analyzing the sources of the asserted truths and considering with me whether it is appropriate in our

minds or in our conduct to regard them or act on them as if they were absolutes, beyond doubt or question.

Another reason for hedging is that I also ask you to consider with me the basis and the manner in which we — any human being — arrives at what he deems to be a truth. That is to say, I wish to propose a basic epistemological question, but of course I am not an authority on that subject either. You may have already noted my preference for a “brain-centered” approach, which seems to me to give validity to a materialistic approach to understanding, but still I will respect a contrary view if it is explained to me in a manner I can understand and goes beyond the contentions that I have in this book already identified as being in my opinion lacking in reason or false.

And finally, I suppose that further hedges may be occasioned by my expressed disdain for the pretensions of modern physical sciences coupled with the greatest uncertainties about “reality” since the ancient Greeks first broached the subject. Also, I know that when I allowed my comments on society, government and economics to venture into the 21st century, I was on risky ground.

Following that apologia I must now face the simple fact that the “truths” that I have labeled as “false” include a number of beliefs that are dear, or even sacred, to many of you. Those range from the concept of God as a being with a will to the concept that governmental support of welfare impairs individual liberty. On the other hand there are surely very few of you who care much about whether an electron does or does not have a physical location.

My fervent hope is that all of you, whatever the mix of your views and interests may be, will accept my repeated protestations that my aim in writing this book was not to offend any of you, but rather to induce openness to all views and to encourage whatever level of accord may be possible. As I announced in the Preface, I do have opinions of my own and do not pretend to present “balanced” views, but I remain firmly convinced that humanity is not forever doomed to strife and that accord can be achieved.

As I have suggested at several points in the book, I think that the key to achieving accord in human society is the sharing of information, bringing a sharing of knowledge, leading to a broader understanding, first of diverse views and then of the elements that are common to us all and may bring us together. The routes to such sharing include interchange among national and international governments, among scientists, NGOs of all kinds and individuals across national borders, the wide and open distribution of news and commentary, the further and much extended ecumenical efforts of religious communities of all sorts, and finally the great expansion of education throughout the world.

When I speak of education, I do not mean, and I reject, indoctrination. The purpose is not to proliferate expertise, to train more chemists, physicists,

engineers, lawyers, businessmen, stock traders, or any other specially skilled persons, and certainly not to proliferate any particular doctrine or ideology. The purpose is to disseminate the awareness of the grand diversity of the knowledge and the viewpoints available to humanity, and to help each child to bring out (*e ducere*) his own ability to understand and to evaluate for himself the choices available to him and the role in society he wishes to follow.

We are surely a long way from that goal, but our society, all societies around the world, are works in process, and we may someday get there. In every large and complex society there are going to be some people who are reasonably satisfied with the way things are and who therefore support the “status quo” and oppose change as at least “ill advised,” and possibly “radical.” On the other hand there are those who are very dissatisfied with their lot and thus demand “fundamental” changes, even if they are in fact “radical.” However, most of us just think that society could stand some improvements, but we know that changes are hard to effect and we can’t expect too much. Therefore, what we want are reasonable steps, taken carefully and prudently, towards societal improvements.

With respect to the kinds of dissemination of information and education I spoke of above, we in the United States enjoy a very strong support of the First Amendment, although as noted in earlier Chapters, some find error in the relation of money to political speech, and some find error in limitation of Christian expression in public places and there are still efforts to inject religious views into science curricula. There is little indication that religious organizations or leaders are seeking to broaden their adherents’ understanding of different religions. Furthermore, our public education system seems to be seriously underfunded and to be falling behind other nations in performance.

Notwithstanding all that, I see the opening of doors to new understandings. Many churchgoers today are far from prepared to accept that *their* beliefs are necessarily the same as or are controlled by the pronouncements of church leaders. They take the Bible to be a guide, a story, perhaps an inspiration, but they do not accept it as infallible gospel. They have their own ideas, which come in great variety, and are sometimes quite contrary to the doctrines of their Church as such, or even to the historic or current theological conception of God.

It is fair to say that generally the Churches not only recognize that phenomenon, but often and in many ways encourage it. From an organizational standpoint, it is certainly better to keep lukewarm members aboard than to insist on doctrinal purity and thereby reject or antagonize many members of the core constituency. And to be sure, there are now many Church leaders, as well as parish ministers and priests, who are themselves prepared to accept modifications of old ideas and doctrines. An Earth centered universe and the

special creation of biologic species are no longer required doctrines of any religious organization (other than minor kooky ones), and the door *is* open to a variety of moral and ethical principles.

While it is wholly proper for us to identify the achievements and shortfalls in our own society and to strive for improvements, we may still take pride when we compare our achievements with others. China, for instance, has prospered and may be admired for devoting increased resources to public education, but it clearly has a long way to go towards freedom of speech and religion. And while we may applaud the democratic election of a new government in Egypt, there remain concerns that its policies may be bound by ideological commitments that are not supportive of a secular, democratic society. When it comes to religion as such, very few Chinese would, I suppose, find it to their advantage to have the government eliminate controls on the free expression of religion, but in Egypt it seems that a large majority wishes to protect Islam, but has no great incentive to protect religions, or free thought, in general.

We cannot expect those nations to follow the pattern of the United States. They, like all nations have histories of their own and are composed of complex societies, as is our own country. Nevertheless, they are bound up in and by some of the same issues. China's curtailment of, or openness to, freedom of expression cannot escape having a relationship to its international trade, its participation in the scientific communities of the world, and its voice and role in the maintenance of a balance of authority and power in the world. Egypt is unmistakably at a crossroads — at the edge of Africa with the Middle East at its doorway and the great water link between Europe and Asia at its heart — and its people cannot thrive and prosper unless they do achieve some proper accommodations with the diverse cultures of the world. Much the same is true as to all other countries, including ours.

In keeping with the goals of sharing knowledge and understanding around the world and thereby bringing people together in peace, I suggest that the role of the American people and our government should not be to criticize the shortfalls of others or their failure to emulate our patterns, but rather to do our best to help them seek and find in their own ways the solutions that will ultimately bring their societies into a world of free exchange of information, knowledge and diverse concepts and understandings of truth and freedom.

Both on the World stage and here at home I would suggest that progress depends upon the participation of many players and the adherence to certain rules of the game. To epitomize them on the domestic front, I would say that: In some respects Congress must act, and of course it is essential that its members avoid parochialism and partisanship, and base their determinations on broader views of the well-being of the people and the nation. In some respects it remains the courts that must stay the course and continue to uphold the principles of the Bill of Rights. In many respects it is non-govern-

mental organizations, including religious organizations, that will be at the forefront of bringing about beneficial advances in our society. And in all cases the people at large must be involved: as voters who know and understand our history and our constitutional principles; as members of a church, synagogue, temple or mosque, or of a secular society, who recognize the equivalence of the rights of those of all other faiths or philosophical viewpoints; and as citizens who accept the principles that all human beings should be afforded equal rights to life, liberty, and to that highly cherished, if ephemeral, goal: the pursuit of happiness.

The issue before America today is the viability of Congress in the face of ideological gridlock. The subject is discussed in Chapter 10, and I would here suggest another possible reform: the establishment of a sort of publicly funded "College of the Congress." I have in mind an assembly of thinkers and teachers who are knowledgeable on various subjects that come before Congress, and were always available to members of the House and Senate for consultation and advice. I hesitate to call them "scholars" or "pedagogues," because those terms have connotations of elitism, and that is not the goal, but rather to have available to our legislators information and advice from persons who have made a career of studying and analyzing governmental issues. A College of the Congress of that kind would make information available to the members from people working for *them*, and not just from lobbyists working for others, who, I hope might then be excluded.

After all, many of our legislators have not studied or been trained in government or governance as a discipline, and many are new to the very workings of the Congress, and take some years of "learning on the job." That may be especially true of members of the House who have to run for office every two years. I am certainly not suggesting that our legislature should be subject to or dominated by an educated elite, nor composed of any kind of elite, whether educated, plutocratic or merely lawyerly. On the contrary, I hope and expect that our legislators will always be — in Lincoln's terms — "of the people" and "for the people." Such a group will, I suppose, very likely include some with considerable formal education, some who, like Lincoln, were largely self-educated, and some with little education other than, perhaps, in the rough and tumble of our cities, factories and farms. All such modes of education are important and valid, and all could benefit from the availability of such a College of the Congress, if its authority were limited to the provision of information, analysis thereof, and the requirement of clear presentation of conflicting views.

Now as to whether the one universe or multi-universe theorists are correct, or the realists or probabilists as to quanta are correct — will you please let me know. I want to know and to understand, but of course I do not.

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