Infinity and the Proofs for the Existence of God

Infinity and the Proofs for the Existence of God

Glenn F. Chesnut

Table of Contents

Part I. Introduction

1. Is There a Necessarily Existing Ground of Being? Is it a Personal God? 3
2. Present-day Science on the Origins of the Universe 11

Part II. Infinity, Pseudo-Infinities, and Fallacies

3. Aristotle on Infinity: Processes Which Could Never Successfully End 33
4. Different Kinds of Infinities 47
5. The Positive Uses of Infinite Series in Modern Mathematics 57
6. The Illusions Created by a Pseudo-Infinite Regress 65
7. The Epicurean Fallacy: Infinite Chance vs. Organized Structure 76

Part III. Anselm's Argument

8. Anselm: the Ontological Proof 95

Part IV. Thomas Aquinas's Five Proofs

First Argument: from Motion

9. Aquinas on Motion, Change, and Alteration 111
10. The First Proof Revised: the Argument from Thermodynamics 122
11. Perpetual Motion Machines, Love and Energy 138

Second Argument: from Efficient Causality

12. Efficient Causality and the Primal Limiting Law of Thermodynamics 159
13. More on how Chains of Events Begin 166
14. Using Empirical Evidence to Free Ourselves from the Fallacies 181

Third Argument: from Contingency

15. Contingency vs. Necessity 187
16. The Third Proof Revised: Necessity and Contingencies 192

FOURTH ARGUMENT: GRADATIONS IN TRUTH AND VALUE

17. Augustine on God as Truth Itself 211
18. Aquinas' Fourth Proof: from Gradations in Truth and Value 234
19. Science and Moral Values: How to Avoid Becoming Psychopaths 241

FIFTH ARGUMENT: FROM DESIGN

20. Aquinas' Two Versions of the Fifth Proof 263
21. The Eighteenth-Century Version: Watchmaker and Architect 272
22. The Appearance of Intelligent Life as Universal Goal 289

Part V. Concluding Thoughts

23. Coming to Know God through Direct Experience 305
24. The Spiritual Dimension of Thomas Aquinas' Life and Works 324

Notes 333
Bibliography 343

Part I

Introduction

CHAPTER 1

Is There a Necessarily Existing Ground of Being? Is It a Personal God?

Modern atheism: reductive naturalism gone wild

In the eighteenth century, modern science began to come into its own: the motions of the planets could be explained with total mathematical precision, the true elements out of which matter was composed had begun to be identified (carbon, oxygen, hydrogen, nitrogen and the rest), the steam engine had been developed, and the first human beings had flown through the air suspended from balloons. By the end of that century, there were those who believed that science was all that the human race needed. The position they upheld was what is called a reductive naturalism: the belief that the physical universe itself, and its natural laws, was a completely self-sufficient explanation of its own existence and being. "Science can explain everything" (or "science will eventually be able to explain everything") became their motto. With the zeal of savages on a jungle island joining a primitive cargo cult, they believed that the magic of science would shortly bring about paradise on earth.

In 1793, when Robespierre and the Committee of Public Safety had taken over the French revolution, this ruling body publicly announced the abolition of the worship of God; by law, everyone in France now had to participate in a new, national, atheistic religion

called the Cult of Reason. Now this fantastic scheme did not last even a full year, and Robespierre himself was sent to one of his own guillotines in the summer of 1794, but the shadow of this revolt against God continued to cast its gloom across the years that followed. By the next century, the flamboyant philosopher Nietzsche had proclaimed, "God is dead," and there are many in the world today who believe that he was right. Belief in God now seems to many to be a relic of an ignorant and superstitious past, kept alive by power-hungry priests to terrorize the more foolish peasants into submission to their desires—or at most, an irrelevancy, something which can neither help us nor harm us in our attempts to build better lives for ourselves and solve our daily human problems here on earth.

The higher power: the transcendent ground of being

But the problem is that the natural universe (with its physical objects and natural laws) cannot ultimately be made good sense of unless it is grounded in something greater than and external to itself: this transcendent ground of being must in fact be capable of breaking some at least of the fundamental laws of nature as we otherwise observe them. In other words, this higher power or transcendent ground must be "super"-natural in the original meaning of that word. Talk of the supernatural nowadays is apt to conjure up images of ghosts clanking chains in haunted houses; witches flying through the night sky on brooms; goblins, gremlins, leprechauns with little green hats, and fairies with their gossamer wings peeking out of the bushes; vampires with their fangs dripping blood; and all the other popular mythology of an American Halloween costume party. But these superstitions are only a degraded notion of the supernatural; the higher power which we are

talking about here is above and beyond the natural order in a far greater sense.

Jews, Christians, and Muslims simply call this higher power God. The ancient pagan Stoic philosophers called him Jupiter or Zeus, and the Neo-Platonic philosophers of the late ancient and medieval world spoke of this supreme reality as the One. Hindu Vedanta authors refer to this transcendent ground as Brahman. In some forms of Buddhism, it can be spoken of as the dharma body of the Buddha.

Is this higher power a personal being? In various religions of the world, we can see it characterized as everything from a warmly personal and deeply loving figure called God the Father, to a totally impersonal abyss beyond all human conceptualization. Even in the Christian tradition, the ancient theologian who wrote under the name of St. Denis (Dionysius the Areopagite) spoke of this higher power only as a superessential reality beyond the realm of being itself, and (in my own century) Paul Tillich wrote about "the God above the God of theism," who can appear only when our naive faith in any traditional kind of personal God collapses, and we are confronted with the bottomless existential abyss which swallows up being into non-being (even though it gives birth to new being in return).[1] In the fourth century A.D., St. Gregory of Nyssa affirmed God's personhood at the theoretical level, but described the spiritual vision of God in terms not all that different from St. Denis or Paul Tillich: We felt ourselves overwhelmed with vertigo, staring over the edge of a cliff as it were, into what seemed at first glance to be an abyss of total emptiness and nothingness which extended downwards forever—or what seemed like nothingness until the little flashes began to appear in our minds of new insight, novel discoveries, and flowing streams of courage and calm which had not existed before.

Thomas Aquinas and Aristotle, Augustine, Anselm, and the Deists

The five traditional proofs for the existence of God were first systematized as a group by the thirteenth century philosopher and theologian Thomas Aquinas (1225–1274) in two of his writings. The earlier work, the *Summa contra Gentiles*, was written c. 1259-1265, and the second work, the *Summa Theologiae* (also called the *Summa Theologica*), was written in 1265–1274.

At that time, for a thousand years Christian philosophers had been building their systems on the work of the ancient Greek philosopher Plato (born in 428/427 or 424/423 B.C.–died in 348/347 B.C.). But now in the twelfth and thirteenth centuries, Western European philosophers rediscovered the writings of an ancient Greek philosopher of the generation after Plato: an author named Aristotle (384–322 B.C.). Aquinas saw his task as one of taking traditional Christian philosophy and reformulating it in these new Aristotelian philosophical terms.

So in this book we will be building primarily on the thought of **THOMAS AQUINAS** and of **ARISTOTLE** (especially the latter's quite brilliant analysis of the concept of infinity).

But we will also look briefly at **Augustine** (354–430), one of the two or three most influential Christian philosophers of the early Christian period, and discuss his concept of God as Truth Itself. And we will move from that to looking at the medieval theologian **Anselm** (c. 1033–1109) who attempted to turn Augustine's ideas into what is called the ontological argument for the existence of God. Some regard Anselm's argument as a sixth workable proof for the existence of God. And we will also have a short section where we look at the eighteenth-century **Deists**, who produced a

version of Aquinas' argument from design which portrayed God as the Divine Watchmaker or the Great Architect.

What do the proofs for the existence of God actually prove?

Some of these proofs were designed to show no more than that some transcendent ground had to exist: this higher power could be a personal God, but it could equally well be only some kind of impersonal absolute, for either kind of higher power would satisfy the terms of the proof. Others of the proofs showed that this higher power must have had some intellectual quality to it, and must have had something to do with universal goals and purposes. But even this was a far cry from a warmly personal God who loved *me*. And many Hindu and Buddhist thinkers (we must remember) would reject these latter proofs (with their personalistic leaning) as being unconvincing, or as leading us astray from true salvation.

And yet, one of the basic principles that ran throughout Thomas Aquinas' work was his central belief that "grace does not destroy nature but perfects it." The proofs for the existence of God were no more than dry bones taken in and of themselves, but engaging in a host of spiritual practices (ranging from meditation, to joining a serious self-help group, to working at a soup kitchen for the destitute) could put flesh on those dry bones, and put a warm and beating heart in its breast, and make those dry bones live. The proofs could form the valid underlying intellectual framework for a true and living spiritual life.

Nevertheless, Thomas Aquinas tried to make it very clear: the proofs for the existence of some kind of higher power did not, in and of themselves, demonstrate that one kind of Christianity was right and another kind of Christianity was wrong, or that Jewish belief was more correct than Islamic belief (or vice versa), or that

some of the Native Americans who spoke of a Great Spirit were more or less right than any of the above.

Aquinas himself was a believing Roman Catholic of course, but as he put it, there were two different kinds of religious claims. What he regarded as the fact of the existence of a higher power was a matter of "natural knowledge." All the additional beliefs about this higher power which made up the Christian faith as he understood it, were largely a matter of "revealed knowledge" (that is, could be read out of the bible and the traditions of the church, but could not be proven philosophically).

Translating medieval ideas into modern

In the European middle ages, what was then modern science taught some truly peculiar ideas. It was believed that the planets were pushed through the sky by angels, that doves were birds of peace because they had no gall bladders, that alchemists had discovered what they called the philosopher's stone which would convert lead into gold, and that weasels had sexual intercourse through their ears.

In the central portion of this book, I will therefore start out by giving each of Thomas Aquinas' five proofs for the existence of God in their original form, but then I will attempt to "translate" them (if that is the appropriate word) into the language of present-day science. The reason this can be done, is because Aquinas' proofs were at heart statements of fundamental principles about the world and reality, which are as true today as they were then. Sometimes it is simply the examples which need to be changed, or the supporting data. Sometimes a key piece of terminology has changed meaning over the past seven centuries: what Aquinas called motion, for example (Aristotle's concept of *kinêsis*) would

better be described today as the concept of pure energy itself. But I have attempted to retain the underlying principles of all his arguments unchanged.

One thing I have stressed very strongly in this book, because it is at the heart of the various understandings and misunderstandings of Aquinas' arguments, is the concept of infinity. That is where the title of this book came from: *Infinity and the Proofs for the Existence of God*. Throughout the five proofs, Aquinas attempted to distinguish between (1) concepts of infinity that are meaningless, misleading, or futile, and (2) understandings of the infinite which are valid and useful. He showed that the idea of a physical universe which, totally on its own (without any God or higher power), has always existed from infinite times past, is totally unworkable. But the concept of a transcendent ground (lying beyond and behind that universe) which has always existed and could not ever NOT exist is a kind of infinite reality which *must* exist (strange as it must be) to account for the universe which we can directly observe through our five senses.

The higher teaching of the five proofs

If we accept all five of the traditional kinds of proof for the existence of God, we also discover that they do teach us more about God than simply that he exists. They show us that God has literally infinite power, so that we could put no limits (in principle) on what he could do for us. He is not some distant thing "out there" someplace, but can and does initiate chains of events within this physical universe: to create and sustain his creatures in continued existence, and (people of faith believe) to act upon us with grace and transform our lives in ways which far surpass our own natural powers. God has always existed, from infinite times past, and from

before even time itself, and no contingent combination of earthly or natural forces could ever threaten his existence. God is the one reality which we can genuinely always count on to BE THERE.

In this higher power lie all the criteria for the kinds of truth which scientists pursue; and we also find there the ultimate truth of our own human existence. Real truth—the important truths at any rate—are not relative or subjective, but based in something absolute and external to ourselves. Real science makes true progress when it learns more about those truths which structure the entire universe, and the living of the genuine spiritual life moves forward only when we honestly and open-mindedly confront a number of important general truths about human life itself. For it has always been the case that, in spite of the multitude of human customs and conventions in different societies and different periods of history, there are nevertheless some things which are truly good and some things which are truly evil, and this higher power supplies the criterion of this distinction.

Finally, the visible universe which arose out of this transcendent ground was designed to produce stars, and planets, and ultimately intelligent life, and the best modern science tells us that this was inevitable and built into the workings of the universe from its very beginnings. This universe is "intelligence friendly"—that is, being able to think enables us to live in it better, and we can carry on the search for answers to our questions, with the faith that worthwhile answers can be found.

The cynics and the skeptics are simply wrong: there are answers worth finding, and some decisions where real moral issues are at stake. All is not empty and meaningless, and what you and I actually do in our lives *does* matter. This is what we are taught by the five proofs for the existence of God.

CHAPTER 2

Present-day Science on the Origins of the Universe

I was born in 1939. Our major present-day detailed theories about the origins of our universe were twentieth-century ideas which developed essentially during my own lifetime (or appeared no more than twenty years or so before I was born). We now have a depth and range of knowledge about how the universe was formed which is far beyond that of any previous century. This shift has been so vast and sweeping, that eighteenth and nineteenth-century arguments about the existence of God, or even those of the very first part of the twentieth century, seem often to be totally irrelevant and out of date today. This is one of the important reasons why Thomas Aquinas' proofs for the existence of God need to be reformulated here at the end of the twentieth century. In fact it was comparatively easy during the eighteenth and nineteenth century, and even when I was in my teen years and early twenties, for an intelligent person to come to the conclusion that modern science could totally account for the existence of our universe without having to include any "odd" or "strange" factors that might point to the necessary existence of some higher power or transcendent ground beyond the physical universe itself.

Now that science itself has learned more, Aquinas' proofs (reformulated in contemporary language) can be seen to accurately

pinpoint the fundamental issues that must be explored to see why a God or higher power or transcendent ground of some sort is an absolutely necessary hypothesis in order to make any sense of all the other things we have learned. At the very least, it now seems necessary that our universe be grounded in something external to itself which is eternal and necessary—something which does not follow some of the major scientific laws and principles (such as the laws of thermodynamics) which otherwise govern natural events within the physical universe.

The age of the planet earth

In the seventeenth century, Archbishop James Ussher (1581–1656) rather unwisely attempted to work out the date of the creation of the earth from the chronology of the book of Genesis in the Old Testament, and determined that the earth had been created in 4004 B.C. (at 6 p.m. on October 22nd, to be precise).

When I say this attempt was unwise, it should be noted that the best Christian historian of the ancient Roman imperial period, a Palestinian scholar and bishop named Eusebius of Caesarea,[2] had already determined back in the early fourth century that the study of Old Testament chronology could not give meaningful data prior to about 1800 to 2000 B.C. (the period during which the stories of Abraham, Isaac, and Jacob were set), and simply quoted the biblical passage "it is not for us to know the times or the seasons" when pressed for accurate dates on any earlier events recorded in scripture. Most modern critical biblical scholars would agree that Eusebius' scholarly evaluation was exactly correct, and that Ussher's attempt to date the creation of the earth from the stories at the beginning of the book of Genesis in the Old Testament was ill-founded from the start.

Nevertheless, Ussher's date of 4004 B.C. became so widely accepted in the eighteenth and nineteenth centuries, that his own purely human speculative hypotheses became regarded as the literal word of scripture itself, to such a degree that, when scientific evidence began accumulating that the earth had to have been in existence far longer than that, many conservative Christians came to believe that, in order to preserve the concept of the Bible as the faithful and dependable guide to the true spiritual life, they had to attack the scientists and defend Ussher's quite naive assumptions.

But the scientific evidence that was going to disprove Archbishop Ussher's date of 4004 B.C. began to appear quite rapidly, beginning in fact not much more than a hundred years after his death. Ussher made his calculation in the seventeenth century; but as early as the eighteenth century, Thomas Jefferson in his *Notes on the State of Virginia* (published in 1785) observed that numerous bones (and tusks) of an elephant-like creature had been dug up at a place called Big Bone Lick, one or two miles away from the Ohio River (in what was then Virginia but is now Kentucky, located only eighty miles upriver from Louisville),[3] and noted that no modern species of elephant could possibly survive the snows and freezing weather of a winter in the wild that far north. The necessary conclusion seemed to Jefferson to be that either there were once species of elephants living in what is now Virginia and Kentucky unlike any modern ones, or that the climate of Virginia and Kentucky was once drastically different from what it is today. And in fact we know today that both of Jefferson's speculations were correct: the bones were those of hairy mastodons, and the combination of continental drift and worldwide climactic changes also produced very different kinds of temperatures in Virginia and Kentucky during different geological epochs.

In this case, the last American mastodons did not become extinct until fairly recently, somewhere around 11,000 years ago, likely from being overhunted by the first human beings who came over to the New World from North Asia. But this is still almost twice as long ago as Archbishop Ussher's Bible-derived date of 4004 B.C. for the creation of the earth and all the species living on it. We can therefore see a few people growing suspicious that the planet earth had been around for a lot longer than Ussher's calculations, as early as the period of the American Revolution.

But truly accurate data on the age of most objects on the earth's surface did not begin to appear until Willard F. Libby at the University of Chicago developed the first radioactive dating method in 1947, using the relative abundance of the radioactive carbon-14 isotope as a nuclear clock to measure the date of any object containing carbon compounds. I was then eight years old, so this discovery was actually made during my lifetime, like a lot of the other discoveries discussed in this chapter. These are in fact quite new discoveries.

Carbon-dating did not solve all of our dating problems. It only allows us to work around 50,000 years back—which still however puts us back eight times as far into the earth's past history as Ussher believed was possible. But in the years that followed, other radioactive isotopes were discovered which enabled scientists to date even earlier objects: Thorium-230 dating allows us to date ocean-floor sediments back 300,000 years. Fission-track dating (measuring paths of radiation damage in micas, glasses, and extremely hard minerals) can give us dates in the period from 40,000 to 1 million years ago. Lead-alpha dating can be used on some kinds of rocks dating back as far as the Cambrian Period (570 to 500 million years ago), and by using the ratio of lead-206 to lead-207 in the sample, it can be extended even further back. For the most an-

cient rocks, the potassium-argon method (often combined with the rubidium-strontium method for additional confirmation) can give us accurate dates.

What this means is that we now have a host of separate dating techniques which can be used to track down through layers of rock and minerals, with multiple means of confirmation at each step. The oldest rock specimen which has been discovered at this time, going as far down below the surface of the earth as scientists have excavated or sent probes, is 4.404 billion years old (4,404,000,000 years old). But on various grounds, the planet earth itself is believed to have been formed just a little before that, around 4.54 billion years ago (± 1%). The earliest known meteorites which were formed within our solar system are 4.567 billion years old. Since the planets were formed by meteorites and other objects within the primitive solar system coalescing into much larger bodies, these meteorites are in fact slightly older than the planet earth.

Hubble and the red shift: calculating the age of the universe as a whole

That date of 4.54 billion years ago for the formation of the earth is important, because it can be measured with greater accuracy than the date of origin of the universe itself. Dating the beginning of the universe as a whole involves hypotheses and data of far less precision, so that we cannot give a hard and fast date with the same confidence, but **the currently most generally accepted figure is that the Big Bang, when this universe exploded into existence, took place 13.799 billion years ago (13,799,000,000 years ago) ± 21 million years.**

This dating was worked out by measuring what is called the red shift. When various elements are heated to incandescence in the interior of a star, they give off characteristic spectral lines which

enable us to identify the particular elements involved. Hydrogen for example gives off light of certain specific wavelengths, and sodium gives off light at other precise wavelengths. The peculiar yellow light which is given off by a sodium vapor lamp, or which can be created by tossing common table salt (sodium chloride) into a fire, is one of the characteristic wavelengths emitted by that element. When measuring the spectra of far distant galaxies however, these precise lines are shifted slightly towards the red end of the spectrum: the yellow sodium line, for example, takes on a slightly oranger hue.

This red shift was produced because these distant galaxies were travelling away from us at such high speeds, vis-à-vis the speed of light, that the colors themselves were being systematically distorted. In 1929 (not long before I was born), Edwin Hubble devised a formula known as Hubble's law, which showed that the velocity with which a particular galaxy was moving away from us was proportional to its distance: that is, the further away the galaxy was, the faster its recession velocity would be.

Now it is clear that, in principle, one should be able to measure the velocities at which the various galaxies in our universe are now moving apart from one another, and simply work that calculation backwards to determine when all the matter and energy in the universe was originally concentrated in one enormously dense compacted clump. This point in time, when all of this matter and energy first began expanding, would then be the date of creation of our universe. It was therefore embarrassing, to say the least, when the first scientific attempts to calculate the date of creation (based on the red shift data and Hubble's law) showed that the universe was created only two billion years ago. As has been seen, we have accurate ways of determining that some of the rocks on the planet earth itself are over twice as old as that!

It has in fact turned out that it was more difficult than was first assumed to determine the precise distances of far-off galaxies, and that assumptions had to be made about the interpretation of some of the data, which required acts of judgment rather than simple mechanical measurement. **But the present generally accepted estimate, as I have said, is that the universe as a whole is 13.799 billion years old.**

The important thing to remember, for the purposes of this book about God and the creation of the universe, is that the oldest rocks found on the planet earth can be shown by very accurate radioactive dating to be a little over 4 billion years old. The universe did not come into existence, as Archbishop Ussher argued on biblical grounds, in 4004 B.C. The planet earth itself can be shown to have been in existence for almost a million times longer than that, quite literally.

Nevertheless, the best scientific evidence also shows that the planet earth, and the universe itself, *had a beginning in time*. Before that point in time, they did not exist. This is one of the things that modern astrophysicists have had to study and theorize about: how did the universe as a whole first come into existence?

The big bang theory

In 1948 (when I was nine years old), George Gamov developed what was subsequently called the big bang theory: the universe was created in a gigantic explosion which took place billions of years ago. The basic subatomic particles, compressed into an incredibly dense mass at an extraordinarily high temperature, fused together to form the first chemical elements (primarily hydrogen and helium at that point), and blew apart explosively from the enormous energy released. As this expanding cloud of hydrogen and helium spread out and cooled down, it began condensing into

galaxies and stars. It is now believed that most of the other chemical elements which we know today were created within the fiery masses of those proto-stars. And at some point planets were formed, including (around 4.54 billion years ago) our own planet earth.

Some physicists began speculating that the enormous burst of high-energy radiation which accompanied the nuclear explosion which formed the big bang would not have totally disappeared even today—this was a nuclear explosion beyond anything imaginable, involving all the matter in the entire universe—but it would have "cooled down" by now to around 3 degrees Kelvin (–270° C or –454° F). When radio astronomers actually detected this background cosmic radiation on their radiotelescopes in 1965, the big bang theory was vindicated with actual presently accessible experimental evidence.

Not all scientists who defend the big bang theory would be ready, by any means, to acknowledge that this supports the idea of some sort of God or higher power. Their attempt to evade that conclusion involves such verbal maneuvers as referring to the moment of creation as a "singularity," which makes it sound like conventional scientific terminology once again. But as nearly as I can tell, the word singularity simply means an event which is totally different from any other kind of scientifically observable event, and one which clearly follows totally different kinds of laws from any which we observe shaping physical events in the rest of the natural universe. The old-fashioned term for an event of that sort is "supernatural." The sudden appearance of the big bang (out of nothing at all, not even a pre-existing space and time) was a "super" natural event in the sense that it broke certain fundamental natural laws which seem to be totally unbreakable in our observations of any

conventional experiments which we can set up in our scientific laboratories.

It would strike me however that if atheistic astrophysicists do not wish to use the word God, or even refer to a "higher power," that it is nevertheless impossible for them to deny that the big bang could only have taken place if there were some *pre-existent ground* already present—that is, something already there before the big bang took place—a something which was not bound by some of the fundamental laws and rules which govern ordinary natural events.

An impersonal (or nearly impersonal) ground of being vs. a warmly personal God of grace

But I must issue a warning: being able to demonstrate that there was some ground of being of this sort which was already in existence before this present universe was created, did not at all mean—just taken by itself—that this pre-existent ground was a *warmly personal being* who acted on our lives and our world through loving acts of grace, and could hear our prayers and would respond to them.

But Thomas Aquinas was aware of this, and knew that, as far as his five philosophical proofs went, none of them necessarily proved the existence of an intensely personal God, and two or more of the five proofs clearly pointed only to the necessity of some transcendent ground of being *which might in fact be a totally impersonal reality*.

Now it is also true that Thomas Aquinas was a Roman Catholic priest who clearly himself believed in a God of love who sent his grace to rescue us from our self-destructive behavior and give us the power to lead good and useful lives. But Aquinas distinguished between two kinds of truths: truths of reason and what he called

truths of revelation. The five proofs for the existence of God were based on truths of reason alone. A good Catholic believer, on the other hand, would also believe that the promises made in the revealed word of the Bible were true. These biblical teachings—which gave far deeper revelations into who God was and how he responded to our pleas and prayers—had to be accepted on faith, Aquinas believed, because they could not be proven by reason and logic alone.

The important thing to remember is, that in putting the five proofs together, Aquinas attempted to stick totally to reason, while avoiding making any faith claims. So in this book we will likewise avoid quoting from the Bible (or the Koran or the Bhagavad Gita or the Tibetan Book of the Dead or what have you), or making personal faith statements, and remember that our job here is only to show that the physical universe we know had to have come out of existence from some transcendent ground of being which did not have to follow all of the normal laws of nature.

So as far as I can see, as long as we use some fairly neutral term, like "ground of being," to refer to whatever it was *out of which* our present universe exploded into being in the Big Bang, I do not see that great a distance between what most good modern astrophysicists believe and what most of Thomas Aquinas' five proofs were actually trying to prove. Surely the majority of good astrophysicists today would acknowledge that there had to have already been something in existence before the Big Bang, in order for there to have been something for all that matter and energy to erupt out of. There also had to have been something already present in order to provide the framework of natural laws which physicists spend their lives studying. The laws of nature did not suddenly appear out of nothing 13.799 billion years ago, and they are not derivable from the laws of logic alone.

The steady-state theory

But for physicists with a very strongly atheistic bent, the big bang theory was very uncomfortable. Was there any way of getting around that theory and providing some other way of explaining where our present universe came from?

In the same year (1948) that George Gamov published the earliest version of the big bang theory, a group of British astronomers (including Hermann Bondi and Thomas Gold, with Sir Fred Hoyle as the most visible member of the group) devised an alternative theory, designed to show that the universe as a whole had always existed, from infinite times past, in fairly much the same form as we now see. This was called the steady-state theory. From my own reading, it seems clear that some of the leaders were consciously and deliberately out to attack the big bang theory largely because it seemed to show that those who believed in the existence of God or a higher power had now gotten a lot of good modern science on their side. This they could not stand, and so they used some truly ingenious theorizing to try to show that the universe was never created, but had always existed.

The only way they could devise to do this however (and still explain the existence of the red shift and the expanding universe) was to hypothesize that matter was being continuously created in some sort of spontaneous natural fashion out in empty space, and that this new matter ultimately condensed into new galaxies to replace those which had receded far away from us into infinite space. It did not seem to dawn on them that creating even small amounts of matter out of literally empty space—and on a continuous and eternally ongoing basis at that—raised exactly the same astrophysical and theological issues as creating all of it at once in a single big bang. Creating matter and energy out of nothing, a little bit at a

time, violated the fundamental laws of thermodynamics, for example, just as much as creating it out of nothing in a single act. The "super" natural element was not eliminated at all, but simply spread out thin, so to speak, in hopes that no one would pay attention to it any more.

The principal problems for the steady-state theory, however, ended up coming from the continual growth of actual experimental evidence which was being gathered by astrophysicists. Sir Fred Hoyle had to keep on revising his theory in largely *ad hoc* fashion as the details of galactic distribution and rates of expansion became better known. His efforts appeared at times to be as much political and directed towards maintaining his own dominance in the field (and obtaining money and grants for research) as they were directed towards discovering pure scientific truth. He set up one public press conference designed to make a prominent defender of the big bang theory look ignorant and lacking in knowledge, which appeared to many to be a totally unfair dirty trick on a thoroughly decent scholar, and which involved data which in fact showed no problems for the big bang theory once anyone thought about the data carefully.

Then quasars were discovered on the outer edges of telescopic observation—objects from several billion year ago, whose light has only now reached the earth—which showed that the ancient universe back at that period was very different in character from the universe we know today. This implied a universe which, after it was born, went through distinct early stages, and only achieved its present form after a long period of progressive development. This presented real problems for the steady state theory, which was trying so hard to maintain, not only that the universe as a whole had existed from infinite times past, but that it had always existed in much the same form as we observe today.

And then the discovery of cosmic background radiation in 1965 showed that the residue of the enormous burst of radiation which accompanied the big bang could still be detected and measured even today. So at this point in time, there are not many defenders of the steady-state theory still active, if any at all.

I am therefore not going to devote much space in this book to showing how Thomas Aquinas's five proofs can be demonstrated to be valid in a steady state universe, although it can easily be done. Aquinas himself was more than aware of one major ancient version of the steady state universe, because that was what had been taught by his great philosophical hero Aristotle (384–322 B.C.): that ancient Greek philosopher had taught that the universe had always existed, since infinite times past, and always would exist.

The cyclic or oscillating model

At one point during my lifetime a third kind of theory was occasionally discussed. It was a sort of variant of the big bang theory in one way. As early as 1922, Alexander Friedmann had pointed out that there seemed to be two forces which had to be accounted for in order to interpret the red shift. On the one hand, there was some force which seemed to be driving all the galaxies of the universe further and further apart. But on the other hand, all mass exerts a gravitational force, so that the sheer bulk of all the mass in these galaxies must be exerting a counter-force which would tend to pull all of these galaxies back together.

If the mass in the universe is distributed rather sparsely, then the outward force imparted by the explosion of the big bang will send the galaxies further and further apart forever. On the other hand, if the average density of matter in the universe is great enough, eventually the interactive gravitational forces will bring the expansion

of the universe to a halt, and the galaxies will then start drifting back together again, slowly at first, until eventually all the matter in the universe will be collapsed inward in what is called the "big crunch" to form a single, extraordinarily dense mass.

We might compare the phenomenon of shooting a rocket off the earth's surface: if the velocity is below a certain critical value, the rocket may rise high above the launching point, but it will eventually fall back to earth when the earth's gravity overcomes its momentum outward. Only if the rocket is propelled so fast that it achieves "escape velocity" can it leave the planet earth forever, and go off into interplanetary space. In the case of the rocket, it is the velocity which we can vary, while the gravitational forces remain the same. In the case of the expanding universe, the velocity is fairly accurately known, but the density of mass in the universe, and hence the amount of gravitational force, is what must be determined.

In the case of the expanding universe, the critical value for the average density of the mass in the universe is now estimated to be 5×10^{-30} grams per cubic centimeter, which may seem very small, but we must remember that most of the universe is empty space. If the average density of matter in the universe is less than that amount, the universe will keep on expanding forever. If it is greater than that, then the expansion will ultimately slow to a halt, and the entire universe will begin collapsing inwards on itself.

It was this observation which gave rise to the theory of a cyclic or oscillating universe: in this hypothesis, the universe as such has always existed, from infinite times past. It explodes in a big bang, expands outwards for billions of years, then turns and contracts inwards for billions of years, until it collapses in the big crunch into a single super-dense mass, which then explodes in another big bang, and so on *ad infinitum*.

What is the big problem for this theory? In fact, the laws of thermodynamics require a transcendent, *super*-natural source of energy for each big bang in the same way that the single big bang theory does. The cyclic model does not in fact avoid any of the theological and philosophical consequences of the simple big bang theory. It is still necessary that there be a God or higher power or eternal ground to keep this process going.

This theory also seems at present to have foundered on the rock of the actual experimental evidence. As far as is presently known, the mass density of the universe seems to be only five to ten percent of the critical value which would be required for the expansion of the universe to be reversed by gravitational forces.

The constantly-changing flux of scientific theory vs. the basic alternatives

Over the course of my own lifetime, scientific knowledge about the origin of the universe has therefore undergone sweeping change at some of the most basic levels. And even as I write, new evidence seems to be emerging about various kinds of "hidden matter" in our universe, which may make its mass density much higher than we have hitherto believed. Ideas and evidence of whose existence we cannot even dream at present, could well surface within a few years after this book is published.

At this point in time however, I have decided to confine my discussion in this book mostly to the big bang theory, because that is what most current astrophysicists believe is correct, and because it certainly makes it far simpler to prove that this big bang must have been produced by something external to, and greater than, the physical universe itself: that is, a higher power, a God, or at least a transcendent ground of some sort (even if it is an impersonal reality).

I hope that all my readers will be aware, however, that if new scientific discoveries eventually emerge which show that the steady state model or some sort of cyclic model is more likely to be correct than the big bang theory, Aquinas's five proofs are easily adaptable to any of these three models.

That is because Thomas Aquinas himself was wise enough not to try to declare himself on the issue of whether we could prove that this physical universe had a beginning in time, using natural reasoning and scientific methodology alone.

What Aquinas did know he could prove quite conclusively, was that even a physical universe which had always existed, from infinite times past, would still require a higher power to account for its continued existence, and even a cyclic model of big bangs followed by big crunches would similarly require a higher power acting at some point within each of these infinitely repeating cycles to keep the cycles going.

The three basic modern cosmological theories

As far as I can see, the astrophysicists of my own lifetime have set out the only three basic alternatives which could exist:

> (1) Either this universe had a beginning in time, 13.799 billion years ago or some other specific date of that sort, where before that there was quite literally nothing at all in the way of a physical reality obeying conventional scientific laws.

Or this physical universe has always existed since infinite times past in one form or another, following the same laws of nature which we observe today. And if the universe itself has always existed in some form,

(2) then we can either go with something like the steady-state model and argue that it has always had something much like its present form,

(3) or we can argue for the cyclic model, where the universe goes through long periods of relatively stable existence, punctuated by periodic fiery death and Phoenix-like rebirth.

But these are the only three possibilities. And all the arguments which apply to alternative no. 1 can easily be adapted to alternatives no. 2 and 3.

The three basic types of theory in ancient thought

I think these are the only three possible fundamental alternatives, not only on the basis of logic itself and the speculations of twentieth-century physicists, but also because back in the ancient Mediterranean world, the thinkers of that time could discover no additional alternatives.

Christians and Jews believed that the universe had a beginning in time, when God created it out of nothing. They found partial defense for their position in one of the Greek philosopher Plato's writings, the *Timaeus*, where he described a divine creator-being called the Demiurge shaping raw matter into the organized universe which we know today.

The classical Greek philosopher Aristotle, along with the Neo-Platonists of the late ancient and medieval world, upheld the theory of what modern astrophysicists would call a steady-state universe. Many of the medieval Muslim philosophers, in particular, adhered to that kind of Neo-Platonic steady-state world-view. But these Neo-Platonic thinkers were well aware that a physical universe which had always existed could not remain in existence forever

without a transcendent ground to maintain it in being. The pagan philosophers among this group called this ground the One (that is, the underlying unity beneath all reality); the Muslims identified it as the great ruler of the universe whom Mohammed had called Allah.

The ancient equivalent to the cyclic (expanding and collapsing) universe was found in the Stoic philosophical system. The god Zeus was viewed as something like a giant thinking energy field suspended in space. When Zeus let part of his energy "cool down," it coalesced into solid matter, and the universe was formed from it, rigidly following the logical laws of nature which formed the underlying structure of Zeus' thinking. Periodically, Zeus would flare up into his highest energy state, and the material universe would be consumed in flames. But then as Zeus "cooled back down," another physical universe would come into being.

These ancient philosophers realized however that there always had to be a higher power

The best thinkers of the ancient world were wiser in one important way, I believe, than many of the twentieth-century astrophysicists who tried to explore these same issues. There must be a God or higher power of some sort—whether we call this transcendent ground by the name of God, the Demiurge, the One, Allah, or Zeus—to make any ultimate scientific sense out of the physical universe which we can directly observe.

Thomas Aquinas knew all of these ancient alternatives quite well. The Muslim Neo-Platonic steady-state theory of the universe was the one which the intellectuals at European universities were most taken with as an alternative to Christian belief during his own lifetime, but Aquinas' incredible knowledge of the history of philosophy and theology was such that he was well aware of all the

basic alternatives. His strategy was to cast his five proofs for the existence of God in the broadest possible fashion, so that anyone embracing any of these three basic types of theory would be compelled to realize that the existence of some higher power or transcendent ground was necessary to make sense out of all the things in the physical universe which could be directly observed, and which could be subjected to direct scientific inquiry.

But again, I believe that it is necessary to warn people that in this book, I will frequently assume (for simplicity's sake) that the reigning big bang theory is the basic one which we need to analyze. Nevertheless, like Aquinas, I hope the reader will always remember that the same fundamental arguments apply to steady-state or cyclic theories—they are far more complicated on the surface, but the underlying basic issues remain the same.

Part II

Infinity, Pseudo-Infinities, and Fallacies

CHAPTER 3

Aristotle on Infinity: Processes Which Could Never Successfully End

One of the first philosophers to look at the basic concept of infinity systematically and carefully was the ancient Greek philosopher Aristotle. This gave additional reason for Thomas Aquinas to look back here to the works of the man whom he regarded as the philosopher *par excellence*. It will therefore be useful to sharpen our wits by looking carefully at Aristotle's statements on the nature of infinity before turning to Aquinas' proofs for the existence of God, since Aquinas himself had to keep that philosopher's observations (and warnings) continually in mind as he carried out his own work.

Now some of what Aristotle wrote about the nature of the infinite was not directly relevant to Thomas in the thirteenth century, nor is it relevant to us today, because his arguments were often directed, not towards devising general propositions about the mathematical and logical nature of infinity in itself, but specifically against the *materialistic theories* of the pre-Socratic philosophers who had flourished during the sixth century B.C., roughly two to two-and-a-half centuries before his own time. This warning is necessary, because a surprising number of modern histories of philosophy, and even book length studies of Aristotle's system, fail to

note this adequately when they begin recounting that philosopher's teaching on the topic of infinity.

Aristotle was concerned with those pre-Socratic philosophers who regarded the infinite itself as an *archê tôn ontôn* (a first explanatory principle in dealing with the problem of being), or who otherwise worked the concept of the infinite into grossly materialistic theories which held that the universe was created out of one or more of the "four elements" of ancient Greek physics: water, air, fire, or earth.[4] Thales, for example, the first pre-Socratic philosopher, had said that the primary stuff of all things was water: one presumes he was attempting to assert that, just as liquid water can be cooled down to make solid ice or heated up into water vapor, so the present universe came into being when the primary material stuff of which it was composed was separated into solids, liquids, and gases. Thales believed that liquid water was the purest and simplest form of this basic building material of the universe because (quite likely) of the lingering influence of the ancient Babylonian creation myth, in which the cosmos was said to have been created from the body of Tiamat, the female monster who was the Primordial Ocean.

Thales stood at the great divide between ancient mythical thinking and modern science: although his intentions and methodology put him on the scientific side, this assumption that everything was "made of water" shows that he still had one foot back in the prescientific mythical world. The philosophers who immediately succeeded him did not do much better, for many confined themselves to unfruitful arguments about which of the four so-called elements was the truly basic one: Anaximenes for example said that it was not water but air, and Heraclitus argued that it was fire. Now Aristotle was still close enough in time to these primitive theories to have to take them seriously, at least at the level of having to ex-

plain in detail why they were philosophically impossible. There could be no logical way, he argued, that there could be an infinite simple body of water or air or fire, nor would a supposed composite body made up of those elements do more than create additional impossibilities.[5]

These particular ancient issues are of no more than antiquarian interest to us today, and were of no real relevance to Thomas Aquinas either. The latter lived in a far more sophisticated and complex philosophical world, where the problems were those presented by the Arabic Neoplatonic philosophers, the illuminationist epistemology of Augustine, the Pseudo-Dionysius' claim that we could make no (or very few) literal statements about God, and so on—a world of philosophical issues as complicated as those of our own time.

One of the pre-Socratic philosophers, however, presented a different kind of challenge, because Anaximander had argued that the primary stuff from which everything else came into being was not one of the material elements, but was instead *to apeiron* (the infinite) itself, which he said was immortal, indestructible, and divine. Aristotle responded to this with a complex set of logical arguments attempting to show that it was impossible for there to be an *apeiron* which was totally apart from sense objects, and which could therefore be *auto ti on*, "some kind of being which existed in and of itself."[6] In these efforts to demonstrate why a supposed natural *thing* which was truly infinite could not be a workable object of the natural scientist's investigations, Aristotle in fact made some very penetrating observations about what we mean by the concept of infinity.

To begin with, the word infinity in Greek, as we have said, was *apeiron*, which meant that which had no *peras*. A *peras* was the end or termination of something, an accomplishment. On a race-

course, the *peras* was the finish line. The infinite (on the other hand) was a racecourse where, no matter how long you ran, you could never get to the finish line. Our English word for that concept comes from the Latin word *infinitas*, which in similar fashion meant (etymologically) that which had no *finis*, that is, no boundary, limit, border, terminus, or end. The English word "finish" is derived from the Latin word *finis* via Old French. So *infinitas* meant a struggle up a steep mountain where you could never arrive at a *finis* or topmost summit, but would be condemned to climb literally forever.

Aristotle therefore said, in words we should remember carefully, that the *apeiron* was a trap where there was no *exodos*, no possible exit or way out. There was no way to "go through" (*diêlthon* or *dieimi*) something infinite so as to come out on the other side.[7]

Infinity therefore also meant that which had no *telos*, no end result which could be accomplished, no fulfillment of possibility which could be produced by attaining something. The *telos* of an acorn, Aristotle pointed out, was to try to sprout and grow up into an oak tree. This was a typical kind of goal-oriented process where the *telos* constituted one kind of *peras* or finish line.[8] Planting an acorn and waiting for it to grow up into a huge oak tree might take an extremely long time to accomplish, but it was not an *infinite* process in the proper sense of the word.

What happened in the case of an infinite process? ***A truly infinite process never accomplished anything, never attained any meaningful goal. A truly infinite process never reached closure, never gave us a conclusive answer.***

The infinite is fundamentally, Aristotle said, that to which we can always add something more (*prosthesis*), or upon which we can perpetually carry out some further subdivision (*diairesis*).[9] It is "that of which there is always something outside" (*hou aei ti exô*

esti). So by definition, something which can be whole and complete cannot be infinite.[10]

Now although Aristotle insisted that the infinite could not be a concrete and tangible thing in any ordinary sense, and that one could never "know" the infinite *qua* infinite, the word still seemed to have *some* kind of meaning. The thing, he said, which most convinces us that the infinite must exist somehow or other, is that we can conceive at the noetic level (*en tê*$_i$ *noêsei*, that is, at the level of mere intellectual constructs) of a "something which never runs out." He gave three important examples:

> 1. *Arithmos* (number), which to the Greeks meant what we would call today the set of all positive integers (1, 2, 3, 4, 5, 6, 7, 8 . . .).
>
> 2. Certain kinds of mathematical magnitudes (*ta mathêmatica megethê*). In ancient Greek Euclidean geometry two parallel lines may have their lengths extended all the way to infinity without growing closer together or widening further apart. The distance apart (which is a mathematical magnitude which is finite and hence comprehensible) remains the same even if the two lines are pursued to infinity.
>
> 3. "The beyond the heaven" (*to exô tou ouranou*). By the end of the ancient Greek period it had been concluded (and was assumed throughout the Middle Ages and Renaissance period, down to Dante's time and beyond) that the fixed stars had their place on a giant transparent sphere surrounding the earth and sun and moon and planets. One could ask "but what is beyond the stars?" or, as we would put it today, "what is outside the physical universe if it has finite dimensions?" The answer seemed to be "absolutely nothing, extending to all infinity."[11]

Let us look in more detail at Aristotle's first example of an infinity, the set of all positive integers. If one begins counting 1, 2, 3, 4, 5, 6, 7, 8 . . . , then no matter how high one counts, one can nevertheless come up with a number which is yet bigger. This seemed to Aristotle to be a clear case of something which was a true infinite, and modern mathematicians would agree. But as Aristotle also pointed out, a number (an *arithmos*)—even if it is a number which exists only in our heads, which does not enumerate any actual physical collection of concrete things—must also by definition be *arithmêtos*, that is, numerable or countable.[12] As we would put it today, something which is actually a number must have a value. It may be enormously huge or trivially small, but to be a number it must have a value, and will therefore be *finite*.

So an infinite series is made up of items, each of which in and of itself is a finite thing. Nevertheless, *infinity itself is not a number*. My beginning calculus teacher used to continually din this into my ears.

If one takes a mathematical formula where x represents one number and y represents another, and tries to put infinity in as the value for one of these, the result will be mathematical nonsense. If we write down on paper that we are multiplying x by infinity or dividing x by infinity, or adding or subtracting infinity from x, these squiggles we have written down mean nothing coherent or intelligible.

Now modern mathematics has discovered ways of using infinities and infinitesimals for making concrete calculations, such as in calculus and in infinite converging series. These are techniques which the mathematicians of Aristotle's era did not know,[13] but their use does not in any way contradict his fundamental assertion, for in both of those modern examples, we obtain concrete numeri-

cal results precisely because we have devised ways to insert the concept of *limits* into the theoretical structure.

In using an infinite converging series to calculate the answer to a mathematical problem, we carry out the series until we have an approximation which is as accurate as far our measuring apparatus will discriminate (a micron, or a millisecond, or a wavelength calculated to five significant figures, or whatever) and then stop. There is no practical need to go any further. This ad hoc decision as to how accurately we really need to know the answer supplies our limit. So we are left with a series which could theoretically be carried out infinitely, but where we arbitrarily set an ad hoc limit or boundary as to how far we will go. It should also be noted that a truncated infinite series of this sort will not be fully dependable (and hence fully useful) unless we can prove that the series, if actually carried out infinitely, would approach the absolutely precise answer as its limit.

In calculus, we devise an approach to a problem which will divide it up into the calculation of infinitesimal increments. We then prove that a second formula describes the limit which we would approach if we used the first formula (and in fact kept on subdividing our calculation to all infinity). Then, instead of carrying out that infinite process, we simply calculate the answer on the basis of the second formula in a single operation, and have the numerical value we were looking for. But again, it is precisely because we can describe the limit to the process that we can make actual concrete calculations.

So in the case of infinite series which converge, and solutions to the differential equations of calculus, we are dealing with infinite processes which, in their own way, have clearly definable limits. Aristotle's fundamental observation is still true therefore, as long as we add one additional caveat: an infinite series *where no logi-*

cally justifiable limit of any sort can be assigned cannot be used in itself to provide meaningful concrete knowledge.

The closest Aristotle came to using the term infinite to describe a concrete, real world process was in his analysis of chronological time (*chronos*) and what he called the coming to be and passing away (*genesis kai phthora*) which characterized the changing world around us.[14] When we thought about chronological time, for example, there seemed no logical way to set any limit on it in either direction. Time in this sense seemed to have neither beginning nor end, and so likewise there seemed no necessary reason why there could not always have been physical objects caught up in the flow of time. Although individual concrete objects "came to be" (*genesis*) and then "passed away" (*phthora*), something seemed always to remain present in the universe we could actually observe.[15] In the case of human beings, for example, as long as enough people of each generation successfully produce and raise children to adulthood, there will be new people to replace those who die, and the human race will continue its existence on the planet earth.

For this reason, Aristotle believed that the material universe had always existed since infinite times past, and that there was no need to invoke the idea of some God having to create it. Aquinas was especially concerned with Aristotle's theory on this particular issue, for some of the Arabic philosophers of his own time had taken this idea over from Aristotle, and young university students in places like Paris had picked this idea up from the Arabs (via Spain and Sicily) and were regarding this idea of an eternal material universe which had always existed as the most daring and *au courant* philosophy to follow.

However, as Aristotle pointed out, the sequence of events which we conceptualize as happening one after the other over a period of

chronological time, do not all happen simultaneously. If I say that, "even as we speak, the Olympic games are going on," I do not mean that all the various contests and competitions are taking place simultaneously out on the field at the same time. I mean that we are presently at some particular point (say the beginning of the discus-throwing contest) in the overall process of the games. At the concrete level, in the real world, only the present exists. So even if we claim that the material world has always existed in some form, neither the infinite past which preceded the present moment in time, nor the infinite future which will follow it, has the kind of concrete existence as the pure "now" which we actually inhabit. So it still remains true that infinity as such is not a concrete, tangible "something," and that the infinite *qua* infinite is unknowable.

The apparent infinity of time however still posed a major issue for Thomas Aquinas. He in fact came to the conclusion that there was no way to prove, using philosophical logic alone, that chronological time (and the universe at its basic level) had not always existed. He devised two ways of dealing with that problem:

First, Aquinas was not an eighteenth-century deist. He did not believe to start with, that God had created the universe at some point in time and then left it to run on its own like a well-wound watch. Like most of the good Christian philosophical theologians of earlier centuries, he believed that God was in continuous contact with the universe, directing it and sustaining it in its existence.

At the philosophical level, what Aquinas actually meant by the term "creation" was similar in some ways to what Kant meant when he spoke of the way in which the phenomena arise out of the noumenon. For Aquinas, God was the continually existing ground of being: although it was true that God was unknowable in his ownmost underlying essence or *ousia*, it was equally true that his continuously ongoing creative activity (the *energeia* or energy of

the divine creativity) impinged upon us at every moment and was interpreted, within our human thought forms, as the physical world around us.

Even though modern folk are so conditioned by deist ideas that it raises eyebrows when this point is brought up, Aquinas in fact maintained that it was impossible to prove logically that time (or the universe) ever had a beginning, but that it *was* possible to prove logically that a transcendent ground had to exist in order to account for the *creation* of this universe. In other words, even if the universe has always been here, a creator was still necessary.

Following Augustine, Aquinas believed that God, *who dwelt in eternity,* was for that reason *equally close to all times*, so the act of creation impinged upon each time in the universe's history—including this present moment that we are living in right now—with equal impact. When was the universe therefore created? Was it 4004 B.C., or was it some other date, such as 13.799 billion years ago? And Augustine's (and Aquinas') answer to me as the writer of this book was, "Why it is being created by God right now, while you the author are writing this very sentence." And their answer to you the reader is, "It is also being created by God right now, while you the reader are reading this sentence."

The second reason why Aquinas felt that the apparent infinity of time could be dealt with, was because he reckoned that he had good grounds for his belief that the present physical universe actually had a beginning in time. As Aristotle had pointed out, the apparent infinity of time was only a noetic construct, a theoretical idea that might or might not be true in the real world of concrete existents. A Greek farmer who had a flock of sheep and counted them all, and came up with the figure of thirty-two sheep by actual count, could not insist that he had an infinite number of sheep simply because the set of positive integers which he was using to

count them could in theory be extended to all infinity. And likewise it did not matter whether we were asking how many sheep were in a flock, or how many billion years the present universe had been in existence, the mere fact that the counting system we used could in theory be extended to all infinity did not mean that the actual count would be infinite. The sides of the door to my study are parallel, and according to the intellectual theories of Euclidean geometry could extend to all infinity without ever meeting, but the boards in fact are only 6 feet 8½ inches long.

Aquinas realized that the question of whether our universe had a beginning in time could not be decided on the basis of purely abstract philosophical reasoning. As a Catholic theologian however, he believed that the Bible was a divinely inspired source of truth, so on the grounds of biblical authority he declared that the universe must have had a beginning in time, even if it could not be proven philosophically.

Many modern scientists would agree that philosophical logic alone could not decide this issue, but instead of quoting the Bible, would say that this was a question which required good empirical scientific evidence to resolve. Radioactive dating techniques show that the planet earth was formed about 4.54 billion years ago, and if we accept the big bang theory, the rate at which the universe is presently expanding shows that it must have been created around 13.799 billion years ago.

So like Aquinas, in interesting fashion we also believe that we have good reason to assert that the present physical universe in fact had a beginning in time. And we also agree with Aquinas' assertion that this conclusion cannot be based on any kind of abstract philosophical speculation.

The most important thing that Aristotle bequeathed to Aquinas however was the realization that infinity "existed" in a certain

sense, but only at the noetic level (*en tê*$_i$ *noêsei*), that is, as an abstract intellectual construct within the human mind, and not as something that we could actually perceive, directly and concretely as such, through our five senses.[16] Aristotle further pointed out that there were two fundamental ways in which a thing could have being (*to einai*): as a concrete actuality which was presently operating in the world (that is, as an *energeia* or *entelecheia*) or as a not-yet-realized possibility (*dynamis*). The infinite can never be a concrete actuality *per se*, so we must conclude that "the infinite has its being as possibility" (*dynamei einai to apeiron*).[17] Infinity can genuinely exist only through the mere *possibility* of adding something further to a thing which is already actual, or through the mere *possibility* of further subdividing something that is actual.

This means that infinity cannot exist as some kind of being in and of itself (*auto ti on*), which consequently means that ***infinity cannot be a causal agent which makes actual things happen.*** Actual things (about which we can have real data which means something) must always be finite beings, no matter how enormously huge or extremely tiny. Infinity refers only to the theoretical possibility that we could add one more on, or make one more subdivision, but once having done either of those things, what we *actually* have in hand is still finite (even though bigger yet or smaller yet). Infinity refers properly only to what *we have not done yet*, as a generalized, unspecific possibility, and therefore refers to something which is not only not an actuality, but is not even knowable yet *per se*. So Aristotle insisted that "the infinite *qua* infinite is unknowable"[18] even if in our speculative imaginations it seems theoretically possible that the infinite be progressively turned into the finite-and-knowable-without-end.

One last word of warning from Aristotle about the concept of infinity, which he put at the very end of his discussion of that topic

in Book 3 of his *Physics*: since the concept of the infinite exists only as a purely noetic concept within the realm of speculative hypotheses, we must use verification methods based on actual empirical observations to see whether these imaginative speculations represent anything actual. I could intellectually entertain the noetic concept of a human being who was 10% taller than I am myself, or 20% taller, or 30% taller, and so on *ad infinitum*. But that did not mean that a real live human being who was 500% taller than me (29.375 meters, or almost a third the length of an American football field) existed or ever had existed. If I traveled to a distant country and saw an actual human being, a true giant, who was as tall as the intellectual concept I had formed before leaving home, I nevertheless could only say that this giant actually exists "not because I conceptualized such-and-such intellectually, but because he does exist" (*ou hoti noei tis, all' hoti estin*).[19]

Infinity is not a "thing," not a number, not a knowable object as such. It has no power in itself to make anything actual occur. Merely thinking about it does not make it actually so, or give it concrete reality. Like all theoretical possibilities, we can never be absolutely sure that any part of it is actualizable until we genuinely actualize it in fact (at which point, of course, it is not part of the infinite any longer), so we must always retain an awareness of the difference between what the human mind can imagine and what actually exists in the real world.

The point of this is that it would be indeed tragic to follow in the footsteps of so many atheistic philosophers and discard the real God in favor of an imaginary infinity. Aquinas saw quite clearly that many of the most basic atheistic arguments try to substitute supposedly infinite natural processes in place of God. The tragedy here is that these atheists so often believe that they are returning the world to our own human control by evicting God from the

neighborhood. But "the infinite qua infinite is unknowable," so *a true infinity would be no more within the control of our science than an insanely authoritarian and capricious God would be*. Atheism is—to a far greater degree than its adherents recognize—the pursuit of imaginary illusions and naive control fantasies. People who enter upon a path which is infinitely long will never get to the end no matter how long they travel. We avoid the path which leads to infinite futility and failure by turning instead to paths whereby we can achieve realizable goals.

CHAPTER 4

Different Kinds of Infinities

Simple numerical infinity

Just as in Aristotle's day, counting onwards through the series of all natural numbers (1, 2, 3, 4, 5, 6, 7, 8, 9, 10 11, 12 . . .) is a classic example of something which clearly could be extended to infinity. No matter how large a number is named, one more can always be added to it to produce an even bigger number. For example, if given the number "one octodecillion" (10^{57}) one can produce a yet larger number simply by saying "one octodecillion and one." One can imagine this process literally being carried out forever, and yet there will always even then be a next number, and one after that, and so on.

But the series of *all* natural numbers is a *generalized* formal system, something which only exists as a series of counting rules inside our minds, not an actual real-world set of things. The concept of infinity can turn itself into a many-headed hydra monster when we take this idealized mathematical theory, and attempt to apply it in various ways—some of them valid but others completely fallacious—to real events in the actual world of nature.

Higher mathematical theories about infinity

At the level of pure mathematics, a good deal more could be said about the concept of infinity. Some of the complexity of this concept first began to come out in the work of a German mathematician named Georg Cantor (1845–1918), who devised the theory of sets used in exploring the foundations of mathematics and logic. Some sets were finite (such as the set of all integers which will divide evenly into 99—made up only of the numbers 3, 11, 9, and 33). Other sets could be infinite, such as:

(a) the set of all positive integers (1, 2, 3, 4, 5 . . .)

(b) the set of all rational numbers, which includes all numbers (both positive and negative) which are integers, or are capable of being expressed in the form of a fraction m/n, where m and n are both integers and n is not zero.

(c) the set of all real numbers, which is made up of all the rational numbers, plus those not expressible as simple fractions of the m/n type mentioned above—such as the square root of 2, or the exact value of pi.

The elements of those first two sets (the positive integers and rational numbers) can be put into a one-to-one correspondence with each other. Neither one can be put into a one-to-one correspondence with the entire set of real numbers, but only with a proper subset of the real numbers.

For this reason, the set of all real numbers may be said to be a "larger" infinity than the other two. It is an aleph-one infinity, while the other two sets are aleph-null infinities. As he further developed these ideas, Cantor created a whole theory of transfinite (infinite) numbers.

I do not believe that Cantor's theories are terribly relevant to the proofs for the existence of God, but Cantor himself speculated about the question. The power set of aleph-one will be an aleph-two infinity, while the power set of aleph-two will be an aleph-three infinity, creating a series of larger and larger infinities, tending toward what we might call an aleph-infinity (or perhaps we might better term it an aleph-aleph-null). And beyond even that, Cantor said that he could prove mathematically that there was an absolute infinite which transcended our ability to discuss it at all in set theory terms. Cantor believed that this absolute infinite might be God.[20]

But for a book of this sort, we had best stay away from that kind of higher mathematical theory and confine ourselves to simple numerical infinities, and whether and how they can be applied to the real world in any way which produces coherent and valuable knowledge.

Sisyphean infinities

In Greek mythology, Sisyphus was an ancient king of Corinth who, just before the god Ares handed him over to Death, deliberately ordered his wife Merope to perform no funeral rites for him. Once down in the land of the dead, he pretended to be outraged, and insisted that Hades allow him to return back to the land of the living to scold his wife. He promised to return after confronting her, but once back on earth chuckled and pointed out that he had never promised exactly how long after speaking to her he would take before returning. Death finally got him, however, when he eventually reached a ripe old age, and Hades decided to punish him for that trick by condemning him to spend eternity rolling a huge stone up a steep hill. The task was designed in such a way as to ensure that each time he heaved the mighty boulder almost to the

very top, it would slip and roll back down to the bottom again. It was an infinite task, because it had a goal (a *telos*) which the gods of the dead had made sure could never be achieved, even though he was forced to continue trying to achieve it literally forever.

Aristotle, as we saw in the previous chapter, regarded all infinities as essentially Sisyphean: they were processes which, no matter how many times they were repeated, never got one to any actual *telos* (goal) or *peras* (finish line). It is important to remember Aristotle's point here: modern mathematics has figured out how to use the concept of infinity for useful applied purposes only by the means of clever tricks. This (as we pointed out) is done by using infinite series which, at the theoretical level, go on forever, but which *converge on a finite limit* as they are repeated over and over, even if the series never technically actually reaches that limit. In other words, modern mathematicians use infinities by bringing in a *telos* or *peras*, based either on practical or theoretical considerations.

The Achilles and the Tortoise paradox

The ancient Greeks knew of formulas which produced infinite series which *converged towards a limit*, but never worked out ways of applying that phenomenon to practical calculations. The pre-Socratic philosopher Zeno of Elea for example devised the following calculation, which most subsequent philosophers saw only as an ultimately meaningless philosophical paradox. I add some details to make the mathematics clearer.

Achilles, the fastest runner of all the Homeric warriors, was presumably sitting on a bench or something of the sort beside a path, watching a tortoise which had ambled past him on the path and was now heading off slowly into the distance. Achilles jumped up, said that he would show everyone how he could run past the

slowly lurching tortoise and arrive at the end of the path long before the poor animal could get there. However, Zeno argued, Achilles first had to run to where the tortoise was now, and while he was running there, the tortoise would have time to move forward slightly, even if only for a short distance. So Achilles now had to keep on running until he reached the point where the tortoise had now arrived. But meanwhile, the tortoise had had time to move past that point, even if only very slightly. Logically, Zeno said, it was therefore clear that no matter how long a time Achilles ran, he could never pass the tortoise and reach the end of the path first.

We could set this up in the form of a precise mathematical equation. It would be an infinite series in which Achilles, as he ran and ran, drew ever closer to the shambling tortoise, but could never actually pass him. This would be the sort of infinite series which converged towards a limit. In this case of course, the limit was zero, when Achilles would presumably actually catch up with the tortoise. Only the form of the mathematical equation would never allow that actually to happen.

Paradox or fallacy?

Now it is important to note that this mathematical equation was entirely logical and rationally constructed and internally consistent. So in that sense, there was no problem of logic or reason involved. It was just that the equation of motion which Zeno devised did not actually fit what was going on at the level of empirical observation. That was what turned it into a fallacy.

Zeno of Elea in fact came up with not only this story, but a large set of paradoxes, ten of which are referred to by name in the philosophical literature. They were devised by him in support of some of the positions put forward by his mentor Parmenides of Elea,

who argued that all motion was an illusion (see my extended note[21]). Now if we are using this story as a way to try to prove that Achilles never was actually able to get past the slow moving tortoise, or even more, as a way to try to prove that everything which we think we see as an object in motion is only an illusion and nothing more, then I would prefer to call the Achilles and the Tortoise story a *fallacy* rather than just a paradox.

What turns it into a fallacy is the implicit claim that if a theory about some part of the universe is internally logical and rational, but nevertheless does not accurately describe what good empirical investigation tells us is actually happening, our intellectual theory is still correct. It is the empirical universe itself which is proven to be illogical and irrational.

Modern science could never have come into existence if empirical verification had not been insisted on. The Ptolemaic theory of the universe, for example, which was established in the second century A.D. and served as the reigning scientific theory for the next thousand years, was completely logical and internally consistent. It held that the sun, moon, and planets were attached to circles which centered on a point, called the eccentric, which was close to, but nevertheless slightly removed from the planet earth. The sun, the moon, and each of the planets then rotated about in a smaller circle, called an epicycle. Other refinements were added over the centuries, but nevertheless, no matter how much scientists toyed with this theory, the observed position of a planet could sometimes be as much as ten percent off from the place where the Ptolemaic theory predicted it would be.

The Ptolemaic theory was logical, it was consistent, but it was still wrong. When Copernicus came along in the sixteenth century and replaced this theory with a heliocentric theory that had the earth and planets rotating in circular orbits around the sun, this also

represented an internally logical and consistent set of ideas. Even then, however, it did not perfectly match up with the empirically observed positions of the planets at all times.

It finally took the work of Kepler in the seventeenth century to devise a theory in which the earth and planets moved in elliptical (not circular) orbits around the sun, speeding up as they approached closer to the sun and slowing down as they moved further away. This is also an internally logical and rational system, which can be described mathematically with great precision. It has the advantage, moreover, that it does an almost perfect job of predicting where the sun, moon, and planets are actually going to appear in the sky when we put this theory to a thorough empirical test.

Likewise, the phlogiston theory of combustion which was developed in the seventeenth and eighteenth centuries by Johann Joachim Becher and Georg Ernst Stahl was a totally logical and internally consistent theory about combustion and rusting. Materials which could burn or rust were composed of a combination of an ash-like substance and something they called "phlogiston." When the phlogiston escaped quickly, this produced the flame, the heat, and the light.

The problem with this theory appeared when Lavoisier discovered in the late eighteenth century that the ashes left when substances burned outweighed the original unburnt substances. According to the supporters of the phlogiston theory, the unburnt material, which they hypothesized was composed of ash combined with phlogiston, should have weighed less after the phlogiston had escaped in flame. Lavoisier's counter-theory was that the original material in fact had combined with something in the air, which science eventually came to call oxygen.

Achilles and the Tortoise and the attempt to form proofs for or against God's existence

I am going to speak of the Achilles and the Tortoise *Fallacy* therefore later on in the book, when it seems as though people arguing either for or against the existence of God, appear to be assuming that simply because a theory is logical and internally self-consistent, it therefore must necessarily describe what is really going on at the level of ultimate reality. We will discover those who believe in God's existence sometimes possibly falling into this fallacy (it is one of the things that always nags at me about Anselm's Ontological Proof, which claims to prove God's existence on purely logical grounds alone). But it also seems to me that a good many of the standard arguments used by atheists in an attempt to prove that God does not exist fall into the Achilles and the Tortoise Fallacy.

Thomas Aquinas was well aware of this danger, and insisted that all of his proofs for the existence of God be grounded in empirical observations of the known universe.

"It would take infinite knowledge, but it is certainly clear that, in principle . . ."

Over the course of the year I once spent in Italy as a Fellow of the American Academy in Rome, I frequently encountered a marvelous Italian phrase. I (the visiting American) would be explaining to an Italian official how the official rule book or guide stated that if I did so-and-so, I should be able to do such-and-such. The Italian would reply, "*Si, si, in principio, ma* . . ." and then shrug gracefully. The phrase meant "yes, of course, in principle, but . . ."

During the years that followed my sojourn in that splendid and incredibly beautiful country, I began to find that, while reading arguments set forth by philosophically-minded atheists, that little

Italian phrase would come to my mind with surprising frequency. I would note how the atheists used logical arguments to explain away one part of a particular occurrence on naturalistic grounds, and then to explain away another portion of the event on naturalistic grounds, and how the atheists would then go on to say, "and in principle, it is clear that, once we had knowledge of *all* the relevant data, we would be able to explain everything that happened, all on perfectly naturalistic grounds—psychological, sociological, and so on—without ever needing to bring God into the picture at all."

And at this point, I would hear the words wryly repeated in my mind, "*Si, si, in principio, ma . . .*." IF the atheists knew *all* the data (i.e., had infinite knowledge), they could conclusively prove that their non-theistic explanation was absolutely correct, and so, on the grounds of this completely logical position, we must agree with them—without their ever having to come up with all this data they claimed they would have been able to produce—that they had demolished any effective belief in God.

Another little phrase would sometimes also echo in my mind at this point—this little saying coming from an old Montana cowboy I once knew—"and if bullfrogs had wings, they wouldn't bump their bottoms when they hopped." If something were first the case, I would hear atheists argue—something which was obviously impossible and untrue—then we would easily be able to prove our point logically, which meant therefore that we had proved our point logically. We need to remember, that if the only way the atheist's position could actually be *proved* was by accumulating an infinite amount of data, then since it is impossible to collect an infinite amount of anything in less than an infinite amount of time, what the atheist was really saying was that "I do not have all the facts that I would need to actually demonstrate that my argument

works, but am demanding that you accept it on blind faith" (or "because I can shout louder than you can").

Infinity in this sense in fact means the Sisyphean task that Aristotle warned us about. It does not mean that "with enough time I could gather the infinite data required to arrive at my goal (*telos*) and prove this to you." What it actually means is that "even if I went on forever, there would always be more information which I had still not obtained, and so I would still not have arrived at my *telos* and genuinely proven my point."

CHAPTER 5

The positive uses of infinite series in modern mathematics

But let us suppose that, instead of trying to use infinite series to set up apparent paradoxes and intellectual puzzles (or to claim that we could prove our point easily if we had infinite knowledge), we try to discover useful and productive ways that scientists and mathematicians can use infinite series. I do not want to give the impression that I believe that all references to infinity are fallacious and misleading. Quite the contrary.

Let me give one example of a useful infinite series, a very simple one, but one that we can easily check out for ourselves. Most small pocket calculators have a square root button on them. The tiny memory in the calculator of course does not have room to store all the square roots of all the figures that could be entered into it, so it in fact uses a repeated algorithm—a converging infinite series—to calculate an *approximation* to the correct figure. If S is the number whose square root we wish to obtain, and r is used to represent the progressive approximations to the true root, the basic mathematical operation which will be repeated may be represented as follows:

$$\frac{\frac{S}{r_n} - r_n}{2} + r_n$$

For the starting value of r, any number can be chosen which is > 0 and < S.

If anyone wishes to see at a more visible level what a small hand calculator is calculating internally when the square root key is pushed, the same process could be set up on any standard computer spreadsheet, such as the Lotus program which I have on my own computer. Using Lotus programming language, you need to put the number whose square root you wish to obtain in cell A1, and set B1 to equal half of A1. Then set B2 to calculate

(A$1/B1-B1)/2+B1

rounded off to the required number of decimal places, say seven figures after the decimal. This formula can then be copied down the B column as many times as one wishes.

The square root of 2,000 is calculated correct to seven decimal places on the ninth recursion, where the computation will yield 44.72136 as the answer. Now when we say that this is still an approximation, it should be remembered that most pocket calculators will only display eight significant figures, so no useful purpose would be served by calculating the square root more accurately than the calculator can display answers.

Furthermore, laboratory scientists and engineers have no practical use for numbers beyond what they can actually measure with their equipment. When one is weighing materials on a professional chemist's balance, one almost never tries for more than five significant figures (e.g. 2.6293 grams), nor is Avogadro's number customarily used in calculating the strengths of chemical solutions to more than four significant figures, that is, 6.023×10^{23}. Machining a three inch metal part in an automobile engine to ten thousandths of an inch tolerance is only five significant figures.

So a repeating infinite series which will give us what is technically a mathematical approximation to the answer we want is perfectly adequate as long as the approximation is correct to within the precision which we can actually observe and measure. How many situations can one imagine in which one would actually need to know the square root of 2,000 to a greater degree of accuracy than 4.72136? In fact, for most scientific and technical purposes, 4.7214 or even 4.721 would be as accurate as any of our other measurements. A carpenter building a house, or a seamstress sewing a dress, does not use a microcaliper to measure the length of a two by four or a piece of fabric to a ten thousandths of an inch, because it would be absurd in that practical context.

At the point when I did my graduate work in chemistry and physics at Iowa State University, the first large vacuum tube computers had just been built, and scientists were devising techniques for using the power of these computers to make some of their calculations. Engineers and physicists sometimes discovered that the differential equation which they had devised to represent the problem they were trying to solve, had no known solution *per se*. But for some of these, they had devised infinite series which appeared to produce approximations to the correct solution if carried out through a sufficient number of repetitions. Since many of these calculations were fundamentally quite simple but nevertheless very time-consuming, and would take literally days (or even months or years) of full-time work to carry out a sufficient number of times to achieve the required accuracy, the new computers appeared as the answer to their prayers.

Now some infinite series genuinely converge towards a limit, which would be the truly exact figure. The Achilles and the Tortoise paradox above, and the algorithm for approximating square roots, are both examples of converging series. But there are other

infinite series which in fact "diverge," that is, do not draw closer and closer to some single answer as the series is calculated over a large number of recursions. In higher-level engineering and physics, it is not always apparent whether a complex infinite series is actually going to converge or not.

Some of my fellow graduate students had had the experience of devising an infinite series which appeared to be one which would give an approximate solution to a particular differential equation. They had used valuable computer time to run their series through more and more additional recursions, and had at first thought that the series was indeed converging. In their zeal to obtain an even more accurate answer, they had then signed up for even more computer time, and then discovered that their series, after appearing to converge for so many recursions, was now starting to diverge instead.

Prof. Ruedenberg, whose research team I was on at the end of my Iowa State period, had made his reputation by devising mathematical proofs which showed that some (at least) of these infinite series which were being used did in fact converge over infinite repetitions, so that one could afford to use valuable computer time to produce results which would be in fact more and more precise. This general area was the field in which I planned to do my doctoral thesis at that point.

Now in Thomas Aquinas' fourth proof (the argument from gradations in truth and value), one of his central theses was that the scientific and rational pursuit of truth was a *converging* infinite series. In other words, Aquinas' fourth proof assumed that, even if the finite human mind could never arrive at the full truth about the nature of the universe with a totally idealized precision, real scientific progress nevertheless could be made.

Aquinas' insistence during the latter 1200's that real scientific progress was possible, was the immediate precursor of the beginning of the sequence of events which would begin toppling the ancient world view and quickly lead to the series of discoveries that created modern science: in the next century (during the 1300's), Jean Buridan and Nicolas Oresme raised the first serious questions about Aristotle's theory of motion, and devised the theory of impetus (straight and curved) to replace it. In the early 1600's, Galileo used experiments in which he rolled metal balls down both straight and curved inclined planes to show that there was no such thing as "curved impetus." The idea of inertia, with which he replaced it, was one of the components of what we call Newton's laws of physics in the late 1600's. Einstein, in the twentieth century, made yet further modifications, even though he failed finally to produce a unified field theory.

We can look at the development of modern science in two ways: We can pessimistically say that, since truly final answers seem so far to have eluded us, we are involved in what is only a futile Sisyphean task that is ultimately pointless and meaningless. Some of the twentieth-century atheistic existentialists came very close to that despairing position, and fell away into total moral relativism, a rejection of reason in favor of romanticism and emotionalism, and the dark philosophy that human beings can never do more than charge with blind fortitude into the absurd. "If we cannot know the truth with God-like perfection, then we will refuse to pursue real truth at all" might almost be their motto. An all-or-nothing attitude can sometimes be the most self-destructive force known.

On the other hand, we can say (as Aquinas suggested) that it is obvious that we can progressively make life better, and come closer and closer to the ultimate truth, if we just continue to work at it.

The goal (*telos*) is not to get to the absolute end of our quest for truth, but to enjoy the multitude of concrete achievements we accomplish en route. In other words, Aquinas stated that our human object should not be the impossible goal of becoming like gods (which would necessarily throw us into despair sooner or later, because it was quite impossible), but the truly humanistic object of becoming *better human beings*.

However, just as an infinite series in mathematics can be of no use in practical calculations unless it converges on a definite limit, so the general human attempt to grow in wisdom and knowledge and make real scientific progress cannot produce practical results unless there is a God or transcendent reality which exists as the ground of the ultimate truths which we strive to know with greater and greater precision. Good science must be based on the conviction that it is not chasing some will-o-the-wisp but is pursuing something that is really there. Otherwise the vital nerve which has produced so many scientific advances over the past six centuries—based at bottom in what was the medieval theological conviction that ultimate truths of that sort actually existed—would be cut, and our world would stagnate.

So we human beings can perhaps never know these ultimate truths with literally God-like precision? A hungry person would accept a loaf of bread with real gratitude, even if three slices were missing from it. Do I need all the bread in the universe to live a happy life, or simply enough bread to eat and enjoy and fill me up today?

Infinitesimals and calculus

One truly major use of the concept of infinity in practical mathematics comes in the use of what is called calculus. This is a technique for analyzing an infinitesimally small portion of a converg-

ing infinite process, and then integrating these infinitesimals into a mathematical description of the whole process. If one can prove that a certain infinite process would converge on such-and-such a mathematical expression as its limit, then one can in effect "shortcut" that infinitely long process by simply calculating the value of the expression which represents the limit, which will in fact be the absolutely precise answer we were looking for. The mathematical description of the process of chopping the calculation up into infinitesimally small pieces is called setting up a differential equation, and the limit towards which it tends is called its integral.

Again we see that Aristotle's dire view that all infinities ultimately were futile Sisyphean processes leading to no useful goals was not quite true. Modern mathematics makes some infinite series highly useful by showing either (a) that one can arbitrarily set an *ad hoc* limit on a particular *converging* infinite series and produce perfectly adequate practical results, or (b) one can (as in calculus) work out a mathematical description of the never-quite-reached *limit* of the converging infinite process and use that for one's calculations instead. In both cases, however, we have unending infinities—processes which never in themselves truly arrive at a *telos* or *peras* or limit—which can be "tamed" only by providing a goal or finish line.

The necessity of a some sort of goal (*telos*) or limit (*peras*)

It is important to remember however, that *most* infinities do not tend towards limits, nor can they be "tricked" into accepting limits. In philosophical arguments in particular, appeals to infinity more usually involve some sort of Sisyphean infinity—a futile regression backwards, with no goal or finish line which would give the

operation any real meaning—or the false claim that a real-world series of events could be extrapolated to infinity simply because our formulaic description of the links between each member of the series of events could in theory be extended to infinity. That is, it is as though poor King Sisyphus, down in the land of the dead, were to proclaim that he was doing something useful "because, you see, I can keep on rolling this stone up the mountain forever," or a Greek farmer were to count part of his flock of sheep and then claim that he had an infinitely large flock of sheep because the series of cardinal numbers which he was using to count them was mathematically infinite.

Although Aquinas showed in his fourth proof (on truth and value) that an infinite series could produce valuable and worthwhile results (as long as the existence of a God of truth guaranteed it), in some of his other proofs he insisted equally strongly that many of the atheistic visions of a Godless universe made appeals to the infinite only in the kind of futile or wrongheaded way we have just noted. To see why this is so, however, we must turn in the next two chapters to see how fallacies and illusions can easily develop when the real world is described in inappropriate fashion, or when improper conclusions are drawn.

CHAPTER 6

The Illusions Created by a Pseudo-Infinite Regress

One kind of pseudo-infinite regress: the eternal space satellite fallacy

The fact that an explanation correctly describes one particular limited body of data which we possess does not mean that this explanation can necessarily be extrapolated into the infinite reaches of the distant past or the far-off future.

An artificial space satellite, used for photographing the earth below, or for bouncing television, radio, and telephonic messages from one part of the earth's surface to another, rotates the earth in an orbit which can be quite accurately described by Kepler's formulas (as explained at the theoretical level a century later by Newton's laws of motion). Using these mathematical equations, if I am told the mass, position, and velocity of one of these satellites at any particular moment in time, I can predict exactly where it will be twenty-four hours later, or two weeks later.

If I confine myself to pure mathematical theory and ignore all my other knowledge about that artificial space satellite and how it actually got into its orbit, then by using these same mathematical equations, I can show not only that the satellite was already orbiting the earth at around 2600 B.C., while the Egyptian pharaoh

Cheops was building the Great Pyramid, but exactly where that satellite was in its orbit at 2:17 p.m. Greenwich mean time on the second Monday in the year 2600 B.C. I can not only do that, I can demonstrate mathematically that the satellite has always orbited the earth, from all infinity, which means that it is an eternal space satellite, which provides a completely adequate reason for its own existence.

This is a most peculiar kind of illusion. In fact we know that this particular artificial satellite was put into orbit by a rocket launched from the earth only a few years ago. And yet the mathematical description of its present orbit discloses nothing of that and in fact, on the contrary, seems to indicate with irrefutable logical certainty that the satellite was always up there circling from infinite times past. The *space satellite fallacy*, as I would like to term it, lures us into believing in a kind of infinity which is only a pseudo-infinity.

It is not quite the same thing as the Achilles and the Tortoise fallacy, because we have chosen the correct equation of motion to describe the satellite's movement during the period in which we are interested in following it. It is also not the same as the Ptolemaic illusion, because we have not been fooled into choosing an equation that does not truly match the observed data, but only comes *close* to matching it. It is its own separate kind of fallacy, with its own specific characteristics, but it can lead us astray just as quickly as the other two illusions, by deluding us into believing in the reality of an infinite regress which in this case is only a figment of our own imaginations.

During the course of the twentieth century, there were periods when many eminent scientists supported the notion that our universe had always existed from all infinity, and one must suppose that new experimental evidence could conceivably be found at

some point in the future, which would revive that theory. Nevertheless, any attempt to defend the theory of an eternal universe must always remain vulnerable, at some level, to the possibility that its defenders have allowed themselves to be deluded by the eternal space satellite fallacy. Eternal universe theories therefore should be adopted only with great caution, and on the basis of overwhelming evidence *which could be interpreted in no other way*.

The big bang theory, according to which our universe simply exploded into existence 13.799 billion years ago, is also vulnerable (in theory) to the charge that its defenders are extrapolating far beyond the simple evidence of the red shift in the spectra of stars and galaxies which we can *presently* observe. It is true that radio-astronomers have now discovered the presence of a uniform background cosmic radiation permeating the entire known universe, which seems to be a still-living relic of that big bang. Telescopes have also penetrated far enough into outer space to show extremely far-off galaxies: because the light from these galaxies has taken so many millions of years to reach us, we are actually seeing what galaxies in our universe looked like millions of years ago. On the other hand, it has become clear that our universe has changed and evolved during that period. Our universe is clearly not locked into a never-changing steady state of some sort—which means that it is possible that the velocity of the universe's expansion has changed, or that some mathematically expressed physical constant has not remained invariable, but has been progressively changing over that period of time. But it must also be noted that the latest generation of extremely powerful particle accelerators has allowed us to study reactions between nuclear particles at the kind of energy levels which would have existed shortly after the big bang, and the actual experimental evidence shows that many of the kinds of processes

which the big bang theory requires are in fact empirically possible to carry out.

So although there must a necessarily speculative quality to the big bang theory of the origins of our universe—no human observer could go back to the time of the big bang and actually watch it happening—there is enough bolstering evidence to make it totally different from falling into some kind of eternal space satellite fallacy.

And it is inherently safer to try to describe an event which took place 13.799 billion years ago than it is to make bold statements about what existed an *infinitely* long time ago, because as Aristotle pointed out, infinity is not a real number—it is simply an imaginary *possibility*.

Thomas Aquinas' third proof, the argument from contingency, basically simply pointed out the logical dangers of extrapolating present-day processes back into the truly infinite past. In fact, if there were no necessarily existing transcendent ground, he pointed out, any process which could be disrupted by any contingency whatever could never have been going on since *infinite* times past. In terms of our "eternal space satellite" example, since it is always possible that an errant meteorite *could* come out of space and smash the satellite into pieces, this would have happened long ago to an artificial satellite which was put into orbit an *infinitely* long time ago.

Another kind of pseudo-infinite regress: the hanging chain fallacy

An explanation which can give accurate step-wise descriptions of the individual links between a long series of events, does not necessarily give a sufficient explanation for the process represented by the series as a whole. If it cannot explain why the series as a

whole exists, then this failure cannot be remedied by making the series infinitely long.

Let us imagine that we come upon a man standing in front of a chain made of iron links, each one about an inch long. In quite peculiar fashion, the chain seems to be suspended vertically in mid-air. The bottom link of the chain hangs several inches above the ground, and the top link of the chain is at about the height of a person's chin. We ask the man what holds the chain up like that in mid-air. He points to the bottom link and says, "that's link number one," and then points to the next link up: "That's link number two, it's holding up link number one." If we ask him what is holding up link number two, he points to link number three, and so on, until we get to the topmost link of the chain, the sixtieth link. "What is holding that up?" we ask him.

The man reaches into his pocket and pulls out another chain link, and fastens it onto the one at the top and says, "We'll just put this one on then, number sixty-one. You see, this is an infinite chain. The sequence of positive integers is infinite, so we can keep adding additional links forever. That's why the chain doesn't fall down."

As any reader can see, this is an impossible story, involving a *pseudo-infinity*. If the topmost link of the chain is not fastened to something solid, the chain cannot simply hang there in midair. A chain hanging suspended above the ground in this fashion cannot genuinely be an infinite chain. At one level, the attempt to keep the chain suspended in mid-air in the way the man in the story was trying to do it, would represent a Sisyphean infinity, that is, an infinite process which we could imagine intellectually, but which could never actually achieve the goal we have set for ourselves, no matter how long we try. But the hanging chain fallacy involves more than simply becoming trapped in an unending Sisyphean

task: King Sisyphus was able to keep on rolling his stone up the mountain forever, even if he was doomed never to finish his task. But the chain would never hang there in mid-air while someone kept on adding further links, so the hanging chain fallacy refers to a scheme which would not only never achieve its goal (even if pursued for all infinity), but could not be successfully carried out, even for one link in the chain, if attempted in that fashion.

The hanging chain fallacy is a methodological illusion. We have a methodology for investigating a particular sort of system composed of a sequence of connected things or events, which allows us to determine how they are *inter*-connected *within the system*. But we forget that this kind of system has a first thing or initiating event which must be connected with something else *outside the system*. The methodology for the internal analysis has no intrinsic limit for how many things or events can be linked, which means that logically—at one level—it could potentially be applied an "infinite" number of times. Because the methodology has the formal, abstract possibility of being applied to whatever number of things and events we please, we let ourselves be fooled into thinking that the actual, concrete system we are studying extends "infinitely."

This fallacy is similar in one way to the space satellite fallacy. In the space satellite illusion, the fact that a formula which describes its orbit might (at the abstract, formal level) have any time value put into it, could make us believe that a satellite which was put in orbit only a year ago had in fact been circling the earth since infinite times past—and we can "prove" it by tunnel-vision logic. But in the space satellite fallacy the system formed by the planet earth and the orbiting satellite is an *independent system* to a great degree, once it has been established: as long as we do not ask how the satellite got into that orbit in the first place, we have no problem accounting for why the satellite can simply continue circling

the earth without either crashing into the earth or flying off into outer space. It is a relatively independent system because, once established, it can continue on its own without having to be connected to anything outside the system.

But the hanging chain fallacy is different from the space satellite fallacy because the chain in itself is clearly a *dependent system* to a far greater degree. The chain cannot be hanging above the ground at all unless the top link is fastened to something like the overhanging limb of a tree. The methodology for explaining what-holds-up-this-particular-link presupposes that one will eventually arrive at a first link which is attached solidly to something else. If one regards the links of the chain as forming the system which is to be explained, then one of the most important things the chain is doing—hanging suspended above the ground—cannot be explained within the system itself as so defined. We must have something *external to* and *logically prior to* the system in order to explain why the system can continue to do what it seems to be doing.

The same arguments apply to the falling-chain-of-dominos example which is sometimes given as a process which is asserted to be theoretically infinite. It is indeed true that the immediate proximate cause of each domino falling, is the falling of the domino which immediately precedes it. But we also have to ask what hands carved all the dominoes out of wood, ivory, or bone. We have to ask what hands built the infinitely long table they were laid out on. We have to ask what hands went along setting up each domino on its end. Picking up a domino which is lying flat and setting it up on end takes only a small amount of energy, but with an infinitely long chain of dominos, this energy is having to come from somewhere—dominos do not just pick themselves up and set themselves on end.

So when we pretend that the reason why any particular domino topples over is that it was hit by the preceding falling domino, *and that this is the only question we need to ask*, we are simply trying to trick other people into believing that this is the only question we *have to ask* in order to account for the table full of falling dominos.

Thomas Aquinas' second proof (the one dealing with efficient causality) was a little more sophisticated than simply invoking the problems with the falling dominos fallacy, because he added one additional requirement (which was nevertheless a totally legitimate one): he pointed out that any natural chain of events—the kind of events in which objects in metastable equilibrium triggered one another into releasing their stored potential energy—could not have extended infinitely far back into the past, because the sequence of events would have to have been initially triggered by something external to the system itself which was not in metastable equilibrium. *An infinitely long chain of dominos standing on end would be perfectly balanced and would therefore never start falling*, unless something outside the system (someone's finger or the like) came in and upset the equilibrium.

The illusions of reductive naturalism

The kind of atheistic system which Aquinas' proofs are directed against, tries to account for the universe totally on naturalistic, scientifically analyzable grounds, without involving any God, higher power, or any other kind of genuinely transcendent ground of being—not even an impersonal Hindu Brahman or medieval Arabic Neo-Platonic One. This kind of system is a *reductive naturalism*, because it tries to reduce everything which exists to the level of natural processes constrained by the same laws of nature which govern everyday natural objects.

The central illusion of reductive naturalism is the belief that an adequate transcendent ground for all reality can be constructed by simply taking some natural thing or process and imagining it to be infinitely huge. But as the famous early twentieth-century theologian Karl Barth was said to have once commented, "You cannot create God by speaking of man in a loud voice." Taking any natural object or process and simply making it bigger—as large as the universe itself, or even (if we wish) *infinitely* huge—would not produce a truly transcendent reality.

What do we mean by genuine transcendence? The proofs for the existence of God show that the ground of the natural universe must transcend the realm of ordinary nature, *at least* to the extent of being able to violate some of the basic laws of nature: it must be able to ignore the fundamental laws of thermodynamics, for example, and perform actions which are not caused by any preceding events but do have causal consequences within the realm of succeeding events.

A concluding note: the ground of being must also be epistemologically transcendent

It is my belief that there are adequate reasons for stating that this ground of all being must also be epistemologically transcendent, even though Aquinas' proofs were not directed towards that goal. That is, God's continually ongoing creative *energeia* (energy, activity, or operation) had to be be related to our human conceptualization of the natural world in a way somewhat like Kant's noumenon was related to the realm of phenomena. That is, we can never do more than talk about how the creation appears *to us*, as human beings whose knowledge about the world external to our own minds is always mediated to us through sense perception.

And we must also distinguish between the divine *ousia* (the essential being or reality of God as he is in himself) and his *energeia* (his actions and operations on us creatures, and the energy he supplied to our universe to allow us to function). The divine act of creation is one ongoing *energeia* which God performs throughout the life of our universe. Special acts of grace make up another *energeia* or way in which God operates within our world.

We can try to work out approximations to the patterns we seem to observe in God's *energeia*, that is, his actions with respect to the world of our five senses. But we cannot even work out approximations as to what exists in the divine *ousia*, which is God's essential nature—God's *ousia* or essence is that which existed before the big bang, continuously lies behind and above everything else, and will always exist, even after our universe has ceased to function. God's transcendence is such that our human desire to obtain a godlike knowledge of everything will always be met with the divine "No!"

I have attempted to carry out a fuller discussion of these issues in another book, a book entitled *God and Spirituality: Philosophical Essays*.[22] This present volume must focus on the much narrower issue of whether one can prove that God or a higher power exists in the first place.

I nevertheless believe that it is necessary to insert these brief comments at this point to make it even clearer why natural objects cannot be turned into truly transcendent realities just by making them a little bigger. *The attempt to produce an adequate ground for the universe by infinitizing natural processes—while still keeping them totally natural processes—is based to the core on illusions, fallacies in reasoning, and deeply-rooted psychological denial mechanisms*. This is just another way of misusing the concept of infinity. The attempt by atheists to deny the necessary existence of some kind of *completely transcendent* God, higher power, or

ground of being is in the long run a fool's game. The fallacies and illusions discussed in this chapter represent only a few of the dishonest intellectual games in which these atheists, in my belief, necessarily become involved.

CHAPTER 7

The Epicurean Fallacy: Infinite Chance vs. Organized Structure

Epicurean chance: non-teleological, illusory pseudo-organization

A genuinely totally random process of the Epicurean variety (just like the infinite processes of the Aristotelian type which we looked at earlier) can have no *telos*. That is, there are no *goals* or states which, upon being accomplished, are *rewarded* within the overall system.

As we know, the ancient Greek philosopher Epicurus (341–270 B.C.) drew up a picture of a universe in which atoms falling randomly through empty space collided together totally by chance until some of them stuck together in such a fashion as to form the world we live in and all the creatures and objects on it. This looks at first glance like a modern scientific depiction of the way the universe developed after the Big Bang. But there was no pattern or reason to the Epicurean universe. Some atoms collided together and formed what we call human beings, while others collided together and formed oak trees. But the size and shape and color and everything about these objects could have been totally different—all these things were totally a matter of chance—and in fact, the

chance that they never would have been created at all was as great as any other chance.

There are many modern atheists who believe that this is in fact the best way of describing the origins of the universe we actually live in. But before we become too persuaded by their claim, let us look more carefully at another example of this Epicurean sort of process, one that every human child has experienced numerous times: As small children, many of us have looked up into the sky when we had nothing else to do, and searched for pictures in the clouds. Straight overhead, we might notice a cloud that looked a little like Abraham Lincoln's profile (the bearded Lincoln with the protruding tuft of chin whiskers), while over to the east we might spot a cloud which looked a little like a bunny rabbit's head with two ears sticking up. As the winds high in the sky continued to blow, the clouds would shift their patterns however, and the pictures we had discovered would soon disappear.

I would like to refer to this kind of illusory appearance of what seem to be ordered patterns as *cloud picture pseudo-organization*. The fact that a cloud had temporarily assumed the outline of some identifiable object would not in any way give it the powers of that kind of object. A cloud that, for a passing moment, looked like the outline of Superman flying through the sky, with his cape streaming behind him, would not be able to use his mighty strength to save Lois Lane from the villain. Even if I saw one cloud which looked like an elephant, and another which looked a little like a tree, the cloud which looked like an elephant could not reach out its trunk and eat leaves off the cloud tree, and continue to live and maintain its form against the shifting winds, and reproduce itself in the form of numerous small baby cloud elephants.

The Epicureans did believe that all matter was made up of atoms, which makes their ideas sound surprisingly modern. But let

us not be misled by that. It was not their teaching about atoms which caused the ancient world to eventually move beyond the Epicureans' naive and grossly oversimplified picture of the universe—Plato, for example, held that the ultimate units of matter were tiny atoms—but the fact that the Epicurean philosophy could not explain how all the higher-level organization of the universe was achieved. One cannot create a coherent universe of the sort we live in by what is merely *cloud picture pseudo-organization*, not even by providing *an infinite period of time* for the process to occur. A purely random universe cannot be turned into an organized universe by dropping in the word infinity. Cloud-picture pseudo-organization is simply not the same thing at all as real organization: the first is an illusion, while the second is a reality.

How the universe actually grew: a compounded multi-level teleological series of chance-based processes

A telos does not have to be the last item in a long overall sequenced structure of events. It can be something quite minor and relatively temporary.

Let us say that we stir large amounts of sugar or table salt into a heated beaker of water, then allow the liquid to cool until a supersaturated solution is created. This forms a totally random dispersion of molecules or ions in the liquid, where the molecules of the liquid also twist, turn, and bounce against one another in a purely random manner. But if we then take a few tiny crystals of solid sugar or salt and drop them into the beaker, the organized internal structure of these crystals will quickly spread throughout the rest of the liquid: additional crystals start forming rapidly and these crystals increase in size until they grow as large as they can. In this case, the formation of a stable, unchanging crystal structure is the

telos or goal—not an overwhelmingly huge goal—but nevertheless the crystalline structure maintains its existence after it is formed because it is not only tightly *organized*, but organized in a manner which receives a *reward*: the arrangement of the molecules in a crystal requires less energy than keeping them separate and floating around in a supersaturated liquid.

Is this a matter of pure chance, or a highly deterministic and predictable process? The answer is that it is a little bit of *both*.

We can see this kind of mixture of chance and teleological process taking place in the course of the universe as a whole. Random movements and events are continually taking place, (1) but they are inserted into the context of *numerous inherent possible structures*, where the choice of which one is chosen is a matter of pure chance, but where a particular structure once formed is fairly stable and offers rewards sufficient to continue maintaining that stable structure for a long time. (2) But sometimes there will be *an inherent undeviating necessary structure and a completely predictable outcome* once certain kinds of processes begin, even if the start of the process seemed at first glance to lie in a completely disorganized collection of totally random events. (3) In many instances, once chance has led to the production of one kind of stable structure, that structure in turn may by chance *evolve into a more complex kind of stable structure*.

In each of these three kinds of cases, a single *telos* or multiple *telê* are involved, so that these are in fact teleological processes, even if they are very different in kind from the sorts of teleological processes that some modern fundamentalist theologians talk about. We are NOT claiming that God said, “I think I’m going to create red roses, and then I’m going to create a hippopotamus, and then I think I’m going to create kind of a horse but with black and white stripes on it, and call it ... hmm ... a zebra.”

As seen in the course of the universe as a whole

After the Big Bang occurred some 13.799 billion years ago, it was immediately followed by the Planck epoch (lasting about 10^{-43} seconds), in which all kinds of matter and energy were concentrated in a dense state in completely random fashion. But then subatomic particles called quarks were formed, and quarks began to join with one another (again in apparently completely random fashion) to create larger subatomic particles called hadrons, and in particular, two kinds of hadrons called protons and neutrons.

As the universe continued to cool, nucleosynthesis began and continued until around 20 minutes after the Big Bang. During this period, atoms began to be formed, dominated by the lighter nuclei: hydrogen (where the nucleus is a single proton), deuterium (which has a nucleus composed of one proton and one neutron), and helium-4 (with a nucleus made of two protons and two neutrons). There were no elements heavier than lithium (where lithium-7, the commonest isotope, has a nucleus containing three protons and four neutrons).

Although these first elements were formed by what appeared to be chance events—when an atom began to be formed, would it become a hydrogen atom, let us say, or a helium atom or lithium atom?—but in fact the possibilities were very narrowly constricted. And then these atoms seemed to be moving around according to pure chance, so that one would have assumed that an infinite number of combinations were possible. It still seemed very much like the Epicurean picture of how the universe began.

But in an Epicurean universe, when more complicated structures appeared, this would have been through what we have called *cloud picture pseudo-organization*. There would be no stable com-

binations formed, no requirement for forming certain patterns nor rewards for attaining them, so that everything would just blow away (as it were) and fall back into random clouds moving across the sky.

But we had the first light atoms formed, which were very tight, strictly organized structures. These were not random cloud pictures of Abraham Lincoln's profile or a two-humped camel seen from the side. And although things began to move much more slowly after this point, by around 100 million years after the Big Bang, the first stars started to be formed, and in their interiors, nuclear fusion began to form the heavier elements, including carbon, nitrogen, oxygen, sodium, magnesium, aluminum, silicon, sulfur, chlorine, iron, nickel, silver, gold, and so on down through the periodic table, all the way to the heaviest elements like uranium. By this point we had a very highly structured universe.

In that first brief period of 10^{-43} seconds after the Big Bang (the Planck epoch), the universe appeared to be a totally disorganized, swirling, tumbling mass of primitive subatomic particles, with no complex internal structure, and nothing obvious that could produce a structured universe. But quarks contained as part of their internal makeup the ability to combine with one another and form hadrons. And a scientific study of quarks would indicate that the only kind of universe that could be formed from them, would be built within the strict pattern of the periodic table, with its 92 or so naturally occurring elements.

These are teleological processes

A *telos* in ancient Greek is not only the goal which the runners attempt to cross at the end of the race, it is any kind of predetermined end result or accomplishment of a long process. If I plant an acorn, the *telos* of the acorn is to grow up into a mature oak tree;

but even after achieving adulthood, the oak tree continues to grow and change. The *telos* of a chicken egg is to become an adult chicken; but even afterwards, adult chickens continue to engage in numerous actions, both intended and unintended.

And as it says in 1 Corinthians 13:9–11, the *telos* of a small child is to become a mature adult human being:

> For [now] we know in part and we prophesy in part, but when *to teleion* [the complete, or mature and adult phase] comes, the partial will come to an end. When I was a child, I spoke like a child, I thought like a child, I reasoned like a child; when I became an adult, I put an end to childish ways.

Becoming a responsible adult means accomplishing one major goal in life. But human beings can continue to achieve additional goals after reaching adulthood: becoming a successful actor on the stage and in movies and television, winning a gold medal in some athletic game at the Olympics, earning a university degree, writing books—*and especially continuing to grow spiritually, which we can and ought to do till the end of our lives*.

So there are teleological processes in nature. All seem to arise out of processes involving a good deal of chance at the beginning, where at first glance, an infinite number of combinations and possibilities can sometimes seem to be possible. Some of the organized patterns which appear are very strict: in the period following the Big Bang, the universe takes as one of its teleological goals, creating atoms to fit in the pattern of the periodic table, with its 92 or so precisely defined, naturally occurring elements.

Other patterns involve a good deal more freedom and chance: when the first stars begin to be formed around 100 million years after the Big Bang, there are a number of different sizes and types

which appear, some using different kinds of nuclear reactions within their interior. Their distances and relations to one another vary in what seems to be an infinite number of different ways. Yet a star is a highly structured entity, and they have to fit within a finite number of stable organizational patterns: neutron star, subdwarf, white dwarf, red dwarf, brown dwarf, black dwarf, red giant, blue giant, supergiant, binary star, pulsar, and so on.

So in spite of the chance elements involved, the formation of a star is a teleological process. I do not mean that a Creator God with a long white beard said something like, "I think I will cause a star to form right here, because from the perspective of the planet Earth, it will create a pattern of stars which will look like a huge dipper up in the sky, and amuse the human beings who eventually appear on that planet."

No, I mean that the formation of a star means that a period of chance and random occurrences will abruptly lose some of its random character. There are only a finite number of basic ways that a star can be structured, and once the star has formed, most of these organizational patterns are fairly stable and will last for a long time.

Patterns (archetypes) seen in the progressive development of life on the planet Earth

The planet Earth was formed about 4600 MYA (million years ago), the first liquid water appeared on its surface around 4404 MYA, and by 4280 MYA or so, the water had turned into a thin soup containing amino acids: carbon-based molecules containing amine ($–NH_2$) and carboxyl (–COOH) groups. All life forms on earth are given their structures by proteins, and each protein molecule is made up of one or more long chains of amino acids.

So it is surmised that the first appearance of life occurred after some of these amino acids began joining one another in long chains, and some of these chains developed the ability to replicate themselves and create copies of their structure which then began to spread all through the primordial ocean.

Somewhere between 3900 and 2500 MYA, primitive one-celled organisms similar to prokaryotes evolved, which were made up of more complicated structures involving different component parts. They usually had one chromosome containing DNA which contained the "construction guidelines" as it were for its replication.

Now a pattern or archetype, once established, can sometimes undergo further development by having part of the pattern modified or expanded, or by having additional subpatterns attached. In the process, the genetic complexity of these early life forms also had to keep on increasing. Some basic underlying patterns seem to have worked much better than others, so that by our present point in time, all organisms living on the planet Earth share a common genetic heritage as their underlying structure: a set of 355 genes passed on to us from an ancestor which lived 3.5 to 3.8 billion years ago.

It is generally believed that there was more chance and random selection involved here than in some of the earliest developments in the universe's history. Which amino acids ended up becoming the most important basic building blocks? What specific genes evolved to guide living organisms into developing the structures they needed for survival and propagation? This was largely a matter of pure chance, but once developed, these patterns fairly rigidly determined the structure of the living creatures which followed.

So after the often quite random chaos of the first period in the development of life on earth, the appearance of new kinds of living organisms became much more structured and much less the prod-

uct of chance alone. The proteins in human beings, fish, wheat, rice, and yams all contain a selection of amino acids from the same small group. By our present point in time, what are the chances that a genuinely new kind of amino acid would appear and start being replicated and propagated here on earth? Zero, or practically so.

Particularly within closely connected groups of species, one can use genetic analysis to see which species was an ancestor of which other species: whales and hippopotamuses had a common ancestor, and via that ancestor, shared a common ancestor with the ruminants (cattle, sheep, and antelopes). Seals on the other hand shared a common ancestor with such carnivorous animals as bears, weasels, raccoons, and skunks.

One kind of archetype: winged flight

As life developed on the planet Earth, there were various sorts of patterns or archetypes which appeared, which had the capacity to cross over and appear in a wide variety of different species.

Let us take the development of wings as one such repeating pattern. The first creatures which flew through the air on wings appeared not long after the first complex life forms began spreading over the land surface of the planet Earth. Fossils of the earliest ancestors of the modern dragonfly appeared 325 MYA in the Carboniferous period, the Age of the Amphibians, when the Earth's ancient coal beds were being laid down. Many other insects subsequently developed similar winged form: grasshoppers (which developed 250 MYA), wasps (first appearing in the Jurassic period), and so on.

But then some reptiles began experimenting with the winged life. Pterosaurs (which were reptiles and not dinosaurs) flew through the air from the late Triassic to the end of the Cretaceous

period (228-66 MYA), They had wings made up of a membrane of skin that stretched from their greatly lengthened fourth finger down to their ankles.

Dinosaurs gave birth to a different kind of winged creature, which we today call birds. Archaeopteryx, for example (an early transitional form) lived around 150 MYA, and had wings composed of feathers attached to its arms like modern birds, but also had lots of teeth, three usable fingers (with sharp claws) at the end of their arms, and a long bony tail.

Mammals proved that they also could evolve winged varieties, which we call bats. And flying fish cannot make extended trips through the air over the ocean surface, but they can jump and glide through the air far enough to escape ocean predators.

The archetypal pattern of a more highly developed intelligence

Around 500 million years ago, the first mollusks appeared: bivalves (the ancestors of modern clams and oysters) were mostly unable to change their location, and did not need any great amount of intelligence. If food drifted by their location they ate; otherwise they went hungry. But there were other mollusks (such as the ancestors of modern snails, slugs, and octopuses) which were able to move around by crawling and swimming. This required more intelligence, but gave them the advantage of being able to go search new areas when food ran out where they were.

Amphibians, and then reptiles, subsequently evolved, and had even greater mental abilities.

But when one of my daughters tried to keep a pet iguana, the reptile's mental ability was so limited that it would attack a woman's red-painted fingernails because it thought they were edible fruit. In those days, with lamps using hot incandescent bulbs, one

had to be wary because an iguana would crawl on top in order to get warm. But after the heat got great enough to start burning and doing serious harm to the reptile, it would take the animal an enormous time to reason out that what was causing the pain was its lying on top of the light bulb.

Mice, by comparison, are such mental giants, that one has to be careful about what kind of cage to keep them in, since they are more than capable to figuring out how to dismantle anything made of metal that is held together by screws and bolts and easily movable latches. The appearance of mammals represented a major advance over reptilian intelligence.

Over and over again, therefore, in the course of evolution, the development of a higher intelligence could serve as a *telos*, a goal which could supply rich rewards.

But we need to be careful about this claim: the largest marine phylum are the mollusks, containing almost a quarter of all known marine species. In fact, they are the second largest phylum of invertebrate animals. They did not disappear when creatures with greater intelligence appeared. When bats learned to fly, all the other mammalian species did not curl up and die.

Developing higher intelligence was hardly the only proper evolutionary goal for living creatures. But it has been a goal or *telos* which has provided certain kinds of evolutionary advantage over and over again, which means that on the proper kind of planet, the universe is constructed in such a way that not only can we predict that living creatures will appear, but also that at least one species will develop a human level of intelligence. But extensive random elements are involved. Why did human beings evolve from monkeys instead of from raccoons? It was probably more a matter of chance than anything else, at certain places along the evolutionary line.

We therefore need to call this a teleologically-oriented random process

It has become clear by this point in the development of modern science, that a vast number of the natural processes which are continually going on in the universe around us, represent some kind of mixed process in which truly random elements are present, but in which things can be achieved which embody kinds of organization which will then become relatively self-perpetuating and which will shape subsequent events in major fashion.

In the contemporary theory of evolution, biologists believe that, in the early days of the planet earth, the ocean became filled with dissolved amino acids formed from ammonia and methane which were still present in our planet's atmosphere. In this warm, dilute organic soup, the chemical interactions between these amino acids was totally random. What were the odds against one of these chance chemical interactions producing a complex organic molecule which could not only survive but reproduce copies of itself? The odds against that happening were very high, everyone would agree. But the total number of chemical reactions going on was so high, that evolutionary biologists are convinced that this is what in fact finally happened. This is the way, they explain, that the first primitive lifeform appeared on this planet. This was the first major *telos* (achievement, accomplishment, or marking point) in what was to be a long series of achievements (*telê*).

That first self-reproducing organic molecule was the product of a purely random chemical interaction, but once it had been formed, these highly organized molecules were "rewarded" by being able to survive and propagate. And when (again by largely random processes) they began to develop an even more complex structure, which made survival and replication even easier to carry out, life

itself began to evolve. Each successful modification was *produced by random processes*, but *resulted in systematic advantages* which were subsequently self-perpetuating.

So tossing around words like "infinity" and "purely random processes" is seriously misleading if it is done to imply that we live in an Epicurean universe totally run by random chance, because talking that way *tells only half the tale*. In the way in which contemporary biologists actually use evolutionary theory, each successful evolutionary advance is seen as representing the achievement of some *telos*, that is, some organized state which confers rewards. I would therefore prefer to speak of this sort of theory as a teleologically-oriented random process, using the word *telos* not in the sense of some single divinely *preordained* goal, but in the sense of achieving a series of *telê* or accomplishments, each of which then served as the start of another random series.

The Epicurean fallacy within modern secular humanism creates anomie

The kind of secular humanism which dominates so many of our current schoolbooks stresses that the forces which produced stars and planets and the first life forms, and even human intelligence, operated purely on the basis of chance and randomness, in a manner which was totally devoid of meaning or higher significance. The unfortunate children who dutifully studied these books in school were left to draw what seemed to be the obvious conclusion: life in general, the universe, and even my own individual fate, were as ultimately meaningless as the random patterns formed by the shifting clouds in the sky.

Many of them drifted into a state of mind which sociologists call *anomie*: to people caught in this mental state, purposive activity seems futile, other than attempts to gain the fleeting pleasures of

greedy self-aggrandizement. But this in turn quickly grows boring or self-destructive. Morality is regarded as nonsense, and one's own life is left without any sense of meaningful direction. Some of these children are pushed all the way over into sociopathic and psychopathic psychological states.

Life itself seems no more than Sisyphus trying over and over to roll his rock up the hill, and failing each time. Only to make the story worse, in this modern version of the tale, wolves and leopards are waiting to gobble the children up the minute the little boys and girls seem to weaken in the slightest.

Contemporary secular humanism is ancient Epicureanism turned vicious: not only do we dwell in a universe of pure chance, they insist, but one ruled only by the battle called the survival of the fittest. The creature with the sharpest teeth or the longest claws (or the most fecund birthrate) will "win" this desperate contest which is being continually fought out over soil which is drenched with the blood of all those who lost the battle.

Is it clear what is at stake here? As in the ancient Epicurean philosophy, words like infinity and randomness are tossed around, and children are given the impression that the story they are hearing from intelligent, knowledgeable adults, is that life is a tale told by an idiot, where no *telê*—no inherently meaningful or worthwhile goals or results or rewards—have ever been obtained or can ever be achieved. And then the modern, truly vicious element is added to the Epicurean mix: the children are told that they have been condemned to strive as hard as they can to kill or eat or outbreed everything else on the planet, but that every individual and every species will nevertheless always eventually lose that battle. If this is *all* the story—if this represents the complete telling of the *whole tale*—then anomie and despair are the totally logical reactions.

Aquinas's proofs

In his fifth proof (the argument from design), Thomas Aquinas argued that some of the processes which we could see occurring at the inanimate level of the universe nevertheless seemed to show what was clearly goal-defined activity: that is, processes in which things could be accomplished, and rewards won. In terms of our current scientific knowledge, we are forced to acknowledge that the appearance of stars, planets, life itself, and intelligent creatures cannot be the result of a Sisyphean infinite process, because that kind of Aristotelian infinite process, by definition, never achieved any identifiable goals. Both in an individual human life, and in the history of the universe as a whole, the course of time is marked by the achievement of numerous *telê*, recognizable accomplishments and attainments.

In addition, Aquinas' fourth proof (on truth and value) can be combined with his fifth proof to demonstrate that the universe simply cannot be portrayed as nothing more than a cloud-picture pseudo-organization, whose laws and structures are only creations of human subjectivity. The fundamental problem with the Epicurean vision of the universe is that it simply begs most of the truly important questions about the nature of human life and the universe. It blatantly ignores these concerns and plunges us into a particularly despairing variety of atheism by pretending that it has covered *all* the issues, and told *all the story there is to tell*.

It is important to remember that blithe talk about infinity and chance—as though these were simple concepts—can quickly lead us into fallacies and illusions and pseudo-infinite regresses, where we eventually talk ourselves into believing that there can be no God or higher power. As part of this, our foolish minds become darkened, and we find ourselves wandering through life in com-

plete inner confusion. One by one, all the goals or purposes we could imagine seem to collapse into meaninglessness or futility or total unattainability. Cynicism mates and breeds with greed and dishonesty. At the end, our lives become permeated only with despair, or bitterness, or self-pity, or an unfocused generalized anger at everything and everyone around us, or (in the darkest and most evil stage of all in the process) the cold, implacable cruelty of total narcissists and psychopaths.

In his *Inferno*, Dante laid out the entire psychopathology of the mind's inner descent into its own hell. The sign over the entrance into this vale of misery, in Dante's account, contained the simple statement, "Abandon all hope, ye who enter here." But Thomas Aquinas, like Dante, knew that there was another, upward path, and Aquinas made it clear in the way that his *Summa Theologica* was structured, that the signpost pointing the way to the path of life proclaimed the opposite of the one over the gate to hell: "This way to the realm of faith, hope, and love." One way hope and progress, the other way hopelessness and the elevator ride that only goes downwards; one way real logic and rationality, the other way the ever-downward path into illusion, fallacious reasoning, pseudo-explanation, and lying to oneself. The proofs for the existence of God represent far more than abstract philosophical word-games: ultimately they force us to make a choice, the only real choice in our lives that will genuinely matter.

Part III

Anselm's Argument

CHAPTER 8

Anselm: the Ontological Proof

In 1078 (roughly two centuries before Thomas Aquinas' time) the medieval theologian Anselm wrote a work called the *Proslogion* in which he gave what some have regarded as a distinctively different kind of proof of God's existence, one set up on an entirely different kind of basis from Aquinas' five proofs. It is called the ontological argument.

Anselm was not only a brilliant philosopher, but also displayed such impressive administrative abilities that he was later called over to England where, in September 1093, he was made the new archbishop of Canterbury. These events all took place shortly after the Norman Conquest in which, as we all remember, William the Duke of Normandy took a French army across the English Channel in 1066 and conquered all of England. If we visit Canterbury today we will see that, although most of the structure of the present cathedral there dates from a later period, the oldest tower over on one side was in fact built during the general period of Anselm's archbishopric, and serves as a sort of visual memorial of his career.

Now Thomas Aquinas' proofs had as their basis our *empirical knowledge* (based on sense perception) of the way in which the universe actually behaves. Anselm's attempt to prove the existence of God, however, must be regarded as something quite different, an "ontological argument" as it has been called, which confines

itself to statements about the necessary internal logical structure of any attempt to talk about the nature of beings (*onta* in Greek) in any possible universe.

God is that than which nothing greater can be conceived: Seneca's materialistic God

In Anselm's proof, he began by defining God as "that than which nothing greater can be conceived" (*aliquid quo nihil maius cogitari possit*). He did not come up with this strategy completely from scratch however. The basic idea was taken by him from St. Augustine, who in turn had borrowed it from the pagan Roman philosopher Seneca (a famous Stoic author of the first century). There is a two thousand year tradition, in other words—both Christian and non-Christian—of talking about the supreme being in a fashion somewhat like this.

Seneca (c. 4 B.C. – A.D. 65) was a Stoic, as we noted: This group of ancient Greco-Roman philosophers believed that everything real was made of matter. This applied even to the world of thoughts and ideas. So the human spirit, they believed, was a thin, warm, luminous gas which permeated the entire human body. When the spirit left the human body, the corpse became cold as a consequence. But the human spirit was a thinking gas, possessing consciousness and able to put thoughts together in logical fashion. God likewise was a fiery gas which possessed the power of logical *thought*—the Greek word here was *Logos*, from which we get not only the English word logical, but also the names of many of our natural sciences (biology, geology, cosmology, and so on), since the ideas in the mind of God provided all the laws of science.

The universe of liquids and solid objects which currently surrounds us on all sides was created, the Stoics believed, when God allowed one tiny portion within his being to cool off. But most of

reality remained as God in his original fiery form, so that God was still far larger in terms of spatial extent than the physical universe which he contained within his being. Since God contained all other spatial objects that existed, in quite literal fashion we could say that *his magnitude was greater than that of anything else which could be conceived*.

Seneca phrased the Stoic argument in this fashion: "After all, how great is the distance from the farthest shores of Spain all the way to India? Only the space of a very few days—if a good wind drives the ship."[23] But suppose the mind travels out into the heavenly regions, to the realm of the farthest star? There we encounter a God who is bigger and greater even than the whole visible universe, and contains the universe within his own being, as a part of himself:

> Here, finally, the mind learns what it long sought: here it begins to know God. What is God? The mind of the universe. What is God? All that you see, all that you do not see. In short, only if he alone is all things, if he maintains his own work both from within and without, *is he given due credit for his magnitude; nothing of greater magnitude than that can be contemplated.* [24]

As those last two clauses say in the original Latin, *sic demum magnitudo illi sua redditur, qua nihil maius cogitari potest*. "Greater than" in this earliest form of the argument meant in terms of spatial extent in a totally materialistic fashion.

God is that than which nothing greater can be conceived: Augustine on God as Truth Itself and God as the Neoplatonic One

Augustine (354–430 A.D.) liked to speak of God as Truth Itself, because this was one of the principal ways in which human beings

directly encountered him. Now if I (or any other rational person) was wrong about something, and then learned what the truth was, I would relinquish my old idea and accept the actual truth as something far greater than myself. The true answer to a question existed before any human beings came along to ask that question, and would continue to exist even if all the human beings on earth believed something false about it. As we will see later on, Thomas Aquinas derived part of his Fourth Proof (the Argument from Gradations in Truth and Value) from Augustine's reasoning here.

Now Truth in this sense meant something very similar to what the Stoic philosophers had called the Logos (and to them of course the Logos was the supreme God, than whom there was no higher). Stoicism had begun falling out of style in the period after Seneca, however, so that by the end of the third century A.D. what was called Neoplatonism had started to become the dominant philosophy among both Christian and pagan thinkers in the Roman Empire.

This new philosophy retained something like the Stoic idea of the Logos. Christian Neoplatonists continued to use the Greek word *Logos* (or its Latin equivalent *Verbum*), but pagan Neoplatonists tended to use the Greek word *Nous* instead (where *Nous* was pronounced to rhyme with the English words goose, loose, and moose). In Neoplatonic doctrine, the *Nous* contained all the Platonic ideas and archetypes.

> My note: in the eighteenth century, the German philosopher Kant took the Greek noun *Nous* and replaced it with the Greek participle from the same root—noumenon—so he could better contrast the noumenon with the phenomenon. The word noumenon was simply Kant's alternate term for the realm of the Platonic ideas and the real laws of nature.

The Neoplatonists taught a hierarchical view of reality. At the bottom was the world of matter, above that was the divine *Psyche* or World Soul, above that was the divine *Nous* or *Logos* (the realm of the Platonic ideas and archetypes, along with the laws of nature which the scientists studied, and other universal truths—what the Stoics had regarded as the high god).

But then they added a yet higher realm, which pagan Neoplatonists called the One and Christian Neoplatonists called God the Father. This was for them the ultimate ground of Being, which could not be described in terms of the truths and logical reasonings of ordinary human language, although a few deeply spiritual human beings were sometimes able to enter a meditative state where they had a vision of this reality as something overwhelming which was too great to be genuinely comprehended. It was the equivalent of what the Hindu philosophers of ancient India called the Brahman.

1. THE ONE
God the Father, the highest level of Being
↓
2. NOUS or LOGOS
This is the level of the Word, Verbum, the Platonic ideas and great archetypes, what Augustine called Truth Itself—in traditional Christian Trinitarian doctrine, this is the part of God that came to earth and became embodied in human form in the person of Jesus
↓
3. PSYCHE
The World Soul
↓
THE REALM OF MATTER

Now when Augustine was writing, Platonic philosophy had only just started arriving in the Latin-speaking western half of the Roman empire, so there were still many Stoics in the part of the empire where he lived, as well as people who were simply skeptics. But Augustine believed that his arguments showing *that God as Truth Itself was superior to anything merely human*, were good enough arguments to convince most skeptics that a Higher Power did in fact exist. And he believed that turning to God as the Nous or Stoic Logos or Truth Itself was sufficient for salvation.

He did however point out that if there is something—the One—higher and greater even than the Nous or Logos or Truth Itself, then this would be God to an even greater measure. Therefore, Augustine said, there was no excuse for being an atheist, or as he phrased his argument:[25]

> Moreover you had conceded that if I should show you that there is something above our minds, you would confess that it is God, provided there were nothing still loftier. I had said, acceding to this concession of yours, that it would be sufficient to demonstrate this. For if there is something still more excellent, that rather is God: if however there is nothing, then truth itself is God. Whether therefore that more excellent something is or is not, you nevertheless cannot deny that God is: which was the question set to be discussed and treated by us.

The structure of Anselm's argument: "The fool hath said in his heart"

Anselm began his line of argument by quoting the famous opening line[26] of Psalm 14: "The fool hath said in his heart, 'There is no God.' "

Anselm then went on to argue that, if by the word "God" we meant a higher power which was the supreme reality—that from which all other possibly thinkable beings derive their being—then this implied the following definition:[27]

1. God is that than which no greater can be conceived.

But since the fool in Psalm 14 is an atheist, he tries to say that such a higher power does not exist. Anselm then points out that one cannot say that something does not exist unless one has some intellectual concept of whatever it is whose real existence one is denying. If one conceives of unicorns as being creatures with bodies like horses, but a single horn sprouting from the middle of their foreheads, then the statement "unicorns do not exist" is an intelligible statement. In the English language, however, the statement that "wurble-woobles do not exist" is not an intelligible proposition, because the word wurble-wooble does not mean anything in English, and we can form no intellectual concept of the first term in that assertion: it is just a meaningless, nonsensical collection of words. So this observation allows us to set out a second proposition:

2. I cannot meaningfully deny the existence of *something unless I have an intellectual concept already in my mind of that to which I am denying any real external existence.*

Now it is in fact true that real atheists who deny the existence of God are not usually talking meaningless nonsense at the simple level of asserting that "wurble-woobles do not exist," because they do have some sort of concept of God in their minds, even if it is confused and muddled and based on garbled childhood recollections and interpretations of what they thought they heard various religious teachers saying. They have some sort of concrete image of a "God," but this idea seems to them clearly to be an imaginary, wrong-headed illusion or wish-fulfillment fantasy which only a very ignorant person could believe actually existed—this is why they insist so strongly that God does not exist.

Anselm then uses an interesting strategy: if I devise an exaggerated idea of what God is and what God can do—let us say the assertion that a truly loving God would never allow human beings to suffer any kind of physical pain—then my denial of that this particular kind of God exists does not necessitate that no kind of God exists.

To counter this fallacious reasoning, Anselm added an interesting proposition to the first two, a clarifying statement about one of the things that could be meant when we said that one thing was "greater than" another:

3. Something which exists in external reality is greater than something which is only a figment of my imagination.

"Greater than" is a fairly broad relational term. It can mean bigger in magnitude (15 is greater than 10, 1.23 is greater than 1.22).

It can refer to a political hierarchy (the king of England is greater than the duke of Lancaster; the Supreme Court of the United States is greater than an appellate court, which in turn is greater than a local trial court). When discussing ontological issues, a higher power or ground of being from which all other beings derive their existence is greater than those derivative beings in the sense of its being ontologically prior to them. What Anselm was doing here was pointing out yet another sense in which we could say that one thing was greater than another: something which actually exists will always be "greater than" something which has no reality at all outside of someone's imagination. If I asked, "which would you prefer that I give you, one real twenty dollar bill or an imaginary stack of hundred dollar bills," which would most people choose?

But if something which exists in reality is greater than something which is only imaginary, this in turn leads to the following logical consequence:

4. There must exist in external reality something which is greater than anything else I could conceive.

That means that there will always be a Higher Power or First Being which is in reality greater than everything else.

Problems with Anselm's argument

A major problem arises from the fact that most present-day atheists regard the natural universe itself as the supreme reality. Since the universe which scientists study and analyze does in fact exist, and is not imaginary, proposition three above does not come into play, and Anselm's arguments (taken in and of themselves) do

not allow us to refute these atheists' belief that Nature in itself is the highest reality which exists. It would require something more than Anselm can give us, to successfully counter that kind of atheistic argument.

Second, we need to remember the Achilles and the Tortoise fallacy from our earlier chapter on fallacies and illusions: the fact that a theory is internally logical does not mean that it actually describes what happens in reality. The theory that the sun, moon, and planets move in circular orbits around the earth (which was believed through the whole length of the Middle Ages) is totally logical internally; the problem is that it does not conform with actual experimental evidence, if we keep truly precise records of the position of these entities against the background of the fixed stars.

An atheist, when confronted with a totally logical theory of God, could likewise insist that—however internally logical this theistic doctrine might be—it did not correspond with the real world as an empiricist would apprehend it.

Third, I am made uneasy by the crucial role played in Anselm's argument by one word—"something than which nothing GREATER can be conceived" (*aliquid quo MAIUS nihil cogitari potest*). The word greater can mean so many different things, that it is difficult to see how this could be regarded as a sharp, precise logical argument.

Fourth, Anselm's kind of argument might appear logical enough in a world which assumed that there was a hierarchy of being (One, Nous or Logos, Psyche, matter). This assumption dominated the western philosophical world for fourteen centuries, all the way from the Neoplatonic philosopher Plotinus in the 200's A.D. to the late 1600's when John Locke began overturning all the medieval assumptions in a wholesale way. But because of Locke, western philosophy in today's world almost never has a real hier-

archy of being in the Neoplatonic sense. Anselm's argument is totally irrelevant to most modern western philosophy.

Fifth, this medieval hierarchy of being was first devised on empiricist grounds, so arguments which assume the existence of this hierarchy cannot truly be said to be purely ontological.

Sixth, in spite of the fact that Anselm seemed to assume that if we had a fully developed intellectual concept of God, we would somehow or other know automatically if this concept referred to something real or was purely imaginary, how could we in fact know this without reference to empirical evidence? The claim that it is a purely ontological proof is false, and it in fact totally begs the question of how we can tell whether or not God truly exists.

Finally, to repeat what we pointed out earlier, the universe which modern scientists study and analyze does in fact exist, and is not imaginary. This means, as we noted, that Anselm's arguments (taken in and of themselves) do not allow us to refute the most common modern atheistic claim that Nature in itself is the highest reality which exists. These modern scientifically-oriented atheists would insist that they had good empirical grounds for denying the existence of anything higher or above the natural world of matter, energy, and the scientific laws structuring this natural universe. "Proving" that the world of Nature as seen by modern natural science is somehow or other "God" would not seem to most people to be a genuine proof for the existence of God.

In conclusion

I have wavered on this over the years, but at this point I believe that Anselm's argument does not work, or at the very most is a bit-too-clever piece of word play that proves very little useful.

There has however been enormous debate among philosophers about the proof over the past almost thousand years, with numer-

ous very good philosophers arguing both for and against its validity: Gaunilo of Marmoutier (who famously entitled his work *In Defense of the Fool*), Thomas Aquinas, Descartes, Leibniz, Spinoza, Hume, Kant, Lotze, Gödel, Frege, Charles Hartshorne, Alvin Plantinga, and Iris Murdoch, to list but a few. It would take a very long book to even begin to sum up all their positions. So I will have to ask the readers of this present book to go back and start researching the issue for themselves if they want to pursue it further.

In this book, the proofs I will primarily be interested in are Thomas Aquinas's five arguments. I believe that they still work if they are reformulated in modern scientific terms. Even more importantly, I regard them as giving fascinating insights into what the western tradition regards as God, and how God is related to the world.

So let us turn to these proofs, taking them one at a time.

Part IV

Thomas Aquinas's Five Proofs

First Argument: from Motion

TEXT OF THE FIRST PROOF

The text is found in St. Thomas Aquinas, *Summa Theologica* I. q. 2 art. 3 which reads as follows: [28]

Article 3. Whether God exists?

I ANSWER THAT, the existence of God can be proved in five ways. The first and more manifest way is the argument from motion.

It is certain, and evident to our senses, that in the world some things are in motion. Now whatever is in motion is put in motion by another, for nothing can be in motion except it is in potentiality to that towards which it is in motion; whereas a thing moves inasmuch as it is in act.

For motion is nothing else than the reduction of something from potentiality to actuality. But nothing can be reduced from potentiality to actuality, except by something in a state of actuality. Thus that which is actually hot, as fire, makes wood, which is potentially hot, to be actually hot, and thereby moves and changes it.

Now it is not possible that the same thing should be at once in actuality and potentiality in the same respect, but

only in different respects. For what is actually hot cannot simultaneously be potentially hot; but it is simultaneously potentially cold.

It is therefore impossible that in the same respect and in the same way a thing should be both mover and moved, i.e. that it should move itself. Therefore, whatever is in motion must be put in motion by another.

If that by which it is put in motion be itself put in motion, then this also must needs be put in motion by another, and that by another again. But this cannot go on to infinity, because then there would be no first mover, and, consequently, no other mover; seeing that subsequent movers move only inasmuch as they are put in motion by the first mover; as the staff moves only because it is put in motion by the hand.

Therefore it is necessary to arrive at a first mover, put in motion by no other; and this everyone understands to be God.

CHAPTER 9

Aquinas on Motion, Change, and Alteration

This first of Thomas Aquinas' five proofs is the most challenging by far when it comes to making sense of it in terms of the natural science of our own times, for physics and astronomy have changed drastically over the seven centuries which separate us from him. In fact, this proof is the only one of the five where it will be necessary to go all the way back to Aristotle and completely rethink the basic issues from the start in order to produce an argument which can be used today. But we need to look at how Aquinas himself presented this proof in the present chapter, before going on in the next chapter to explaining how it can be revised.

A good deal of Aristotle's *Physics* was devoted to an analysis of *kinêsis* and *metabolê*. It is customary among classics scholars to translate the first word as "motion" and the second word as "change," but in fact Aristotle used them as synonyms, or near synonyms. The word *kinêsis* did not mean only motion in the common modern English sense, that is, motion as an object moving through space, but change in general. So to eliminate this confusion, I will translate *kinêsis* in the following discussion as "change" (not motion), and *metabolê* as "alteration." Aristotle said that there were four kinds of *kinêsis*:

> There is no kind of change (*kinêsis*) apart from things. For the thing which is altering (*to metaballon*) always alters into something which is different essentially (*kat' ousian*), or quantitatively (*kata poson*), or qualitatively (*kata poion*), or by change of place (*kata topon*).[29]

In other words, when we look at the various kinds of change and alteration which take place in the world of nature, we see four sorts taking place:

> ***Kat' ousian*:** one thing changes into something which is in some essential and substantial way a totally different kind of thing. A person chops down (1) an oak tree which is growing naturally in the forest, saws it up into lumber, and builds the frame for (2) a small barn out of it. A growing, living oak tree and the barn where a farmer keeps his cattle are two totally different kinds of things.
>
> ***Kata poson*:** a thing can change at the level of the "how-much" (quantitatively): When fed enough food, the small calf in the barn grows bigger. When no rain falls for a long period of time, the stream running through the meadow grows smaller. If I go a long period of time without a hair-cut, my hair grows longer.
>
> ***Kata poion*:** a thing can sometimes change at the level of one of its qualities (some sort of subsidiary attribute or character) without nevertheless changing its essential and substantial identity: An apple can change from a green apple into a ripe apple, but will still be an apple. A person may suddenly begin to speak angrily and brusquely, so that another person responds by asking "Why are you talking to me *in such a rude manner*?" and yet the person who was speaking angrily still remains essentially a human being, and the words being spoken were still essentially intelligible human speech.

> ***Kata topon*:** change in the sense of movement through space, moving from one place (*topos*) to another, was in fact put in last place by Aristotle, as not necessarily the most interesting philosophically of the various kinds of changes which things could undergo.

This is why translating *kinêsis* as "motion" can get us into trouble and make us misread what Aristotle was saying on many occasions.

At one fundamental level, Aristotle was quite correct: in the realm of nature, taking an object which was at rest and putting it in motion did in fact require active energy, and changing the velocity or direction of an object in motion also in fact required the application of some kind of force. Some sort of actual energy (*energeia* in Greek, *actus* in Latin) had to be applied from the outside in order to produce a change which would otherwise exist only as a possibility (*dynamis* in Greek, *potentia* in Latin). When a baseball pitcher stood on his mound with a baseball in his hand, it was potentially possible for that ball to travel 60 feet 6 inches to home plate where the batter was standing, but that potential could only be realized if the baseball pitcher used his muscles to throw the ball at the plate.

What Aristotle did not realize, however, was that once an object was put in motion, it would continue in the same *unchanging* direction at the same *unchanging* velocity unless some outside force was exerted to *change* it. That is, he misapplied the underlying principle and falsely assumed that an inanimate object could remain in motion only as long as some external force was continuously expending energy on it. Aristotle's mistake here unfortunately blocked the European and Arab world from developing a workable scientific formula for the physics of objects in motion for over a thousand years.

Now Aristotle's faulty theory of motion can appear to be true in certain situations: if I attempt to push a heavy table across the floor it may seem to be the case that the table moves only as long as I am actually pushing it, and that the minute I stop energetically shoving it, the table stops moving. The same may seem to be the case if an ox is pulling a heavy ox-cart: when the ox stops pulling, the cart stops moving instantly.

But in the century after Aquinas, scientists like the Paris philosopher Jean Buridan, along with Nicolas Oresme, the bishop of Lisieux, started the process of challenging Aristotle's theory of motion. Why does a spear keep on flying through the air for a considerable distance even after the hand which was pushing it is no longer in contact with it?

> As a note: ancient Aristotelians had a rather naive rationale for explaining this phenomenon away, which was rather weak to say the least: the moving front of the spear pushed air out of the way, they said, which swept around and hit the spear from the back, thereby keeping it in motion for a while.

And there were many other kinds of natural phenomena where Aristotle's theory likewise simply did not seem to be true. Medieval Europeans became quite expert in using windmills and waterwheels for running simple machinery. It was well known that if Hans, who worked at the watermill, got the end of his coat caught in the huge gears, the supply of water to the waterwheel could be cut off as soon as he screamed out, but it would still take time for the wheel to start slowing down and eventually grind to a halt, and during that time Hans himself might well be pulled into the gears and severely mangled. Yet Aristotle's theory said that the wheel

(and the gears) should have stopped moving instantly, the moment the onrushing water which was turning the wheel was cut off.

It was not until Galileo came along that the essentially correct answer was worked out: an object in motion tends to remain in motion at the same velocity and in the same direction until some force acts upon it. When a spear is thrown, wind resistance progressively slows its velocity and the earth's gravity pulls its trajectory downwards until it finally lands on the ground. But if that same spear had been thrown by a space-suited spear-thrower somewhere out in outer space, the spear would keep going at the same speed and in the same direction until it fell under the influence of the gravitational field of some planet or star or other object.

But that was later on in history. Thomas Aquinas in the thirteenth century did not know about the scientific advances of later eras—he had only Aristotle to go on, and so he put forward his first proof for the existence of God based on Aristotle's theory of change and motion. The Latin word *motio*, which was used to translate the Greek word *kinêsis*, meant motion in the English sense—primarily movement in space—and it seems to me, when reading Aquinas, that he was principally thinking of motion through space, even though he was certainly aware that Aristotle had used the word to refer to change in general. So for example we see Aquinas subdividing motion into categories such as something being moved by accident, something being moved by violence, heavy bodies sinking or light bodies rising, and the movements of animals.[30]

So in his *Summa contra Gentiles*, which he wrote in 1259–1264, Aquinas phrased the basic argument from motion as follows:

> Everything that is moved is moved by another. That some things are in motion—for example, the sun—is evident from sense. Therefore, it is moved by something else that

> moves it. This mover is itself either moved or not moved. If it is not, we have reached our conclusion—namely, that we must posit some unmoved mover. This we call God. If [that which moves the sun, for example, is not an unmoved mover but is also itself] moved, it is moved by another mover. We must, consequently, either proceed to infinity, or we must arrive at some unmoved mover. Now it is not possible to proceed to infinity. Hence, we must posit some prime unmoved mover.[31]

If there were an infinite chain of movers, Aquinas argued—on the grounds of Aristotle's theory of motion, of course—it would necessary for all the movers and things moved to exist simultaneously, and they would all have to move simultaneously. This idea of an infinite chain of finite beings all existing simultaneously and moving simultaneously in what was nevertheless a finite period of time would be impossible, he argued.[32]

Aquinas also pointed out that Aristotle's theory of motion necessarily implied that a chain of events in which one thing moved another thing, which in turn moved another thing, and so on, could move only as long as the first mover continued to move, and would stop the instant the first mover stopped moving. But a chain of movers and things moved which extended infinitely far back in the past could have no first mover—by definition, for that is what infinity meant—and so there would be no motion at all, for there could be no first mover to start it moving.[33]

In the *Summa Theologica*, which he put together in 1265–1272, Thomas phrased the argument from motion in far fewer words, but in the same essential fashion. He began with a statement of what must be our empirical starting point, which is both simple and obvious: "It is certain, and in accordance with sense experience, that some things in the world are moved." Using Aristotelian physics

and metaphysics, Aquinas argued that something could be brought from potentiality (*dynamis* or *potentia*, mere possibility) to actuality (*energeia* or *actus*, becoming actually operant) only by the agency of something which was already actual. Hence something which was not in motion (but which had the possibility of movement) could only be put in motion by something which was already actually in motion.

This put us into what would be a pseudo-infinite regress unless we postulated a first mover which was somehow an unmoved mover, a mover which could move without itself being moved by anything, a first mover which we called God:

> Whatever is moved must therefore be moved by something else. If, then, that by which it is moved is itself moved, this also must be moved by something else, and this in turn by something else again. But this cannot go on forever.[34]

Now the fundamental problem with this argument was the assumption by Aquinas and the scientists of his period (both in Europe and in the Arab world) that the sun and moon and planets could not continue moving through the sky unless some source of energy was continually applying force to them. In modern physics, however, we know that an object in motion tends to stay in motion at the same velocity and in the same direction until some force is applied. So, to give a simple, first-order explanation of the moon's movement through the sky, we may say that, since there is no wind resistance (for the moon moves in the near perfect vacuum of empty space), there is no resisting force coming from this source to slow its velocity. The gravitational pull of the planet earth forces the moon into an elliptical orbit, so that the direction of its motion is continuously forced to change, but in such a way that the moon simply continues to travel around the same elliptical path without

end. No unmoved mover is needed to keep the moon orbiting—in fact, quite the contrary, it would take considerable force indeed to stop the moon from continuing its constant circling of our planet.

But the ancient and medieval world did not know this. So their attempt to solve this problem gave rise to a theory of planetary motion which was truly bizarre by modern standards. Plato and Aristotle and the ancient Greco-Roman world in general had assumed, as we have seen, that inanimate objects could not move under their own power. Since the sun and moon and planets nevertheless moved through the sky, this left only two possibilities: these heavenly bodies were themselves living beings (the alternative grasped by ancient thinkers as diverse as the Stoic philosopher Seneca and the Christian theologian Origen), or they must be pushed through the sky by some kind of superhuman living beings. For ancient pagans, this meant that either the planets were themselves visible gods hanging in the sky (our names for the planets in English still reflect that notion: Mercury, Venus, Jupiter, and so on), or that each planet was pushed through the heavens by its own god. For ancient and medieval monotheists (Jews, Christians, and Muslims), the superhuman beings who pushed the planets through the sky were called "angels." For the Valentinian gnostics of the second and third century A.D., the heavenly entities who made the planets move across the sky were referred to as the "seven planetary archons."

In Aquinas' theory, these angels were inspired to push the planets in their orbits around the earth because their spirits were turned in reverence towards God, the Unmoved Mover, and they knew that obediently carrying out this task would enable their spirits to rise upward to God in love. A revival of interest in astrology had also begun by the thirteenth century, so that Aquinas also probably believed (as some of his contemporaries did) that God directed the

angels who moved the planets to the correct points in the Zodiac in order to control certain kinds of events taking place down here on earth.

> My additional note: Christians who believed in astrology (from Eusebius of Caesarea in the fourth century to Dante and Chaucer in the fourteenth) believed that the stars might control certain material things in our lives, and even affect the cruder emotions running through our minds, but could not control our ability to make fundamental spiritual decisions about right and wrong. So if human beings committed actions which were grossly immoral in terms of their higher spiritual motivation, they were morally responsible, regardless of how the planets were located.

Those who wish a good visual image of the thirteenth-century view of the universe and the heavens should read through all of the last part of Dante's *Divine Comedy*, called the *Paradiso*, with its fundamentally astrological organizational structure, and particularly the triumphant conclusion, where the author described his ultimate vision of the divine Unmoved Mover in the memorable words:[35]

> *A l'alta fantasia qui mancò possa;*
> *ma già volgeva il mio disio e 'l velle,*
> *sì come rota ch'igualmente è mossa,*
> *l'amor che move il sole e l'altre stelle.*
>
> Here strength fails the lofty visual imagery:
> but already my desire and will were being turned
> like a wheel, that was moved in the same way one sees
> Love moving the sun and other stars.

"Love moving the sun and other stars" was the love which motivated the actions of the angels who moved the planets (for their

spirits were turned toward God, the great Unmoved Mover, their sole desire), as their angelic love flowed back towards the divine Love which brought them into being and gave them their existence.

It was an ancient Christian tradition, going back to the fourth century, which spoke of a two-way flow of love: first there was a procession (*proodos*) of the divine Love downwards to produce both the intelligible world and the realm of individual created beings, and then this was followed by an return upward (*epistrophê*) of the created beings, as they strove to be totally reabsorbed once again into the Godhead.[36] This was the fundamental spiritual dynamic which Thomas Aquinas was invoking as he attempted to use the concept of the Unmoved Mover to explain (among other things) the motions of the sun, moon, and planets.

The problem is that in our own world today, we know the moon and planets like Mars to be simply large hunks of rock and dirt, and the sun to be only a large globe of gas under so much heat and pressure that nuclear fusion reactions are induced. They are not animate objects: they do not have souls or spirits resident within them which consciously will them to move through outer space like gazelles leaping over mountain crags. Nor do they have animate beings (gods or angels) pushing them through the sky. A scientific astronomical theory of an Unmoved Mover who draws these planetary spirits to himself by a consciously felt love is totally unworkable in the present day.

How could one go about adapting this totally alien view of the universe to the modern scientific world-view? In the next chapter we will go back to what Aristotle originally said, not about *kinêsis* (change and motion) but about the even more fundamental concept of *energeia*, where we will look, not at the problem of describing the motion of objects moving through space, but at what modern

science says at an even more general level about using energy to do useful work, and the laws of thermodynamics which govern these processes. To make sense out of this proof in our own world, it needs to be converted from an argument about motion into a far more fundamental argument about energy.

CHAPTER 10

The First Proof Revised: the Argument from Thermodynamics

In Thomas Aquinas we see one of the most brilliant philosophic minds in the world's history. When he developed the particulars of this first proof of God's existence, he was led astray by the natural scientists of his own time—people who were for the most part what we would today call astrologers and alchemists—into believing that the motion of the planets through space was produced by angels pushing them across the sky, winged spirits motivated by their pure love for a God who thereby became the Unmoved Mover of the ceaselessly moving heavens. These thirteenth-century scientists further misled him into believing that no object in motion would remain in motion unless force and energy were continuously supplied.

So we need to look, not at the detailed working out of the proof, but at the fundamental intuition which Aquinas had when he began working on this problem: that what the ancient Greek philosopher Aristotle had said about how change (*kinêsis*) occurred, contained somewhere within it the germs for a philosophical demonstration that some sort of higher power must exist, a power which did not need to follow the normal rules governing ordinary natural events.

In Aquinas's picture of the universe, it seemed absolutely necessary that the original source or motivating agency behind all the

other motion and energy in the universe had to be what he called an Unmoved Mover. This power had to have an ability which nothing else in the universe possessed: it could start all the other energy and motion in the universe into action without itself having been set in motion by something yet higher and more powerful.

> **So we have two possible views of the universe. One view is that the entire universe and everything beyond it is absurd, unexplainable, and impossible. Science is impossible, so the only thing we can do is to sit around and tell myths about why volcanos occur and what causes human diseases like leprosy.**
>
> **The other view is that the material universe which natural scientists study, is a universe which works in logical, rational fashion and can be explored and explained in terms of experimental science. The only thing irrational about the universe—or perhaps we should rather say "supernatural," somehow outside the normal laws of nature—is its starting impetus.**
>
> **We either give up trying to explain how the universe started at its beginning (or is maintained in existence at its fundamental level) and acknowledge that this seemed to have been based on some different set of rules and behaviors, or we give up being able to explain anything at all that happens in the universe.**

The First Law of Thermodynamics

In the modern study of the physics of energy and mechanical work (what is called thermodynamics), the first law is *the law of the conservation of energy*. Machines that accomplish work convert energy into that work. A joule is the amount of work done

when a force of one newton produces a displacement of one meter, or the amount of energy which it takes to do that amount of work.

In a perfectly efficient machine, the amount of energy supplied (measured in joules) will exactly equal the amount of work done (likewise measured in joules). In a machine of less than one hundred per cent efficiency, more energy will need to be supplied than the amount of useful work which is produced, but the extra energy supplied will not disappear—it will simply be transformed into some non-useful form (usually heat energy—produced by friction or wind resistance or electrical resistance within a current-carrying wire or something of that sort—where one calorie of heat energy is equivalent to what would otherwise have been 4.186 joules of useful work). The amount of useful work done plus the amount of energy wasted (in heat produced by friction or wind resistance, or what have you) will always exactly equal the amount of energy which was originally present and/or supplied from the outside during the process. The overall amount of energy in the system as a whole cannot be changed.

Energy can be stored in various ways (chemically for example in batteries or gasoline or coal), released in the form of electricity or heat or water falling through a height, transferred through various means (electrical wires, moving gears or belts, the circulation of hot fluids, and so on), and then turned into useful work. Energy can be degraded and dissipated in various ways, and allowed to flow off into the general environment, so that it is no longer available for useful work. But no matter what form it takes, energy itself can neither be created nor destroyed. This is the first law of thermodynamics.

One caveat must be given: under certain conditions (such as in a nuclear power plant or bomb) mass can be converted into energy, following Einstein's famous $E = mc^2$ equation. And in other spe-

cial situations, the reverse process can occur, and energy can be converted into mass. So for example, one big problem with building present-day massive particle accelerators arises because, as the tiny electrons or protons are accelerated to velocities approaching closer and closer to the speed of light, the kind of relativistic effects which Einstein predicted causes the mass of the particles to increase proportionately. (An electron or proton moving at the actual speed of light would have an infinitely huge mass, which would of course be impossible, which is why no physical object can even attain the speed of light, let alone exceed that speed.) So once a particle accelerator has a small subatomic particle moving at a velocity near the speed of light, all our attempts to accelerate it to an even higher velocity have to be "paid for" by pumping in incredible amounts of energy which are simply being converted into mass. The faster the particle goes, the heavier it gets, and the more energy it takes to make it move even a tiny bit faster, both (a) to make what is now an even heavier object go faster and (b) to be transformed into the enormous increase in mass which would have to accompany that tiny incremental speeding up of its motion.

In ordinary situations, where Einsteinian relativistic effects can be ignored, the first law of thermodynamics can still be phrased in its classical form, as the principle of the conservation of energy: energy itself can neither be created nor destroyed. Einstein showed, however, that the underlying rule is even more basic than that, and affects anything at all that a physicist might study: it is the total *mass-energy* in a system which can be neither created nor destroyed by any known natural process. He linked the two classical principles of the conservation of energy and the conservation of mass into a single universal rule of the conservation of mass-energy.

The big bang and steady state theories of the origins of the universe

It is patently obvious that a big bang theory of the origins of the universe would have to violate the first law of thermodynamics at the most fundamental level: when the big bang occurred almost 14 billion years ago, all of the present matter and energy in the entire universe had to have come into existence, apparently out of nowhere, in a single enormous explosion localized in a small section of space. Present-day astrophysicists who are atheists often try to minimize the extraordinary nature of such an event (and try to make their descriptions sound more scientific) by describing the event as a *singularity*. As nearly as I can tell, the use of this peculiar word means no more than saying that this single event violates the normal rules of science and does not fit into the same scientific categories as any other kind of event that scientists study. I am not sure that the word singularity in the final analysis means anything much different from the old-fashioned word supernatural (which merely meant an extraordinary event which did not fit the normal causal rules).

The steady state theory defended during the mid-twentieth century by Sir Fred Hoyle and his supporters might seem at first glance to avoid that problem, because this theory claims that the universe had no beginning in time and has always existed. But the only way this theory could account for the observed fact that our universe was continually expanding, was to hypothesize that this expansion was being produced by the continuous spontaneous appearance of small amounts of new matter (and energy) in empty space all over the universe.

Both theories violate the first law of thermodynamics at the most basic level, because each of them, in its own way, requires

that matter and energy just appear out of nowhere. The only difference is that the big bang theory postulates that the *creatio ex nihilo* (creation out of nothing) occurred only once in a single enormous explosion, while the steady state theory argues that the *creatio ex nihilo* takes place in bits and dribbles on a continuous basis.

The appearance of virtual particles is not a true parallel

Astrophysicists who are atheists sometimes try to minimize the shocking nature of this *creatio ex nihilo* by pointing to the generation of virtual particles in the field equations used to describe certain kinds of subatomic interactions. In this type of field theory it is true that, when a physicist sets up the equations to deal with the interactions of certain subatomic particles in a laboratory experiment, the equations will seem to show that what are called "virtual particles" appear out of empty space and serve as intermediaries in the reaction the physicist is trying to describe.

This is however a very weak argument, on two different grounds. This kind of field theory is a very problematic area within modern physics to begin with. It can in fact be made to match up with real experimental data if certain assumptions are made—but the assumptions are not only totally ad hoc and grounded in no fundamental theoretical level, but would imply consequences in other areas of physics which are impossible.

Additionally however, and even more importantly, this kind of field theory shows that these "virtual" particles will seem to appear within the field and interact with real particles, only if certain kinds of real sub-atomic particles are interacting with one another to set up the field in the first place. The virtual particles do indeed seem at one level to appear out of nothing, in totally empty space—*but they do so only when there are also real particles there*. There is

no appearance of real particles coming out of literally nothing and nowhere in totally empty space. And even more important than that, the virtual particles are introduced into the equations *to preserve* the first law of thermodynamic's principle of the conservation of mass-energy, not to overturn or deny it.

In my own personal experience, atheistic astrophysicists who try to use the phenomenon of virtual particles to defend their position, back down the very moment someone calls their hand on it, because in fact they are totally aware of the correctness of what I said in the two preceding paragraphs. When this happens, I myself am left with the rather sick feeling inside, that I am dealing with a fundamentally dishonest person who is perfectly willing to use cheap rhetorical tricks and deliberately misleading pseudo-scientific explanations on non-scientists if the person thinks he or she can get away with it.

Are the laws of thermodynamics truly fundamental principles of physics?

Atheistic astrophysicists frequently attempt to evade the problem of the *creatio ex nihilo* (creation out of nothing) by saying something to question "whether the laws of thermodynamics really *are* truly fundamental rules of physics." Now at the surface level, this is a truly preposterous statement to be coming from someone who pretends to be a scientist. If one took people of that sort to see a magic act on a stage somewhere, when it came time for the magician to perform the illusion of pulling a live rabbit out of an empty hat, what would they say? That it would break no truly fundamental laws of nature for a person to pull a live rabbit out of thin air? That the hat really was empty, and that magicians who performed this trick genuinely had nothing hidden up their sleeves? That live rabbits (and entire universes) routinely pop into existence

out of empty space all the time, and that this is a perfectly scientific view of the universe?

Or let us imagine these same scientists having laboratory assistants or graduate students working under them. They ask their helpers to go perform such-and-such an experiment in their laboratory, and the assistants come back afterwards saying, "For goodness sake, we have measured more matter and energy in the system after we finished the experiment than there was at the beginning. We do believe that we have experimentally verified that the first law of thermodynamics can be broken." Any even moderately reputable scientist would either laugh uproariously or snarl impatiently at that point (depending on his or her basic temperament), and send the foolish and inept assistant back to re-do the experiment: "And get it done right this time, and don't come back to me with any more of *that* nonsense!"

Why would any good scientist take the attitude that the first law of thermodynamics can be broken whenever convenient? All of the formative scientific advances that have been made since the seventeenth century have been based on the assumption that, in a laboratory experiment, matter and energy can never truly be created or destroyed. If we toss out the first law of thermodynamics, we would also be forced to discard the work of Newton, Einstein, Lavoisier, Mendeleev, Bohr, Schrödinger, and all the other great discoverers, and would be back in the middle ages (or worse), trying to turn lead into gold in our alchemical labs with magic chants, and conjure up love potions out of bats' wings and dried toads.

Why then would any astrophysicist at all say something so apparently preposterous as an attempt to deny the centrality of the principle of the conservation of mass-energy in modern science? I believe that what these astrophysicists are actually trying to say—and I am reformulating this slightly in the attempt to save them

from fatal foolishness—is that the principle of the conservation of mass-energy *of course* must be the basic assumption of all scientific theory *except for* the theoretical analysis of the origins of the universe as a whole. I believe that what they are *trying* to say, is that problems involving the creation and continued existence of the universe as a whole force us to move down to a more fundamental level of reality, where some of the basic rules may be quite different. But *this is part of nature too*, they are insisting, even though it might force us to have two different kinds of "nature" with two different sets of "natural laws." In no way, they are saying, does this fact commit us to believing in some kind of personal God who created the universe by an act of conscious will and decision.

With respect to that last sentence, I do not know of any good philosophical theologian who would even try to argue that Thomas Aquinas' first proof, in any form whatsoever, could be used to prove that God was a personal being. Certainly Aquinas himself never made that claim: the warmly personal God of the Catholic faith, who was incarnate in Christ Jesus and spoke through the prophets, came for him mostly from what he called *revealed knowledge* (the bible and the teachings of the church). That sort of belief was not, for him, based on any kind of *natural knowledge*, that is, what we today would call the realm of scientific investigation and pure philosophical theory.

All Aquinas' first proof was designed to show was that the universe we can directly observe must be grounded in some deeper reality which must necessarily follow some quite different set of rules, at least where energy and change are concerned.

But this of course is exactly what present-day astrophysicists are actually *trying* to say, at least in my interpretation of their real position. So I think the conflict between theists and atheistic scientists in this area is in one part more verbal than substantive, and is

in the other part based on a two-fold confusion among the disputing scientists: a muddle within their own attempts to explain what it is that they are really arguing, and a confusion as well about what the more intelligent theists are actually saying.

We must remember that the five proofs of God's existence are totally independent of one another in the sense that a person could agree, for example, that the first proof had some validity to it, even though that same person might continue to refuse to take any of the other four seriously. And in actual practice, there have been many philosophical theologians down through the centuries who have accepted the validity of the central conclusions of the last two proofs (from truth and value, and from design), but have nevertheless regarded the divine ground of the universe as still a fairly impersonal reality in and of itself. So an atheistic scientist could easily acknowledge that he and the theist are actually talking about the same thing, *in so far only as this first proof actually goes*, without the scientist being forced to start attending church or synagogue or the mosque or whatever once a week, and kneeling every morning facing Mecca or praying the rosary or anything of that sort.

Something the size of the known universe, with all its galaxies and stars extending for light years in every direction, is an awfully large rabbit to pop into existence out of empty space. The reductive naturalist cannot sweep a rabbit this huge under the carpet and then mumble "business as usual, the laws of modern science can still explain *everything* about the universe," without doing a bit of further explanation, to say the least.

The Second Law of Thermodynamics and the concept of entropy

In addition to the big bang and steady state theories, there has been a third type of attempt during this past century to explain the

existence of the cosmos without bringing any kind of God or higher power into the picture: what has been called the theory of the pulsating universe. This theory holds that the universe has always existed since infinite times past, but goes through a regular cycle: at this point in time it is expanding outwards, but at some time in the future it will reach the limits of its expansion, as its own internal gravitational forces slows it down and then starts pulling the scattered parts of the universe together for another long period when we will have a continuously shrinking universe. When all the matter in the universe has shrunk down to one compact mass, it will explode outward and start another period of expansion, with galaxies and stars once again being formed in the same way that our present galaxies and stars were formed.

The big bang and steady state theories both require a violation of the first law of thermodynamics. To explain why the pulsating theory would also have to violate the laws of thermodynamics, we must turn now and look at the *second law*. This is a statement about the nature of what is called *entropy*.

The concept of entropy did not play a major role in what we now call the older "classical" thermodynamics. This was a set of ideas and equations which were developed during the last half of the eighteenth century and through the course of the nineteenth century: the first experiments were carried out by people like James Watt, and were designed to produce more efficient steam engines. As these experiments (and the accompanying mathematical interpretations) were carried still further by scientists like Dalton, Gay-Lussac, and Joule, they led in the 1860's to the development of some of the world's first internal combustion engines. The fact that engines built on these principles were able to power, first railroad trains and steam boats, and then automobiles and airplanes, was proof of the validity of the basic concepts.

Since the principal focus of interest of most of these experimenters and theorists lay in the area of steam and internal combustion engines, the basic terminology of that older classical thermodynamics was designed to describe the behavior of a gas enclosed within a cylinder with a piston which could move back and forth: the pressure, volume, and temperature of that gas, and the amount of heat added or subtracted to it, were the basic directly measurable quantities. The "entropy" of the gas was considered, during that period, to be a rather obscure and relatively minor concept, which was referred to mainly in purely theoretical speculations, and was not regarded as having much value for most practical engineering calculations.

In that classical terminology, entropy could be explained in the following way: If one took a perfectly ideal gas enclosed in some sort of container, and changed its pressure and volume, but heated or cooled the gas in the process so that the temperature remained exactly the same, then the total amount of heat H which had to be added or taken away, divided by the constant temperature T at which the gas was maintained, represented the change in entropy of the gas as it was moved from its initial state to its final state. This value of H/T, the change in entropy, was therefore one kind of measure of the heat that was added to the gas by heating it, or subtracted from the gas by cooling it down: it was a measure of heat as a function of the temperature at which the process was taking place.

The concept of entropy in statistical thermodynamics

This rather abstruse concept of entropy quickly jumped to a position of great importance when statistical thermodynamics and the kinetic theory of gases began to be developed. This new approach

to an old subject was based on the observation that what we call a gas was a collection of molecules moving essentially at random. In an ideal gas, we assume that there are no attractive forces between the molecules, and that when they collide with one another or against the walls of the container, these are perfectly elastic collisions. Looked at in this way, what we call the temperature of the gas at the macroscopic level is simply a measure of the average kinetic energy of the randomly moving molecules: the greater their average velocity, the higher the temperature. Likewise, what we call the pressure of the gas at the macroscopic level reflects the average change in momentum of those molecules which collide with the walls of the container and then rebound. Increasing the temperature or decreasing the volume raises the pressure: a rise in temperature raises the measured pressure because the rapidly moving molecules are striking the walls of the container at a higher velocity, and a decrease in volume also raises the pressure because this will cause more molecules per square centimeter to strike the walls of the container.

The first advantage of this new way of looking at thermodynamics was that it allowed what had formerly been regarded as a totally separate domain of physics to be brought within the explanatory framework of Newtonian mechanics: the relationship between pressure, volume, and temperature in an enclosed gas could be shown to result from the same fundamental laws which governed falling bodies here on earth (apples falling off of trees and so on) and the movements of the planets out in space. The second advantage arose because, given the vast number of gas molecules contained in something like the cylinder of a steam or internal combustion engine, and the fact that they were moving about essentially at random, statistical theory could be used to make addi-

tional statements about the behavior of gases—and, it turned out, other substances as well.

In statistical thermodynamics, *entropy* leaps to prominence as *the measure of the amount of disorder in a system*. In a crystalline solid, the atoms and molecules still show some motion at any temperature above absolute zero, but are fundamentally constrained within positions in the crystal lattice which are regular and perfectly ordered. The way the molecules are packed together will determine the shape of the crystal: ordinary table salt forms cubical crystals, water (as we see from snowflakes) forms six-sided crystals, and so on. This is a state of very low entropy, because it is a highly-ordered system.

When enough heat is applied to a solid, and the temperature is raised high enough, it turns into a liquid. In a liquid the molecules move about much more freely, but cohesive forces still constrain their movements to a certain degree. If water is poured into a bottle, the bulk of the water settles to the bottom of the container, and the forces attracting the molecules to one another cause a curved meniscus to be formed around the edge of the top surface of the liquid. The entropy is much greater than that of a solid, but there are still remnants of order within this state. When still more heat is added, and the temperature is raised high enough, the liquid will then turn into a gas: this is an even more disordered state, so it will have an even higher entropy.

When a system has become as random and disordered as it can become, given the overall amount of energy available within the system, it will have achieved its maximum entropy. This is that particular system's state of final equilibrium, because once having achieved its maximum entropy, no more changes can be generated from within that overall system, and no more useful work can be done within it. This is an inexorable rule, for the basic laws of

probability drive all systems towards that end: a random state will always be overwhelmingly more probable than any given ordered system, and will always triumph in the long run. When a closed system has reached a state of total disorder, there is no way to re-introduce order into that system without introducing some fresh source of energy into that system from the outside.

So put in terms of statistical theory, *the Second Law of Thermodynamics says that the entropy of an isolated system can increase, but can never decrease*.

There are other ways of making this same point which are easier to grasp intuitively. For example, heat (energy) can be transferred from something hot (an area of high energy) to something cold (an area of low energy); but at the end of the process, the hot area will be cooler and the cold area will be warmer, and that connected system's overall entropy (its fall into the essential same-ness of a universal randomness) will have increased. Heat (energy) cannot be transferred from a cold area to a hot area without bringing in some external source of energy to do that work, because otherwise such a process would produce an overall decrease in the entropy of the system, which the Second Law forbids. Furthermore this law applies, not just to heat transfer, but to the movement of all forms of energy, which is why water here on earth will not flow spontaneously uphill, and why a 1.5 volt flashlight battery cannot be used to recharge a 12 volt automobile battery.

The law of entropy could therefore be thought of as the "there's no such thing as a free lunch" principle, or the "everything eventually runs down or gets used up" principle. It is the fundamental law of physics which explains why it is impossible to build a gasoline-powered automobile whose gas tank never needs to be refilled, why it is impossible to construct a battery-powered flashlight which never starts growing dim and eventually ceases to give light,

and why it is impossible to build a nuclear power plant (whether for generating electricity on land for domestic purposes or for driving a ship or submarine at sea or whatever) which never has to have its fuel elements replaced. It is the reason why the radioactive isotopes which are used in medical diagnosis cannot be kept on the hospital's shelves in perpetuity: as its atoms decay, the level of radioactivity falls continually and eventually falls too low to be measured by the hospital's medical instruments.

The law of entropy even applies to areas like information theory. It was this principle which was the underlying universal dynamic behind something which one international organization discovered recently when their chief archivist began going through some forty-year-old tape recordings of famous members of that group giving public speeches, and discovered that the magnetic patterns on the tapes had become so degraded that they were no longer intelligible when she attempted to play them. The proximate causes of the degradation were cosmic rays, shifts in the magnetic and electrical fields within the environment, and (even more importantly) the small random motions within the molecules of the magnetized tapes (where higher temperatures produce more degradation more quickly, but where any temperature above absolute zero will eventually produce this result). The proximate causes can be listed in that fashion, but at a deeper level, this unfortunate loss was simply the ultimate triumph of entropy (the principle of disorder) over the human attempt to record those famous people speaking by converting their voices into orderly magnetic patterns on the tapes. There would be no way to produce a magnetic tape recording which would literally last forever.

CHAPTER 11

Perpetual Motion Machines, Love and Energy

Cranks, charlatans, and perpetual motion machines

A machine or mechanism which would be able to violate the laws of thermodynamics would be what is called a "perpetual motion machine." This would be something like an automobile which you could literally drive forever without ever needing to put gasoline in the tank (or replace a battery or fuel cell or whatever). It would be something like a clock which you could set out on a mantel or a table—not attached or connected or plugged into any kind of external source of power—which would run literally to all eternity without it ever being necessary for anyone to wind it up again or replace the batteries or otherwise replenish its energy supply. The U.S. Patent Office receives diagrams and descriptions over and over from ignorant and foolish cranks who believe that they have invented such a perpetual motion machine and wish to patent their device—but none of them of course ever actually work.

People with a snake oil salesman's glib tongue may be able to dupe the extremely gullible and ignorant out of large sums of mon-

ey by claiming that they have invented a perpetual motion machine. This is usually done by tricks such as displaying a small device with a lever arm which keeps turning back and forth, or a wheel which continues to spin, where the real source of energy is carefully hidden. The foolish marks are told by the con artists that they need investment money to make an industrial sized version of this machine, so that they and their investors can start making big money out of it. Clever scammers can sometimes talk people out of their money by simply showing a blueprint of a supposed perpetual motion machine, while giving a glib pseudo-scientific explanation of the way it is going to revolutionize business and energy, "just as soon as we can gather enough investment money to build a prototype model."

Now any reputable scientist knows that the claim to have built a successful perpetual motion machine is nothing but trickery and fraud, or sheer stupidity—at least as long as the machine is small enough to fit on a tabletop! But when the claim is made that the perpetual motion machine in question is much bigger—namely, as big as the entire universe—even skilled scientists can allow themselves to be lured by the smooth words and infinite promises of the snake oil salesman's spiel. Perpetual motion machines do not work—and never have and never will, no matter how big they are—as long as they are constructed out of materials which are part of the sensible universe around us, which have to follow all the ordinary laws of nature. Of necessity, this continues to be true even if the purported perpetual motion machine is the entire natural universe itself, because all its component parts are still materials that must follow all the ordinary laws of nature.

Perpetual motion machines and the pulsating model of the universe

The defenders of the continually pulsating, expanding and contracting model of the universe want to believe somehow that, at the end of the contraction phase (when all the matter in the universe is pulled back together and compacted into a single mass once again by enormous gravitational forces), enough energy will be generated by that process to create another big bang just as big as the previous one, *without any additional energy having to be introduced back into the universe from outside*. But the basic laws of thermodynamics would have to be broken in order for this to happen, which means that the atheistic version of the so-called pulsating model of the universe is nothing but an imaginary perpetual motion machine.

No matter how much energy might be generated when the universe collapsed inward upon itself, the second law of thermodynamics and the principle of entropy specify that it would be energy *much of which would not be available for re-creating another ordered universe*. Now it can indeed be difficult to understand why a perpetual motion machine of this kind cannot ever work, when we start talking about something as huge as the entire universe: explanations which we would ordinarily reject as nonsensical suddenly start to appear plausible.

So let me use a smaller scale example to make it clearer why the second law of thermodynamics would have to be broken in a pulsating (alternately expanding and contracting) universe. Let us imagine that an amount of purified uranium-235 about the size of a baseball is suddenly compressed together—this is what the first atomic bombs were made of. In an enormous atomic explosion, a good many of the uranium-235 nuclei are split apart into smaller

nuclei while also releasing fast neutrons. Let us suppose that, by some incredible feat, all the materials left from the reaction were somehow collected: there would be some atoms of uranium-235 left because the reaction by its nature could not be completed one hundred percent, along with atoms of smaller, lighter elements which had been produced by the splitting of the reacted uranium-235. To complete the task, one would also have to recapture a number of stray neutrons and other subatomic particles which were created when the uranium nuclei were split. But if one somehow could collect all this debris and compress it once again into a sphere about the size of a baseball, nothing would happen: no nuclear explosion would result. Too much of the nuclear reactant would have been spent in the prior explosion. One simply cannot produce an infinite number of explosions from the same explosive by collecting the used-up reaction fragments and reassembling them.

Let us speculate yet further. Let us suppose that hard and undeniable experimental evidence was discovered that absolutely proved that the big bang which started this present universe was produced by the collapse inward of some previous universe, and that this predecessor universe in turn had been produced by a big bang produced by the inward collapse of a yet earlier universe. The laws of thermodynamics (including the observation that it is impossible ever to build a totally efficient machine) would require that each of these big bangs would have to have been slightly smaller than the previous one. This is the same effect we see in a roller coaster at a county fair: the first peak is the highest, and all the other peaks have to progressively be lower and lower in order for the car on the tracks to get to the end. But what this means is, that if this cycle of universes had genuinely been in existence *literally* from all infinity, the process would also have lost the ability to

generate another big bang at some infinite time back in the past, and there would be no universe here today.

What this all means in terms of the first proof is that an expanding and contracting universe could exist in reality only if each big bang in that infinite series involved contact with some transcendent ground which had the ability to violate the laws of thermodynamics. The reductive naturalists who devised the expanding and contracting model believed that they were doing an end run around the necessity of having a God (or some sort of super-natural ground), but in fact their theory could not work unless there were some transcendent ground present, over and over again. At this most basic level, it is no fundamentally different from the simple big bang theory, just more complicated, because in the pulsating universe theory we have an infinitely long series of big bangs instead of only one.

The Primal Limiting Law of Thermodynamics

In addition to the first two laws of thermodynamics, I came to realize in recent years that there must exist an additional law. I have come to call it the Primal Limiting Law of Thermodynamics, and it states that a finite space or finite amount of matter cannot contain an infinite amount of energy. I will discuss this law in greater detail in Chapter 12, and explain why I believe that it is valid. It necessitates, for example, that an infinite amount of electrical energy cannot be stored in a single rechargeable battery of finite size. Likewise, an infinite explosive power cannot be stored chemically in a single bomb of finite size that we wish to drop from an airplane on our enemies.

The Primal Limiting Law can not only be cited to defend the First Proof (from Motion) which we are discussing here, but also

(as we will see in Chapter 12) Aquinas's arguments in his Second Proof, the one from Efficient Causality.

If the universe had existed from infinite times past, then any finite portion of the universe which we selected would have to have originally contained an infinite amount of energy. But the Primal Limiting Law of Thermodynamics tells us that this would be impossible, which means the whole idea of an infinitely existing universe is impossible.

Other pseudo-infinities which must be avoided: steady state and big bang theory

We also need to look back at the other two types of explanation for the origins and/or continued existence of our universe—the steady state theory and the big bang theory—and make a few final comments. Let us take the steady state hypothesis first.

The scientists who put together the steady state model of the universe were aware of the problems created by the second law of thermodynamics. If the present physical universe has always existed, from infinite times past, and no additional mass-energy had ever been supplied, it would have totally run down by now. At the present point in time nothing more would be happening nor could it happen—the universe would be like an electrical battery which has used up all of its stored energy and gone dead, or a mechanical clock whose spring has totally unwound. A major point in many of Aquinas' proofs was that certain kinds of infinite chains are impossible in the real world.

Sir Fred Hoyle and his supporters attempted to evade this kind of obvious violation of the second law by hypothesizing that matter was continually being spontaneously created out of nothing in empty space. So the steady state model avoided violating the second law of thermodynamics only by grossly violating the first.

This is the nub of my rephrasing of Aquinas' first proof in modern terms: it is impossible to devise an atheistic, reductive naturalist's explanation of the origins and continued existence of the universe without violating one or more of the fundamental laws of physics.

Before closing this chapter, I believe that one last comment must also be made about the big bang theory in its atheistic version. I cannot help but feel that many of the atheistic reductive naturalists who defend the big bang theory believe, somewhere deep in their hearts, that it might someday be possible to investigate whatever-was-right-before-the-big-bang and reduce it also into an explainable natural entity. In their own way, they are pursuing a kind of knowledge of God, but they want their God to be an entity which they can analyze and predict and control. They have a deep fear of having to acknowledge a ground of the universe which their science might not be able to totally domesticate and encapsulate in human theories and manipulations.

The problem is that if whatever-was-right-before-the-big-bang *were* analyzed and proven to be something which obeyed all of the natural laws of physics, then the laws of thermodynamics would simply require that there be something back of that which had the power to violate one or more of these laws. Otherwise we would be involved in what Aquinas saw as a pseudo-infinite regress, an appeal to infinity that led to absurdity. There had to be, somewhere in the chain of events, *something* which had the power to violate at least one of the laws of thermodynamics, and that "something" would be the ultimate ground which allowed the universe to exist. This transcendent ground was the higher power which theists call God.

The higher power which emerges from the first proof

No matter which of the three fundamental types of theory we choose—the big bang theory, the steady state theory, or the pulsating (expanding and contracting) theory—there must be a universal ground, from which the universe derives its existence—a ground of being which has a nature totally different from the universe which natural science describes and analyzes in all other non-cosmological contexts. We may refer to this source of being by any name we choose: higher power, God, Zeus, Brahman, or what have you. I often prefer to speak of it as the *transcendent* ground, because its nature surpasses or goes beyond the ordinary realm of nature and phenomenal objects. It is "super"-natural in the original meaning of that term. The first proof shows that this transcendent ground must have the ability to violate at least one of the laws of thermodynamics.

In and of itself, the first proof does not demonstrate that this transcendent ground must necessarily be a personal being. A scientist could admit that this first proof does have a valid point, and yet reject the other four Thomistic proofs, and also could continue to scoff at the ways in which many theists believe God's warmly personal character can be shown to be real.

In this revised version of Thomas Aquinas' first proof, I have moved the argument back from a discussion of motion (*motio*) to a more generalized discussion of how change in general (*kinêsis*) is produced, focusing especially on the nature of the energy (*energeia*) which is required to effect such changes. It seems to me that the inescapable conclusion must be that:

(a) A universe cannot appear out of nothing, whether all at once or in spurts and dribbles, without violating the first law of thermodynamics.

(b) A universe cannot run forever with no external input of mass-energy without violating the second law of thermodynamics.

Ergo, the universe must derive its existence from a transcendent ground which is not bound by these laws, so that (in effect at the very least) this ground operates as though it had literally infinite energy at its disposal.

This is also the underlying basis of the traditional theistic assertion that God is omnipotent, that is, all-powerful. This ground which can create matter and energy on a scale which encompasses thousands of galaxies for as far as a telescope can peer, out over countless light years, has the raw power to do literally anything that could be imagined. The Israelites of the Old Testament saw the power of Yahweh their God revealed in the thunderous sweep of a desert storm, the cataclysmic eruption of a volcano, the irresistible power of the earthquake which shifts the earth's very crust, and the relentless fury of a storm at sea. We might today remember, while beholding the brilliance of the noonday sun, or even more while gazing at the star-swept heavens of a dark night, that we are beholding the fiery maws of millions of hydrogen bombs flaring out in empty space, and then stand in awe at the power that is greater even than all these.

Natural science allows us to venture up to the very edge which separates nature from super-nature, but can tell us little about that transcendent reality which lies beyond. As long as we keep our "scientific eyeglasses" on our eyes, when we look over the edge which divides those two realms, we see what appears to us to be

(for the most part) a bottomless abyss: a realm in which our thinking can find no ledges or purchase points upon which it can rest and begin to consolidate its thoughts. Using what Thomas Aquinas called the *via negationis*, our human scientific reasoning can say that this ground is that-which-does-not-have-to-follow the law of the conservation of mass-energy and the law of entropy. We can also say with Aquinas that God is Being-Itself: he is the *actus purus*, the simple act or pure energy of the event in which being comes into being.

Is God a personal being? Love and energy

The first proof, as we have pointed out a number of times, does not necessarily prove that the universe is governed by a highly personal deity. An impersonal Ground of Being which had the power to violate the laws of thermodynamics would fulfill the basic requirements of the first proof.

Let us look however at a different dimension of what we regard as energy. At the level of the material universe, energy takes the form of heat, electricity, electromagnetic radiation, the potential energy of a mass pulled into a gravitational field, and other such physical shapes. ***But in the realm of the spirit, energy takes the form of love.***

Plato said that it was *Erôs*, Love itself, which was the connecting link between the human soul and God. From that Platonic hint, Augustine supplied the last major building block in the classical metaphysical doctrine of the trinity by elevating this divine Love to the status of the third element within the Christian Godhead.[37] But then Aquinas tried to interpret this in the thirteenth century by speaking of a God who was an Unmoved Mover, who could produce change in the realm of nature without becoming a part of

these chains of events and falling subject to their laws. Aquinas said firmly that the universe was pulled to God by overwhelming love for him, but he was rather weaker (at least in my interpretation of his philosophy) when it came to his discussion of God's love for us human beings. By doing that, I believe that he may have allowed himself to become too ensnared within the pagan philosopher Aristotle's vision of an essentially passive God: the God of the real Aristotelians, we must remember, was said to not even know of the existence of individual human beings. Now Aquinas certainly never said that, but we must nevertheless remember that there were snares and traps concealed in numerous places within that basically pagan world-view of the Aristotelians.

Modern science is so different in character from that of Aquinas' period that this alone has forced us to change the first proof in this book so that the proof speaks of God, not as the Unmoved Mover who pulls the rest of the universe forward by loving attraction for him, but as *the Fount of Being and Energy which* not only provides existence to the universe, but also *supplies the essential dynamism of the physical world*.

But if love is the common name for the force of pure positive energy *at the spiritual level*, is this revised concept of God not a gain rather than a loss? In other words, if we move from the material level (where the natural scientists construct their theories) to the purely spiritual level, then we can speak of love (spiritual energy) as the ontologically constitutive foundation of human existence—that is, it is God's divine love which flows through our human hearts and allows us to exist as truly human beings who have the vital energy to strive for the highest and the best. Each individual human being exists as a separate hypostatization, a tiny streamlet, within the ongoing flow of the river of the divine *energeia* of creation. When we cut our hearts off from God's love, we not only

lose sight of any ideals which could inspire us and give us good guidance (God as the Unmoved Mover of the human spirit), but also lose our internal creative and productive energy itself (God as the overflowing Fount of All Being and Energy). Our hearts grow weaker and weaker, until finally we collapse into despair and the total loss of the will to go on. We ultimately find that we can no longer love anything enough even to want to live.

God, in other words, is not just some distant Beauty and Goodness which we strive ever to attain, like walking towards a mountain top so far away that we will never arrive even if we walk towards it all our lives (even though Aquinas and the medieval and patristic spiritual tradition were correct in saying that this is part of what God is). But even more, God is a power which already runs through our very being, which we can learn to draw upon ever more effectively to provide the energy and vital force to live our lives in the best and highest way here in this very moment. If I learn to lead the spiritual life in the right kind of way, I can learn to *feel* this dynamic power of God's love coursing through me like a powerful, healing, energizing, ever-flowing stream. In the New Testament, this was the evangelist John's image of the Water of Life which was the divine Spirit itself.

God is not only material power and energy, but spiritual dynamism as well: the source of a transcendent energy which (unlike natural energy, in its ceaseless fall towards its final entropy death) can never run out, and is sufficient for every need and purpose. Love is a kind of energy which is not bound by the laws of thermodynamics—in the right kind of context, love is an energy which, as more and more of it is expended, only grows even greater and greater.

Its power extends throughout this whole physical universe, and even beyond, into any possible world or realm. Those who learn to

walk and live in the spirit, discover that God can and will supply us, from his own literally limitless supply, with all the spiritual energy we actually need for our lives, and will never place those who sincerely turn themselves over to his will and care into any situation where he will not also give them the power they need to handle that situation as he would wish them to.

The cosmological possibilities

Theories about the origins of the universe have gone through enough shifts over the past century or so, that I hesitate to focus in on one theory alone and go into too much detail on the present state of that particular theory. Experience shows that it is highly likely that significant changes will eventually have occurred in scientific theories about the origins of the universe. I am therefore trying to keep my arguments phrased in the most general terms for the most part.

But the basic possibilities are not that many, and were all worked out to some degree by the end of the late ancient world: ***This present universe either (a) had a beginning in time or (b) has always existed.***

> ***(a') Epicurean philosophers*** (building on the atomic theory of Leucippus and Democritus) took the first position—that the universe had a beginning in time—and argued that the universe had been created when separate atoms of the primordial elements were falling at random through the void, and then began spontaneously to "swerve" so that they collided with one another by pure chance and began to adhere together into larger assemblages. By a sufficient number of chance combinations, the earth and the heavenly bodies were formed, and then the first life on earth appeared in the seas, and eventually ventured out onto dry land. Epicurean philosophy however did not explain where the atoms origi-

nally came from, what produced their movement, nor what produced the "swerve" which was necessary to transform a totally chaotic mass of atoms into areas of significantly higher and lower concentration where they could begin adhering to one another. Once we get much past Lucretius in the first century B.C., it becomes increasingly harder to find any ancient pagan philosopher or literary figure who took the entire Epicurean theory seriously—it left too many essential issues unexplained.

> *The big bang theory of the origin of the universe is the modern-day equivalent. The necessity of small eddies or irregularities in the wave of elemental particles exploding out from the big bang is the equivalent of the Epicurean "swerve," and has thus far not been totally explained by contemporary physicists either, without a certain amount of pure speculation and unprovable surmises.*

(a") Jewish and Christian philosophical theologians operated from the first position also, and theorized about a physical universe which was assumed to have had a beginning in time. These philosophers however argued that the mass-energy was created out of a transcendent ground, and given direction and formal structure out of this divine ground. They held that this was the only way to construct a sensible theory about the origins of a universe which had a beginning in time.

> *The Thomistic proofs for the existence of God which are being analyzed and reinterpreted in this volume represent a modern version of this traditional position.*

If we go with the other basic alternative, and argue that the universe has always existed in some form, then we have two subpossibilities: ***(b') it could always have been existent in something***

much like its present form, or (b") it could have gone through infinite cycles of creation and dissolution.

(***b') Aristotle*** assumed that time and a universe of individual things being generated and being destroyed had always existed. This theory was further elaborated by Plotinus, the founder of Neo-Platonic philosophy. In spite of the basic Platonic cast to its basic understanding of reality, Neo-Platonic philosophy incorporated a good many Aristotelian elements into its system as well. The Arabic translations of Aristotle which began coming into western Europe in the twelfth and thirteenth centuries (and formed the basic philosophical problem for Thomas Aquinas) were accompanied by Neo-Platonic commentaries which argued for a universe which had always existed in fairly much its present form. The Neo-Platonic philosophers did however argue that a transcendent ground, which they called the One, was necessary to make this model of the universe work. The One was the fundamental transcendent unity lying behind all things, and was "super"-natural in that it lacked all the limitations of the natural objects which we encounter within the realm of ordinary space and time.

The steady state model of the universe is the contemporary form of this basic kind of theory.

However, the modern steady-state model of the universe tries to hold its theory together without any contemporary version of the Neo-Platonic transcendent ground of being. This refusal to permit a divine ground to the universe makes them unable to explain how their theory is allowed to violate the laws of thermodynamics.

(b") The Stoic philosophical system held that this present universe of solid, concrete objects had been created out of a super-cosmic energy field at some definite time in the past.

> This present universe would not exist forever, but would ultimately be re-absorbed into that super-cosmic energy field in a fiery event which they called the World Conflagration. However, this cycle of universes being created and then destroyed had been going on since all infinity and would continue to all infinity.
>
> > *The expanding and contracting model of the universe is the modern form of this ancient Stoic theory.*
>
> However, the underlying ground in this Stoic theory was divine (they identified it with Zeus or Jupiter) so the infinitely repeated creations of new universes had a source which was not bound by normal natural law. A God or super-natural ground has to be introduced in order to make a cycle of creations work at all, which the current defenders of the expanding and contracting model of the universe refuse to do.

I cannot myself discover any other truly different alternatives to these four types of cosmological theory (at least alternatives that seem even remotely sensible) in either the world of ancient philosophy or the realm of modern thought, so I believe it is possible to keep a good deal of the discussion of Thomas' five proofs for the existence of God at a fairly general level. If it can be shown that alternative *a′* leaves too many basic issues unanswered and violates fundamental principles of rational thinking, then since alternatives *a″*, *b′*, and *b″* all involve some sort of divine, transcendent ground lying behind and in back of the natural universe *when they are fully explained*, the crucial goal of defending the theistic proofs is simply to show first, why alternative *a′* (the Epicurean universe produced simply by the chance collisions of atoms moving randomly through space) violates too many rules of sound thinking if it is regarded as an adequate explanation with no additional ele-

ments in its theory, and second, why alternatives b' (the steady state model) and b'' (the expanding and contracting universe) also require the presence of some transcendent ground in order to answer all the questions which can be raised about them.

It may be objected that Thomas Aquinas was a Christian, and that a Jewish, Christian, or Muslim Koranic account of the origins of the universe would have to insist that the universe had a beginning in time (when it was first created), and that no steady state or expanding-and-contracting model could be proper Judeo-Christian-Koranic theology.

My response to this is that—as I warned at the beginning of this work—the philosophical proofs for the existence of some divine ground to the universe do NOT allow us to prove, on the grounds of natural reason alone, a detailed picture of the highly personal God of Abraham, Moses, Jesus, and Mohammed and all the other doctrines which would make up orthodox Jewish, Christian, or Muslim Koranic belief. What the proofs do is to demonstrate the necessity of some transcendent ground to the universe, which is capable of violating the normal laws of nature. Past that point we must look to (1) actual experimental evidence and (2) knowledge gained through acts of divine grace. Aquinas himself was totally clear on this: human reason alone can only demonstrate a small portion of the teachings proclaimed by this world's organized religions.

In fact, philosophy and pure reason and logic alone cannot ever answer all the questions of life. But we are never left stranded without help if philosophy and pure reason cannot answer certain questions, if (that is) these answers are genuinely necessary to the true spiritual life and walking in the paths in which God would want us to walk. To walk the spiritual path, do I actually need to know more than that the physical world around me came from God

and is fundamentally totally in God's hands? All God basically asks of me is to acknowledge that fact, and show gratitude, and honestly follow the voice of my own deep inner conscience and treat the other human beings around me in a truly moral fashion.

Romans 1:19–21 and 2:13–16

> For what can be known about God is plain to them, because God has shown it to them. Ever since the creation of the cosmos his invisible nature, namely, his eternal power and deity, has been clearly perceived in the things that have been made. So they are without excuse; for although they knew God they did not honor him as God or give thanks to him, but they became futile in their thinking and their senseless minds were darkened.
>
> For it is not the hearers of the biblical moral law who are righteous before God, but the doers of the biblical moral law who will be regarded as righteous. When pagans who have not the biblical moral law do by nature what the law requires, they are a law within themselves, even though they do not have the biblical moral law. They show that what the biblical moral law requires is written on their hearts, while their conscience also bears witness and their conflicting thoughts accuse or perhaps excuse them on that day when . . . God judges the secrets of men.

Second Argument: from Efficient Causality

TEXT OF THE SECOND PROOF

The text is found in St. Thomas Aquinas, *Summa Theologica* I. q. 2 art. 3 which reads as follows: [38]

Article 3. Whether God exists?

> The second way is from the nature of the efficient cause. In the world of sense we find there is an order of efficient causes. There is no case known (neither is it, indeed, possible) in which a thing is found to be the efficient cause of itself; for so it would be prior to itself, which is impossible.
>
> Now in efficient causes it is not possible to go on to infinity, because in all efficient causes following in order, the first is the cause of the intermediate cause, and the intermediate is the cause of the ultimate cause, whether the intermediate cause be several, or only one.
>
> Now to take away the cause is to take away the effect. Therefore, if there be no first cause among efficient causes, there will be no ultimate, nor any intermediate cause.
>
> But if in efficient causes it is possible to go on to infinity, there will be no first efficient cause, neither will there be

an ultimate effect, nor any intermediate efficient causes; all of which is plainly false.

Therefore it is necessary to admit a first efficient cause, to which everyone gives the name of God.

CHAPTER 12

Efficient Causality and the Primal Limiting Law of Thermodynamics

Aristotle spoke of four kinds of "causes," that is, answers to questions such as who, what, and why. If a Greek farmer obtained some oak planks and built a bed for his bedroom, the *efficient cause* of the bed being constructed (answered the question "who" or "what agent") was the farmer who did the carpentry. The *material cause* (answered the question "what was it made out of") was oak. The *formal cause* (answered the question "what form did it take") was the design of an ancient Greek bed which the farmer had in his memory. The *final cause* (answered the teleological question "why" or "in order to do what") was that the farmer wanted a new and better bed to sleep on.

In modern natural science, the word "cause" is used principally to refer more or less to what Aristotle and Thomas Aquinas called the efficient cause. What causes the disease called malaria? Certain kinds of protozoans which can be borne by mosquitos causes the effects of the disease when it is introduced (say by a mosquito bite) into the human blood stream. What caused the passenger pigeon to become totally extinct? Excessive hunting by human beings with firearms after Europeans began colonizing North America.

In the case of any modern science, the crucial endeavor is to discover what actually causes things to happen. What causes this disease or that? why does the moon continue circling the earth instead of falling out of the sky? what makes the sun shine? what causes earthquakes? why does a particular society have a certain custom? and so on. Aquinas argued that a full appreciation of this kind of causation and what we meant by the concept of one event causing another to occur, would show that the universe had to have a cause, and that this cause could not be the universe itself. Furthermore, he argued that one could not evade the necessity of a first cause by appealing to infinite chains of cause and effect.

Aquinas gave this argument in its fullest form in his *Summa Theologica*.[39] As was his custom, he began with a simple empirical statement: when we observe the world of sense objects which is all around us, "we do not find that anything is the efficient cause of itself. Nor is this possible, for the thing would then be prior to itself, which is impossible." For example, the symptoms of the disease called malaria (the chills, fever, and sweating) do not cause themselves; they are caused by the prozotoans which have invaded the human system. Passenger pigeons did not shoot themselves to death with rifles; they were shot by human beings who hunted them down.

When we search for the cause of something which has just happened, we can discover that what caused this to happen was itself caused by some even earlier event. If event A was caused by event B which was caused by event C, we might even be able to discover that C was caused by some earlier event:

. . . . D ➔ C ➔ B ➔ A

But to try to push such chains of cause-effect relationships infinitely back into the past would be impossible. The attempt to postulate

causes of causes of causes literally forever back into the past would form a *pseudo-infinite* regress, because the series itself would not exist if it had no first cause. As Aquinas put it:

> Nor can the sequence of efficient causes be infinite, for in every sequence the first efficient cause is the cause of an intermediate cause, and an intermediate cause is the cause of the ultimate cause, whether the intermediate causes be many, or only one. Now if a cause is removed, its effect is removed. Hence if there were no first efficient cause, there would be no ultimate cause, and no intermediate cause.

This was the crux then of Aquinas' argument. *In a chain of cause-effect relationships, there were only two important things: the initial event which caused the process to start, and the event which happened at the end as a consequence*. There could sometimes be only one intermediate event in the sequence:

initial cause ➔ intermediate ➔ end result

but there could sometimes be three intermediate links in the chain of events:

initial cause ➔ inter.#1 ➔ inter.#2 ➔ inter.#3 ➔ end result

or twenty links, or a million—the number of intermediate links did not matter—only it had to be a real number, and infinity is not a real number. Aristotle pointed that out, and modern mathematics agrees: an infinite progression does not mean that you only come to the end after an extremely long time, it means that you *never* come to the end. As a consequence:

> If the regress of efficient causes were infinite, there would be no first efficient cause. There would consequently be no ultimate effect, and no intermediate causes. But this is

> plainly false. We are therefore bound to suppose that there is a first efficient cause. And all men call this God.

God must therefore be a first efficient cause which is somehow an uncaused cause, an agent which can cause effects to occur but does not need some prior cause to make it act in this way.

In his earlier version of the proof in the *Summa contra Gentiles*, Aquinas simply laid out the most crucial part of the argument. "There is no infinite regress in efficient causes" because:

> In all ordered efficient causes, the first is the cause of the intermediate cause, whether one or many, and this is the cause of the last cause. But, when you suppress a cause, you suppress its effect. Therefore, if you suppress the first cause, the intermediate cause cannot be a cause. Now, if there were an infinite regress among efficient causes, no cause would be first. Therefore, all the other causes, which are intermediate, will be suppressed. But this is manifestly false. We must, therefore, posit that there exists a first efficient cause. This is God.[40]

To understand exactly what Aquinas was saying, let us look at a game which American children sometimes play with dominos. A domino is a rectangular object made of wood or plastic, roughly an eighth of an inch thick, three-quarters of an inch wide, and an inch and a half long. If the dominos are carefully balanced on their ends, and arranged in a row where they are about half an inch apart, when the child pushes over the domino at one end, the ripple effect will travel down the chain until all the dominos have fallen. The child's finger pushing the first domino over is the initiating cause of this set of events, and the toppling of the last domino at the end of the chain is the end result. It does not matter how many intermediate dominos there are, the chain of falling dominos does not begin until the first domino is pushed over.

It is Aquinas' argument that there are natural processes in the universe which are like the falling domino chain. No matter how long the chain of dominos, there must be a first domino, and there must be something doing the equivalent of pushing a finger at the first domino and toppling it over. For the universe as a whole there must be some higher power which is the "finger," so to speak, which pushed the first domino over.

An effect cannot cause itself to happen, Aquinas pointed out. Whatever causes an effect to happen must be in some sense *prior to* the effect (either prior in time or ontologically prior in some way). The universe cannot cause itself to happen: the cause of the universe as a whole must be something external to the natural universe and in some sense prior to it. This is the one whom we call God.

The Primal Limiting Law of Thermodynamics

The laws of thermodynamics are involved here too. In addition to the four laws which are commonly spoken about,[41] I would like to introduce an additional law here, which would help explain why infinitely long chains of efficient causes cannot be created. We could perhaps call it the ***Primal Limiting Law of Thermodynamics: A finite space or finite amount of matter cannot contain an infinite amount of energy.***

This law has never been stated per se at any place I know of up to this point, because it has simply been assumed at such a basic level by practicing scientists and engineers. There is no way to build a battery of one particular size and weight which will hold more than a certain limited amount of electricity. There is no way to build automobiles with fuel tanks or batteries or whatever that can run forever without refueling or refurbishing their internal

power sources. Military engineers can work to develop bombs which will contain more and more explosive power in a bombs of a given size and weight, but there will always be a finite limit to the size of their blast.

The fact that this begins simply as a *pragmatic observation* is not an objection, because the science of thermodynamics did not arise (historically speaking) as the result of theoretical musings by pure mathematicians, but as part of the process by which the builders of early steam engines experimented to see how they could create steam engines with more and more efficiency and power.

This primal law of thermodynamics begins as a pragmatic observation (so clear and obvious to working scientists and engineers that no one has ever thought it necessary to state it as a formal law), but it can also be defended on a purely theoretical basis, by reminding ourselves that attempting to create mathematical equations which talk of an infinite amount of energy stored in a finite amount of physical space would produce mathematical nonsense.

It does not matter whether the finite amount of matter and physical space is the size of a flashlight battery, an automobile fuel tank, the solar system, or an entire cluster of galaxies. Trying to set up equations which would talk about a system of galaxies somehow being able to have had an infinite amount of energy stored in the galactic cluster at some time in the infinite past would produce total nonsense mathematically. “Dividing by infinity” does not mean anything sensible, and strictly speaking, “multiplying by infinity” does not mean anything intelligible either. Infinity is not an actual number which just happens to be extremely large.

How this law prevents us from creating an infinite string of dominos

Any time we attempt to imagine an infinitely long chain of dominos, we would have to assume that the first little domino in the chain contained an infinite amount of stored energy in its tiny square shape. Or perhaps some would prefer to say, that the tiny child's finger which stood all the dominos on their ends at the beginning and organized them in a chain had an infinite store of energy to draw on.

CHAPTER 13

More on how Chains of Events Begin

There are people today with some knowledge of science who might be skeptical about Aquinas' claims in this proof. Even when confronted with the Primal Limiting Law of Thermodynamics (a finite space or finite amount of matter cannot contain an infinite amount of energy), they still claim that they can see no reason why a chain of dominos could not have been in the process of falling from infinite times past, and so they see no need for there to have been a first domino, let alone a finger to push that domino over.

So to understand better what Aquinas was saying, let us review what we called the hanging chain fallacy back in Chapter 6, on pseudo-infinite regresses. We imagined that we came upon a man standing in front of a chain made of iron links. In quite peculiar fashion, the chain seemed to be suspended vertically in mid-air. The bottom link of the chain hung a small distance above the ground (without touching the ground however), while the top link of the chain was at about the height of a person's chin. We asked the man what held the chain up like that in mid-air. He pointed to the bottom link and said, "that's link number one," and then pointed to the next link up: "That's link number two, it's holding up link number one." If we asked him what was holding up link number two, he pointed to link number three, and so on, until we got to the

topmost link of the chain, the sixtieth link. "What is holding that up?" we asked him.

The man reached into his pocket and pulled out another link of chain, and fastened it onto the one at the top and said, "We'll just put this one on then, number sixty-one. You see, this is an infinite chain. The sequence of positive integers is infinite, so we can keep adding additional links forever. That's why the chain doesn't fall down."

This is of course an impossible story, involving the claim of what could only be a *pseudo-infinity*. If the topmost link of the chain was not fastened to something solid (like an overhanging tree branch), the chain could not simply hang there in midair. Even if it was supposedly an infinitely long chain, it still could not remain suspended like that. It would be one sort of Sisyphean infinity, that is, an infinite process which we devised intellectually but which could never actually achieve the goal we set for ourselves, no matter how long we tried.

If we were looking at a chain of dominos where one portion of it was in the process of falling at this very moment, and tried to argue that the chain could extend infinitely far back into the past, so that there never was a first domino (or something equivalent to a finger to push the first domino over) we would also be involved in the hanging chain fallacy. To explain why, we need to discuss different kinds of systems.

A domino lying flat on the table is in a fairly *stable* position: it would take a reasonably large force to disturb it enough to fall to the floor (such as an angry cowboy who had just lost a domino game kicking the table over with his booted foot). A domino balanced on one little corner, on the other hand, is inherently *unstable*. For all practical purposes, if the corner of the domino is sharp and the table is smooth and solid, it will be impossible to place the

domino so it remains balanced on this one corner for any length of time at all. As a third possibility, a domino balanced on one end is in what is called a *metastable* position: it takes some energy to push it over, but relatively little. Moreover, the falling domino also releases enough energy in its fall to topple another similarly balanced domino, which is why a chain reaction can occur.

A totally stable system can do nothing new and significant in and of itself. As part of the big bang theory of the universe, it has been suggested that the universe will eventually end up in what is called the "heat death." As the universe continues to expand, everything in the universe will eventually reach the same temperature, all energy differences between different portions will have been balanced out, and as part of this development all organized systems will have disintegrated into randomly moving particles. There will still be movement going on in the universe after this "heat death," but it will be totally random motion with no pattern. Nothing will be able to happen any longer, because (since everything will be at the same energy level) there will be no free energy to transfer in order to do any useful work. This would be the ultimately stable system.

An example of an inherently unstable system would be a cube of some radioactive material. A one-centimeter cube of pure radium-226 would start to spontaneously disintegrate immediately. Its half-life is 1,622 years, which means that after that period of time, half of the radium-226 in the cube would have decayed. In another 1,622 years, half of the remaining radium-226 would also have decayed, so that only one quarter of the original amount would still be left, and so on (one eighth, one sixteenth, one thirty-second), until there was essentially no radium-226 left at all.

An inherently unstable system, once created, needs no outside force to make the changes occur. On the other hand, no system

now present in the universe which involves inherently unstable processes can have been going on since infinite times past. This is the reason why the big bang theory of the origins of the universe states that the elements which now make up the universe were created during the big bang. The fact that radium-226 still exists naturally in the universe at all today, proves that it must have been created at some finite time in the past. Any radium-226 which had been in existence "infinitely" long ago would have long since disappeared from the universe.

But the most interesting kinds of systems are the ones which are to some degree metastable. Let us say that we mix liquid vegetable oil with hydrogen gas. If we could cause the hydrogen atoms to break some of the double bonds in the molecules of the oil and attach to the carbon atoms at those points, it would cease to be a light liquid at room temperature and become instead a semi-solid fatty substance. This is the way in which liquid vegetable oils such as corn oil are turned into fats which can then be used for margarine (used as a butter substitute) or vegetable shortenings (used as an alternate to lard made from pork fat).

But the reaction between a vegetable oil and the hydrogen gas will not take place spontaneously if they are simply mixed at room temperature and standard air pressure. The oil and the hydrogen form a metastable system at that point, which means that (like the necessity of a finger to push over the first domino) some sort of initiating energy must be applied to the system from outside before anything can begin. The oil and the hydrogen have to combined at very high temperatures and pressures, and in addition, a certain amount of powdered platinum must be supplied as a catalyst, before the reaction will take place.

A good many of the processes which take place in our universe occur when a system which is to some degree metastable encoun-

ters some external force which starts the system changing. Many of these are chain reactions, where the external force is only needed to initiate the reaction; once started, the process will continue on its own.

The important point to remember however is that a metastable system cannot begin reacting without some external stimulus. The history of the universe as a whole involves so many reactions of that sort, that the entire universe viewed as one giant system must be regarded as a predominantly metastable one. This means that something outside the system (that is, external to the entire natural universe) must have acted to begin the sequential process which forms the history of the universe.

The object of the proofs for the existence of God is to show that something which transcends the natural universe must exist in order for the universe as we know it to act the way it does. The first proof showed that this creative force must transcend the universe in the sense of not being bound by the laws of thermodynamics which govern all *natural* processes, that is, that this higher power must be *super*-natural. This second proof now shows that the initiating cause of the processes which make up the natural universe viewed as a single huge system, must transcend the universe in the sense of being external to it, and in some way prior to it and distinct from it, and not part of its natural system of processes.

Perhaps there are still readers who are skeptical about the domino chain example, and who still believe that it might in fact be possible to have a chain of falling dominos which extended to all past infinity, and never had a first domino or anything equivalent to a finger to push that first domino over. So let us give some other examples of processes of this sort to make it clearer what is involved.

When the end of a firecracker fuse is lit, the flame slowly creeps along the fuse until it reaches the firecracker itself, which then explodes with a loud bang. Some firecrackers have long fuses and some have short ones. One can easily explain how the flame creeps along the fuse: let us call this Explanatory Device A. As each new section of the fuse catches fire, that part burns itself up, but supplies enough heat to catch the next portion of the fuse on fire, so that the combustion process slowly advances along the line of the fuse.

If we apply Explanatory Device A to any intermediate portion of the fuse while it is in the act of bursting into flame, we can further explain that this portion was made to catch on fire by the heat produced by the burning of the immediately prior part of the fuse.

We could then try to argue that Explanatory Device A proves that it would be possible to have a *burning* firecracker fuse which *had never been lit by any outside agent* because it was an "infinitely long" fuse which had "always been burning." But we can surely see that this would be impossible, or perhaps better put, an example of fallacious reasoning on the part of someone who did not understand what infinity meant. It does not refer to a number, even an extremely large number, but to a kind of process. A *full explanation* of the burning fuse would have to answer, not how each part of the fuse connected to the next, but *why and how the whole process was occurring at all*.

We can say more about the firecracker fuse. If a five-minute firecracker fuse had been lit all the way back at some infinite time in the past, it would already have burnt to its end by now (and in fact it would have burnt out an infinitively long time ago). If a four-hour fuse had been lit at some infinite time in the past, it also would have already burnt out. If a ten-billion-year long fuse had been lit at some infinite past time, it also would already have burnt

itself out an infinitely long time ago. Now at this point, some people might say, "but if the firecracker fuse itself was infinitely long ...." But the word infinity does not refer to a specific number or a specific thing or event—it refers to a kind of process. An infinitely big firecracker fuse could not exist. Where would the rest of the universe have been shoved off to? If the firecracker fuse is still burning today, it would have to still be infinitely long, so it could continue to burn down into the infinitely distant future.

People who talk about infinitely long firecracker fuses might also say, if the sun were infinitely big, it would never burn out because it would never run out of fuel, and human life on the planet earth could go on forever. But an infinitely big sun is an impossibility, and in fact it is not clear if the idea even has any meaning at all. Certainly everything on earth would have been burnt up by an infinitely big sun, an infinitely long time ago.

These people might say, that if we had an infinitely big orange tree, then it would grow so many oranges, that the human race would never lack for orange juice again. But think about what is being said here: Would it be possible? What would happen to the rest of the universe? Does the idea of an infinitely big orange tree even mean anything at all?

Or let us suppose that a letter is dropped in my mailbox by the postman. By looking at the envelope, I can tell that it was forwarded to this address from some previous address, and that it was forwarded to that address from some even earlier address. Does this allow me to speculate that perhaps this letter was never originally mailed at all, but had been forwarded through the postal system since infinite times past? No, because the logical explanation of the way the United States Postal Service forwards mail *also* assumes that the letter was originally posted and entered into the postal system somewhere and at some point in time.

We must also remember not only the hanging chain fallacy but also the space satellite fallacy. An artificial satellite which was placed into orbit around the earth only a year ago (say to transmit television signals to remote locations) circles the earth in a motion which can described by a mathematical formula. We could choose a date back in 44 B.C., let us say March 15 (the Ides of March, the day the dictator Julius Caesar was stabbed to death in the Senate House in ancient Rome). We could choose a particular time on that day, say 11:38 a.m., and use the mathematical formula to calculate where the satellite "was" in its orbit at that time. The problem is that in the real world, the satellite did not yet exist at that time. In other words, the fact that we can devise a formula or explanation for an ongoing process which *could* at the formal logical level theoretically be extended as far as we wished (that is, "infinitely" back into the past) does not mean that the process was *actually going on* at all those times and places.

In theory, once we have two chickens (a rooster and a hen) we can produce a self-perpetuating system. From that point on, new baby chicks will be hatched at a rate sufficient to make up for the deaths of the older chickens, so that although no chicken alive in the philosopher Socrates' time is alive today, the chickens which are alive in our present world are all descended from the chickens who lived back in his day, back the fifth century B.C. If we look only at the way in which chickens reproduce other chickens in the narrowest sense, it may seem possible that chickens have existed from infinite times past. In fact, the philosopher Aristotle believed that the earth, and all the creatures on it, including chickens and human beings as well, had always existed.

Modern science has discovered that this is not the case. There was a time when there were no chickens, and there was some point in time when the first chickens which had ever existed came into

being. The oldest rock formations found on the planet earth show no signs, not only of fossilized chicken bones, but no signs of any kind of life at all on the planet during its very earliest history.

The actual empirical evidence gathered over the past century or two in fact shows that nothing whatever in the way of the gross features of this universe has *always* existed. There was a time when there was no life of any sort on the planet earth, and there was a time when the rocks which make up this planet did not exist. There must have been a time when the stars that we can now see did not exist, because their light is produced by nuclear reactions which will eventually run out of nuclear fuel.

Aquinas pointed out that proofs for the existence of God cannot be set up on the grounds of pure logical possibility alone, but must also involve empirical observations of what we in fact observe going on in the universe. We in fact see a universe made up of (a) some "domino chain" processes (like the burning firecracker fuse) which had to have been begun by some external initiating force, and (b) other processes which (like the orbiting space satellite or the continuing propagation of chickens as a species) are self-continuing once begun, but where *in fact*, every time we can obtain enough empirical evidence, it turns out that they were begun by some external initiating source or agent.

A universe viewed as a giant interconnected system made up in large part of processes such as these—processes which we can empirically and scientifically observe going on—must have had some transcendent external agent or source or force to initiate these sequential processes.

Is it possible to get in back of the big bang?

The presently accepted scientific account of the origins of the universe, the big bang theory, says that the universe came explo-

sively into existence at a point around 13.799 billion years ago. Experiments with giant particle accelerators are presently attempting to reproduce conditions such as they would have been almost immediately after the big bang began.

There seems no possibility yet of discovering what was going on "before" the big bang—and I put the word *before* in quotation marks here, because it seems as though not only space but time itself may have come into existence with the big bang, and the phrase "before time began" does not really mean anything coherent.

Nevertheless it seems clear to me, that somewhere in their hearts, modern cosmologists and astrophysicists believe that it might someday be possible for scientists to investigate the precursor state to the big bang (whatever it might be) and reduce it to a normal scientific object also. If we abbreviate the big bang as the BB, then a precursor state which was "before the big bang" could be referred to as the BBB. We could even speculate about whether, centuries from now, scientists would have discovered something even prior to the BBB, which I suppose we could then call the BBBB.

But Aquinas' warnings against pseudo-infinite regress must once again be heeded here. *In terms of the first proof*, if the BBB (and even the BBBB) were turned into natural objects, then there would still need to be some super-natural ground which existed even before that, which had the capability to break the laws of thermodynamics. The process of regression back into the past, from the BB to the BBB to the BBBB (or even beyond), has to terminate at some point.

In terms of the second proof, if the BBB was turned into an object of scientific investigation, then the overall natural system would be composed of both the present physical universe and its

precursor state—so there would still be the necessity of some initiating cause prior to and external to both of them. Again, we cannot regress backwards forever: something has to be the uncaused cause which started off all the natural causal chains which make up the universe.

The uncaused cause which this second proof requires would have to be capable of acting in a manner unlike any natural causal agent. This extraordinary uncaused cause (upon which all other causal chains depend) is the higher power which rules this universe, that is, the transcendent ground which traditionally (in the western world) is called God.

The divine will as uncaused cause

The speculation in which I am going to engage at this point goes beyond the bare proof itself, so if the reader rejects my arguments in this section, I would ask that this not reflect backwards on the arguments in the preceding parts of this chapter.

The second proof shows that the kind of causal chains which natural science investigates and explains must have been initiated by a transcendent uncaused cause. It would have to be capable of acting in a manner unlike any of the natural causal agents which play their role in normal scientific explanations.

Now most of the material in the five proofs for the existence of God shows the necessity for some transcendent ground to the physical universe, but does not demand that this ground be regarded as a warmly personal God—quite the contrary, because for the most part the proofs could be satisfied by a quite impersonal ground which is mysterious and violates the normal laws of nature, and could perhaps be regarded as impressive and awe-inspiring, but

which had nothing analogous to any kind of consciousness or awareness.

This second proof however could potentially be pushed, I believe, into showing that a personal God who had something analogous to a will (that is, the ability to make a free choice of some course of action) would solve a good many of the problems associated with determining what an uncaused cause could be. To show how this is so, it would be helpful to begin by talking about what a human act of free will would be.

Most human decisions (as the Calvinist predestinarian Jonathan Edwards showed in his misleadingly entitled book, the *Freedom of the Will*) are not free at all, but are predetermined. Each of us develops during our childhood a set of character traits (and character defects as well) which define most of our decisions. Given a description of the person's underlying character, and a description of the situation in which that person is placed, the decision the person makes is usually fairly predictable and always ultimately explainable, if we dig deeply enough.

But contrary to Edwards' Calvinist belief that human beings have no real free will at all, it has been my own observation that a period of psychotherapy with a good therapist, for example, can ideally ultimately enable a person to exercise free will in a certain area, and a true spiritual conversion will likewise require a genuinely free act of decision. In an act of free will, the person radically reevaluates his or her own character traits, habitual behaviors, and value system, and decides to change his or her whole way of looking at life and doing things. When a historian tries to "explain" the conversion experience of some great spiritual leader like Augustine or John Wesley, it is clear that a study of the antecedent circumstances cannot totally account for the decision the person made. Somehow or other, the people change their basic attitudes and con-

ceptualities at some quite basic level, and begin acting in a quite different kind of way. In the case of major leaders like these two figures, the new kinds of actions produce enormous historical consequences. Whatever the nature of the free decision which these people made at the point of their conversion, (a) it was not totally caused by any antecedent set of natural causes and (b) it initiated new chains of cause-and-effect in the natural world.

In an account written by a modern historian (let us say one who knows a good deal about real psychology and sociology) an act of free will on the part of one of his historical characters will appear as a spontaneous blip in the story line, where the kinds of effects which that person was causing on the world changed markedly, without any fully adequate explanation in terms of the person's life up to that point, or the circumstances the person was in at the time the change occurred.

Now Aquinas insists that most of what we can know about God must come from observing the nature of the natural physical world which he created. In what Aquinas called "the analogy of being," he said that the universe will display analogies to God in various ways: analogies which arise because the nature of the effects produced by a particular kind of cause will always be in some sense analogous to the nature of the cause.

If we assume that God has something analogous to a human will, then the simplest statement of how God could act as the initiating and empowering cause of the universe would be to say that he decided to create a world and then did so. A God who can will something, and make decisions and choices—or at least something analogous to what this kind of action would involve in a human being—would be a personal being and not simply a blind force of fecundity.

Some of the Arab Neo-Platonists whose works began coming into western Europe in translation in the twelfth and thirteenth centuries regarded the transcendent higher power (the One) as simply an impersonal power, a kind of fount of being which spontaneously and automatically overflowed and caused all the lower levels of being to appear. This was simply a revival of the neo-pagan thought world of late antiquity. From where they lived in western Europe, Thomas Aquinas and many other good Christian theologians of that period realized that the first thing they had to combat in confronting these Arabic neo-pagan philosophical systems was to insist that God had a will (that is, was a personal God), which meant that he deliberately chose to create the universe. The existence of the physical universe was not the effect of some impersonal natural process operating automatically.

Although Aquinas did not push that point, I furthermore believe that his second proof for the existence of God can only make good sense if we take that fundamental position. When we look closely at what we know about God, we find something analogous in an important way to what we would call personhood in a human being, which includes the ability to make free decisions. An act of free will is an uncaused cause, because it is not the simple effect of any antecedent causes (i.e. it is "uncaused"), but can itself cause new chains of effects to emerge as a consequence.

The spiritual implications

If we combine what we have learned in the first two proofs, and wish to talk about some of the possible spiritual implications, we could point out that we have learned that God is power and energy—the source of a transcendent energy which (unlike natural energy) can never run out, and is sufficient for every need and purpose, extending to the very limits of the physical universe and be-

yond. At the spiritual level, creative and positive energy is called *love*. Our spirits become futile and ultimately despairing when we cut ourselves off too much from the divine love which is our source of vital energy at that level of our being.

God is personal. He brought our universe into reality, and us human beings also, because he willed us into existence. He chose to do so, not because he had to or was compelled to, but as a free act of love. All the chains of cause and effect which make up the natural universe were deliberately initiated by his energy and love. He made us, gave us life, and set us in motion in this extraordinary universe where all is energy, motion, and change—ever novel, ever bringing some new discovery or delight, ever challenging us to continual growth.

Those human beings who have walked further than most down the spiritual path, tell us that "all is grace." God's act of creation was an act of pure grace, and the universe and everything in it was the first of his grand gifts to us.

Chapter 14

Using Empirical Evidence to Free Ourselves from the Fallacies

In talking about supposedly infinite processes, there are a number of logical fallacies we can fall into. And we can also find numerous examples of chains of efficient causes which, when looked at from one perspective, could apparently extend infinitely back into the past, but where we know that the empirical evidence shows that they did not. It is the empirical facts that we need to base our arguments on.

Let us remember at all times: according to Aquinas, we can only prove God's existence decisively by observing what is ultimately empirical evidence.

(1) We do not try to set up logical games like the ones employed by the defenders of Anselm's ontological proof. In this regard, we must remember the problem of Zeno's paradox, where he claimed to "prove" that in *the footrace between Achilles and the Tortoise,* no matter how fast the great Greek warrior ran, he could never pass the tortoise ambling slowly down the path. The fact that some explanations seem to hang together logically and display flawless internal reasoning does not mean that they actually describe the real world events that we can empirically observe. Every time we put a swift human runner, an Olympic champion, into a real this-worldly footrace with a slow-moving turtle, we will see

the human quickly pass the shambling reptile, which is weighed down to a crawl by its heavy shell.

(2) Let us remember *the space satellite fallacy*, where mathematically speaking, an analysis of the satellite's orbit shows that it could have been circling the earth forever, but where a careful look at the actual physical satellite here in the year 2018 finds inside it, a computer chip of a sort which was not invented until the year 2014.

(3) Let us join to this *the Aristotelian chicken-and-egg fallacy*, where Aristotle argued that chickens have always been in existence, going infinitely back into the past, because (logically) chickens could have been laying eggs which turned into additional chickens which went on to lay their own eggs, going back forever. But the empirical evidence gathered by paleontologists shows that the wild jungle fowl from which chickens are descended only evolved about six to seven million years ago, and the first truly bird-like fossils only date back to around 160 million years ago. That is not infinitely far back into the past.

(4) On the only good empirical evidence which we possess, the universe itself has certainly not existed since infinite times past. It seems to have simply exploded into being 13.799 billion years ago. The planet earth did not come into existence until around 4.5 billion years ago. We can write learned philosophical speculations about the possibility of dominos which have been toppling over, in incredibly long chains extending back infinitely far into the past. The answer to this argument which would be given by a follower of Thomas Aquinas is "give me your empirical evidence: show me *a real chain of falling dominos* which you can prove have been falling since infinite times past." Or even better, "show me a single domino which you can prove, by good empirical evidence, is older than 4.5 billion years."

(5) In the real world of nature we do find *inherently unstable systems*, which simply began falling or decaying or breaking apart all on their own. But we find that these chains of events had to have had a beginning in time, otherwise they would have already ended at some infinite point back in the past. So we can find numerous radioactive elements in nature, for example, which cannot have been in existence forever, because they would already have decayed away an infinite time ago—for example Radium, Uranium-235 and Uranium-238, Thorium-232, Strontium-90, Potassium-40, Calcium-48, Cadmium-113 and Cadmium-116, and Barium-130.

Aquinas' observation was that each actual chain of cause-and-effect which we find in nature had to have had an initiating event or cause which itself was of a different kind than the events which made up the repeating chain which followed. For the universe as a whole, therefore, the interconnecting net of millions upon millions of cause-and-effect chains which make it up, had to have had an initiating cause or event (the Big Bang erupting out of the ground of Being) which was of a different kind than the natural world processes which followed.

(6) So in the case, for example, of *the letter forwarded by the postal service*, the writing on the envelope might indicate that it had been sent by mistake (and then forwarded by that receiver) one or two or three times or more before I found it in my mailbox. But a look at the postmark stamped on the envelope shows that it began this process by being placed in the mail by a human hand at a definite time in the finite past.

(7) In the case of what was claimed to be *a burning firecracker fuse* which was infinitely long and had always been burning, how could such a thing exist, when gunpowder was not invented until the ninth century A.D. in China, and was not known in Europe un-

til the thirteenth century A.D.? What do we actually see in the real world of nature and human history? And can those who think carefully about it actually conceive of how an infinitely long firecracker fuse could be burning without anyone ever having lit it?

(8) In the case of *the hanging chain fallacy*, can anyone with experience of the real world actually conceive of how an iron chain could be hanging in midair, no matter how long it was, without being fastened to something solid (like an overhanging tree branch) at the top?

Do not say, "but these are not philosophical arguments." Let us remember again how Aquinas insisted that the proofs for God's existence had to be based on empirical evidence.

Third Argument: from Contingency

TEXT OF THE THIRD PROOF

The text is found in St. Thomas Aquinas, *Summa Theologica* I. q. 2 art. 3, which reads as follows: [42]

> The third way is taken from possibility and necessity, and runs thus. We find in nature things that are possible to be and not to be, since they are found to be generated, and to corrupt, and consequently, they are possible to be and not to be. But it is impossible for these always to exist, for that which is possible not to be at some time is not.
>
> Therefore, if everything is possible not to be, then at one time there could have been nothing in existence. Now if this were true, even now there would be nothing in existence, because that which does not exist only begins to exist by something already existing.
>
> Therefore, if at one time nothing was in existence, it would have been impossible for anything to have begun to exist; and thus even now nothing would be in existence—which is absurd.

Therefore, not all beings are merely possible, but there must exist something the existence of which is necessary. But every necessary thing either has its necessity caused by another, or not.

Now it is impossible to go on to infinity in necessary things which have their necessity caused by another, as has been already proved in regard to efficient causes.

Therefore we cannot but postulate the existence of some being having of itself its own necessity, and not receiving it from another, but rather causing in others their necessity. This all men speak of as God.

CHAPTER 15

Contingency vs. Necessity

In Aquinas' first statement of the five proofs, in the *Summa contra Gentiles* (written c. 1259-1265), he devoted by far the bulk of his argumentation to the first proof, the argument from motion, which attempted to show the need for a supracosmic unmoved mover. The argument from contingency was totally subordinated to that central concern, so that its major thrust became the attempt to demonstrate that this unmoved mover must be everlasting, such that its existence could have no end:

> It is . . . evident that, according to the position of Aristotle, some self-moved being must be everlasting. For if, as Aristotle supposes, motion is everlasting, the generation of self-moving beings (this means beings that are generable and corruptible) must be endless.
>
> But the cause of this endlessness cannot be one of the self-moving beings, since it does not always exist. Nor can the cause be all the self-moving beings together, both because they would be infinite and because they would not be simultaneous.
>
> There must therefore be some endlessly self-moving being, causing the endlessness of generation among these sublunary self-movers.[43]

Aquinas also points out that it would not work to try to make the universe itself the source of its own continued existence, by first arguing that it had always existed, and then viewing it over the entire period of its existence in time, as a kind of extended four-dimensional space-time continuum. The problem with this, is the fact that all the physical entities in this universe, as they have extended over all time, obviously have not existed simultaneously. It was therefore impossible to view this total assemblage of physical objects as being a coherent causal force.

Aquinas' obvious target here was a rather simple-minded version of Aristotle's picture of the universe, where the universe and all its living species were viewed as having always existed, because the physical beings which made it up always generated something else before they passed out of existence, or were simply turned into something else. In other words, the rains might slowly erode away a hill, but the soil of that hill was simply deposited as silt further downstream as the rainwater coursed off in the form of streams and rivers. Each generation of chickens hatched out enough eggs before it died to provide for the continuing existence of chickens over the centuries.

Here in his *Summa contra Gentiles* (written c. 1259-1265), Aquinas was so sharply focused upon showing that *the totality of all the hills, soil, chickens, and other things that had ever existed could not be the unmoved mover,* that he did not generalize the argument from contingency into a truly independent proof for the existence of God.

When he wrote out the proof the second time around however, in his *Summa Theologica* in 1265–1274, he remedied this problem, and turned it into a free-standing argument of its own. He realized that the basic issue was that the natural universe was made up of the coming-to-be-and-passing-away, *genesis* and *phthora*.[44] The

individual physical objects of which the universe was composed were of such a nature that they had not always existed, and they would not continue to exist forever. Now if a universe is composed solely of individual things which will, at some point, not be in existence at all, then over truly infinite periods of time all the chance permutations will occur, and a time will come when, by pure chance, there will simultaneously be nothing at all in existence. But past that point, there could be no more universe, because there would be no previously existing universe in existence any longer to give rise to any further developments. Now if the universe has always existed since infinite times past (as naive Aristotelianism claimed), then that point would already have come, and there would be no universe now—which would of course be absurd.

> There are some things which may either exist or not exist, since some things come to be and pass away, and may therefore be or not be. [Given infinite time, there will be] at least some time when that which may possibly not exist does not exist.
>
> Hence if all things were such that they might not exist, at some time or other there would be nothing. But if this were true there would be nothing existing now.[45]

So arguing in more general fashion in this second version of the proof, Aquinas asserts that there must be something which exists and must necessarily exist, whose existence is not confined to any specific times or places, and which exists in a manner which is not dependent on the existence of anything else other than itself. It must also be capable of providing for the origin and existence of all other things.

> [Therefore] something in things must be necessary. Now everything which is necessary either derives its necessity from elsewhere, or does not.

> But we cannot go on to infinity with necessary things which have a cause of their necessity, any more than with efficient causes, as we proved.
>
> We are therefore bound to suppose something necessary in itself, which does not owe its necessity to anything else, but which is the cause of the necessity of other things. And all men call this God.[46]

It is interesting to note that Aquinas acknowledged the possible existence of different levels of necessity. In our own modern understanding of the world it seems to be necessary (on the grounds of the fundamental laws of physics) that nothing can move faster than the speed of light in a vacuum (3×10^{10} cm/sec). But it is not clear why this should be necessary in and of itself, so one must assume that there is some deeper level of necessity which makes this a necessary truth of our particular universe. Furthermore, modern philosophers of science routinely discuss what would be necessary "in any possible universe," which clearly demonstrates the existence of some deeper level of necessity.

The important thing, Aquinas said, is to realize that *no truly infinite regress* is possible in this pursuit of the absolutely necessary: we must arrive eventually at something which would be necessary in any possible universe, and whose necessity is not dependent on the existence of anything else.

I do not think that any present-day philosopher of science or cosmologist would disagree with Aquinas' contention that there must be *something* which has this kind of absolute necessity. The reductive naturalists among them would however argue that somehow or other this necessary existent is part of the natural universe itself. A modern re-statement of Aquinas' proof must therefore make it clear, in terms of present-day science, why no part of the natural universe itself can represent that sort of necessary exist-

ent—or in other words, why mass or energy or the laws of nature themselves or something else of that sort cannot be inherently necessarily existent, and why they could not form the only necessary things in order to provide for the existence of everything else.

CHAPTER 16

The Third Proof Revised: Necessity and Contingencies

Three cosmological theories

Now in terms of cosmologies of the past century or so, we have been presented with three basic varieties. The big bang theory obviously acknowledges that nothing in the present physical universe can be this necessary existent, because not only all the matter and energy in the universe, but even space and time themselves, first came into existence at the time of the big bang, which did not happen in some infinite past time, but only 13.799 billion years ago. The other two theories however—the expanding and contracting model of the universe and the steady state model—attempt to show that the physical universe itself has always existed from infinite times past, and is the sufficient reason for its own existence.

The expanding and contracting model not only has no experimental evidence yet to show that it could even be remotely possible, but it is so clearly a perpetual motion machine of the first kind (a device which purports to be able to produce useful work forever without ever consuming energy, like an automobile whose gasoline tank miraculously never needs to be refilled), that I am not at all sure that there are many physicists any longer who regard it as a

serious possibility for explaining how the natural universe could provide its own reason for existing.

I believe that the reason why the steady state model of the universe, promoted by that very clever Cambridge University scientist Fred Hoyle, continued to be taken seriously by many people for as long as it did, was because it promised a way of getting around Aquinas' argument from contingency. One might grant that this theory violated Aquinas' first argument (in our contemporary revised form), because it clearly broke the first law of thermodynamics in not maintaining the conservation of mass-energy. Certainly the theory required that new particles (which had both mass and energy) be continuously generated out of nothing in empty space, in a manner similar perhaps to that in which virtual particles appeared under certain circumstances in field theory. But it could perhaps be shown, somehow, that a large enough amount of existing matter and energy could cause additional matter and energy to appear out of nothing within its force fields.

One might also grant that the steady state theory appeared to violate Aquinas' second argument, because one clearly had something equivalent to a falling domino chain or a burning firecracker fuse which had no beginning, but continued to fall (or burn) forever because it had always been falling (or burning) since infinite times past. But I think that most physicists, when they turn to speculating about cosmology instead of performing actual experiments in their labs (where in real laboratory experiments the equivalent to infinitely long chains of falling dominos or infinitely long burning firecracker fuses never in fact appear), are so taken by the possibility that this might somehow be possible, and are (at least some of them) so eager to prevent any kind of God from entering the picture (regardless of the *sacrificium intellectus*), that many scientists have in fact been fascinated by Hoyle's theory.

In fact the steady state theory turned the universe itself into a supernatural entity: that is, the physical universe became God. The reason why this lure was so attractive to so many was that a higher power of that sort would be (potentially at least) completely rationally understandable and hence manipulable by human beings for their own self-centered purposes. As Augustine put it in his *City of God*, those who attempt to live the true spiritual life "use the world that they may enjoy God," while fallen human beings "that they may enjoy the world, would instead use God."[47]

In favor of the steady state theory, one could argue, I suppose, that *if it worked* we could invoke Occam's razor and say that a supernatural universe by itself was a simpler hypothesis than that of a natural universe plus a separate supernatural ground. Occam's razor in its original formulation said that *entia non sunt multiplicanda praeter necessitatem* (entities are not to be multiplied beyond necessity), so that it could be argued perhaps that anyone attempting to show that only a physical universe *plus* a transcendent ground could solve the problem, would have to clearly explain the *necessity* for this additional entity, that is, the transcendent ground.

The difficulty with this however, is that over the past seventy years,[48] attempts to develop a steady state cosmology which might have half a chance of actually working, have in fact involved the invention of more and more complicated explanatory schemes and ad hoc assumptions. As a result, it seems (to me at least) to be the case that a physical universe *plus* a transcendent ground is actually the simpler way of solving the basic scientific issues. Occam's razor, in my view, in fact comes down on the side of the transcendent ground of being (which is actually a quite clear and simple and obvious explanation) rather than on the side of the so-called steady state universe.

Ascribing godlike powers to that which is not and cannot be God

One of the central problems with the steady state theory is that it proposes to create out of pieces—none of which by themselves have supernatural powers—a combined entity (the physical universe as a totality) which *does* have supernatural powers. Even though ancient pagan Canaanites and Philistines and Babylonians made statues out of wood or gold or stone, and then claimed that these statues were gods and had supernatural powers, I believe that it has been firmly established since biblical times that this kind of simple-minded idolatry is ignorance and superstition of the highest order. Many biblical passages point out that such idols are merely pieces of wood or gold (or ivory or marble, or whatever) and could not conceivably have any kind of real supernatural power. I do not believe that any modern scientist would be naive or credulous enough to believe that a single piece of wood or stone or metal (or what have you) could have divine powers, or that a beam of electrons or neutrons could be a god, or that a planet or star could have miracle-working ability.

So the question becomes: why would *a universe* composed of such things suddenly become a credible idol? In our discussion of the first proof, we observed that even normally sensible people, who know good and well that only cranks or charlatans claim to have invented working perpetual motion machines, can often take leave of their ordinary common sense when someone claims to have constructed a perpetual motion machine the size of the entire universe. I believe a similar phenomenon is taking place here: those who would reject small-scale idolatry as the superstitious nonsense of the dark and ignorant past, can often all too easily be-

come convinced that an object as big as the entire universe could have godlike powers.

Different kinds of contingency

But we must not allow ourselves to become diverted from the actual proof, which is an argument from contingency. The fundamental flaw in any steady state model of the universe is the fatal fallacy that one can create a necessary being by simply linking together an infinite number of contingent beings. One cannot produce necessity by multiplying contingency by infinity: this would be both logical and mathematical nonsense. Just as in the first two proofs, Aquinas in this proof shows that those who try to deny the existence of God and turn the universe itself into the adequate reason for its own existence, badly misuse the concept of infinity, and are gravely confused about the difference between proper and improper usages of this term.

The argument from contingency begins by stating that there must be something which exists and must necessarily exist, which is dependent on the existence of nothing else, and whose existence does not depend on time or place. It must also be capable of providing for the origin and existence of all other things, which will have only contingent being.

The contingent and the necessary are opposites. There are different ways of defining how this difference between necessity and contingency is to be construed. But in the form of the argument from contingency which Aquinas gave in his *Summa Theologica*, he clearly regarded things which come-to-be-and-pass-away as contingent, and that which is everlasting as the necessary.

The steady state model of the universe so cleverly works around this argument in the form in which Aquinas stated it, that we must develop a broader understanding of what is meant by contingen-

cies. On certain islands in the Caribbean, numerous species of birds had flourished for thousands of years, each species fitting smoothly into its own niche within the overall ecological scheme. Then European settlers introduced mongooses (to kill the native snakes), but the voraciously predatory mongooses also wiped out these species of birds. The arrival of creatures like the mongooses was a contingency which many parts of the local ecosystems were not equipped to handle. A lump of pure uranium-235 the size of a golf ball would react quietly in one kind of way; a lump the size of a baseball would explode almost instantaneously, for this is the critical mass that was used in the first atomic bombs. Overall size can be a contingency in physics as well as business operations (for a large national corporation can use different kinds of management and business strategies than are used in small local businesses, and vice versa).

On occasion, young men and women who did not have their doctoral theses totally completed were hired to teach at the university whose faculty I served on. Their continuance on the faculty was however clearly made contingent upon their successful completion of their doctorates within three years maximum. A life insurance policy will usually specify certain contingencies under which the policy will not pay off even if the policy-holder dies: death by act of war (declared or undeclared) for example, and frequently suicide (within the first year or two at any rate after the policy is granted). A wise business person maintains a contingency fund, sometimes called a “prudent reserve.” At the present time in the United States, eighty per cent of new businesses soon fail, and one of the commonest reasons for failure is a lack of adequate capitalization at the beginning, which renders them vulnerable to the first unforeseen contingency which comes along. The wisest

general can sometimes lose a battle because some contingency arises which had not been prepared for.

The ancient Greeks referred to contingencies of this sort as acts of *tychê*, "fortune." The most scientific and non-theological of the ancient Greek historians, Thucydides, nevertheless repeatedly warned political leaders and generals not to underestimate the power of *tychê* to disrupt their carefully planned-out schemes. It is easy to make the decision to declare war against another nation, he warned, but even the best politicians and generals can sometimes find it challenging indeed to actually end what was supposed to have been a short and easy war (in the modern world, we could think about the United States involvement in the Vietnam war and the war in Iraq). *Tychê* did not represent any kind of supernatural power to Thucydides, it was simply created by the impossibility of creating any human plan which could predict and defend in advance against all possible contingencies.

Now scientists operate by setting up experiments in which they attempt to eliminate all contingencies except ones they know about and the ones which they wish to study. The first serious experimental work which I did in my early days as a chemist, involved irradiating a sample of an amide dissolved in carbon tetrachloride. Carefully measured, chemically pure samples of the amide (which was a crystalline solid) and the liquid carbon tetrachloride were placed in a glass tube closed at one end. The tube was immersed in a freezing mixture of dry ice and acetone, and then connected to a high vacuum system to draw off all atmospheric gases. Then the tube was sealed at the top with a torch which melted the glass together and removed from the vacuum pump. It was then placed near a highly radioactive cobalt-60 source for a period of time. Afterwards, the sealed glass tube was broken and the contents analyzed to see what had happened to them. Ultimately, the research

group of which I was a member hoped to be able to better understand how radiation overdoses injured the proteins (with their amide linkages) in human flesh, which might enable scientists to devise better treatments for victims of radiation sickness, but protein molecules are so complex that it seemed more useful to try to break the problem down into smaller and more manageable pieces. One should notice here how good scientific method always tries to reduce problems to their simplest form, with the least number of contingent variables.

Somewhat oddly, the amide I worked on for many months had, as its principal radiation product, some strange crystals which had water molecules embedded within the crystal structure. Apparently the double-bonded oxygen in the amide molecule, together with some of the hydrogen atoms, were being broken off as free radicals under the powerful radiation, and then combining into molecules of water (H_2O). But good science tries to eliminate all contingencies, so the excellent chemist who headed the research team had me go back and check to make sure that the water molecules were not coming from any other source. Perhaps the supposedly chemically pure starting ingredients had been contaminated somehow: so I used an infrared spectrophotometer to make sure that there were no trace amounts of water in the amide or the carbon tetrachloride. Perhaps the principal reaction product was slightly hygroscopic and was absorbing water vapor from the air after the sealed glass tube was opened: I redid the experiments while opening the tubes in a sealed box with a glass top and rubber gloves inserted into it, where chemicals had been used to remove all water vapor from the internal atmosphere.

It turned out that the water molecules actually were being formed from free radicals dislodged from the amide molecules under the intense radiation, but nothing was published until we had

determined that no other contingencies could have accounted for this result. This is the way good science has to work: simple situations in which only a small number of variables exist, and all of those can be measured and accounted for.

Experiments in social sciences (such as psychology and sociology) rarely obtain the rigidly precise results which can be produced in physics and chemistry, because human beings cannot be standardized and controlled in that rigid a fashion. There will always be contingent elements which are both frustratingly numerous and extremely difficult to measure precisely. In the life sciences, the degree of control and predictability varies: in medical experiments in particular, the same drug (say a kind of penicillin) which may cure a disease in many people, may cause life-threatening side effects in others. In different human beings there are too many contingencies involving different kinds of body chemistry to come up very often with a drug which would enormously help everyone with a particular health problem and harm absolutely no one at all.

So different branches of science are accustomed to different levels of control and predictability. Physicists in particular tend to think in terms of rigidly controlled experiments in which all possible contingencies are covered, so that they are more apt to believe that an extraordinarily controlled experiment carried out with a high-energy particle accelerator or extremely accurate radio telescope allows them to jump from laboratory results straight to grandiose pronouncements about what "must" take place in the universe as a whole.

Devising schemes which can provide for all possible contingencies

As long as contingent elements are involved, no formal system yet devised has proven capable of inventing a scheme which can

produce meaningful results and which can continue to so operate perpetually. Eventually, some unforeseen contingent element appears, or some combination of contingent elements develops, which destroys the scheme. To rephrase this, as long as the context in which the scheme is employed is capable of change and development, and particularly as long as genuine novelty can appear, the scheme will not be capable of working forever.

A steady state universe which could exist forever would have to be a universe in which we could absolutely guarantee that no genuinely novel combination of events could ever appear. We need to remember that, in the big bang theory of the origins of the universe, when the primordial drifting gas clouds began to coalesce into galaxies and stars, totally different kinds of reactions could begin occurring: these were (at the time) total novelties, which dramatically changed the subsequent history of the universe.

The history of the universe, and of the planet earth, and of the life which developed on it, is marked by the continual appearance of novel developments—things which had never been seen before. In the development of science itself over the past few centuries, totally novel discoveries have been made over and over.

The steady-state theory seems to me to have finally died because, as each new piece of experimental data came in, Hoyle and his supporters had to keep on revising their theory in order to provide for these new contingencies. It soon became evident that any kind of significant changes at all in the overall makeup of the universe would prevent this theory of an automatically-self-perpetuating universe from operating. In the real universe there were simply too many contingencies.

Is anything in the natural universe absolutely necessary?

Aquinas set up his argument from contingency to show that there must be something which exists and must necessarily exist, which is dependent on the existence of nothing else, and whose existence does not depend on time or place. It must also be capable of providing for the origin and existence of all other things. The steady state theorists tried to show that the physical universe as a whole could be this absolutely necessary being, but as we have seen, as long as real change and evolving situations can occur, and genuinely novel developments arise, there is no way of devising a scheme which can maintain a self-perpetuating universe in operation forever, in spite of any contingency whatsoever.

So now we must ask whether any *part* of the natural universe could be this absolutely necessary existent. Nothing in the normal field of study of the natural sciences seems to be able to fulfill all the criteria we have specified. Mass-energy itself cannot be this everlasting necessary ground, because the laws of thermodynamics prevent it from engaging in significant action for more than a limited time, and because we have no reason to suppose that infinite chains of cause-and-effect could exist in actuality. The laws of nature do not fulfill all these criteria, because a bare law of nature is an abstract idea and cannot act to bring any kind of physical object into being by its own power.

Parenthetically, it might be added that it also cannot be shown on logical grounds that the laws of nature could not have had some different form. How could we prove that it was absolutely necessary that the particular set of laws which seems to govern this universe would have to shape any possible universe? There is no logi-

cal way of doing this. *The laws of physics cannot be derived from the principles of pure logic alone*.

In modern physics, the dimensionless constants (which in fundamental ways shape the numerical answers to calculations made under these laws) are particularly fascinating, for example, because they seem to be pure numbers with quite specific values, but are not simple integers (or powers or roots of simple integers or the like), which means that they appear to be purely arbitrary.

> One well-known example would be the dimensionless constant with the value of approximately 1⁄137.036, which modern physicists call the fine-structure constant.

On the other hand, if the numerical values of these dimensionless constants were changed even slightly, no universe could exist which would allow life to appear and develop—we would have a universe which rocketed from birth to death too quickly, for example, for there to be enough time for anything to develop on any planet, or a universe where fundamental changes occurred so slowly and with so little energy that it would be effectively stagnant. So we can say that if the dimensionless constants which shape the laws of nature in our own universe had even slightly different values, we human beings would not be here, but we nevertheless cannot give any logical reason at all as to why these precise but apparently totally arbitrary numbers could not have been different than they are. There is no way of proving, on the grounds of pure logic alone, that some purely arbitrary number—any purely arbitrary number at all, in fact—is logically necessary in any inherent sense.

So if there is no reason to regard any constituent of the natural universe as itself absolutely necessary (and capable as serving as a ground for the existence of the rest of the universe), and if the attempt of the steady-state theorists to turn the universe-as-a-whole

into a supernatural entity with divine powers of negating the laws of thermodynamics and perpetuating itself in infinite chains of cause and effect, founders on the rocks of evolving contingencies, then this absolutely necessary entity must transcend the natural universe. This necessary transcendent ground must be something which would necessarily exist even if the universe did not, and it must also be capable of providing for the origin and existence of the entire universe with all of its contingencies. This strange higher power is God.

Some spiritual implications

In a movie called *Karate Kid*, a young boy says in amazement to his wise old Oriental teacher of the martial arts, something to the effect of: "You would not have to take anything from anybody, because you could beat anybody in combat." The wise old man says back to him gently, "No, there is *always* someone better than you." In the first part of the old Anglo-Saxon epic *Beowulf*, the hero successfully kills two incredibly ferocious monsters; but in the story which concludes the epic, the now aging Beowulf takes on a fire-breathing dragon, and does indeed slay the monster, but dies himself in the process. In this regard, that wise old Greek historian Herodotus coined the phrase about "the wheel of fortune." Human lives are on a wheel, he said, and his study of history had shown him that "there are many empires that are now great which were once small, and many that are now small which were once great, so that the same person cannot prosper forever."

If we try to turn money into our God, or fame and respect, or *our own self-reliance upon ourselves*, we will still ultimately meet disappointments, and we will always someday die. If we try to deify a nation, or a supposed race of human beings (like blonde, blue-eyed Teutonic people, or Japanese people), we will always ulti-

mately find that we have leant our entire weight upon a frail reed which will break under enough pressure. No matter how well we try to provide for the future, and predict all possible contingencies, we can still end up finding ourselves isolated, miserable, and essentially alone at the end our lives.

A widely-known spiritual leader in the area where I lived for many years, a black man called Brownie who had originally been a professional gambler in the riverboat town of St. Louis, liked to remind people of what he had noticed at every funeral he had attended: there was never more than *one person per box*.[49] If we have not realized it prior to that point, when each of us finally stares our own eminent death in the face, we will realize that in the final analysis, all there is will be me and God.

But God cannot die, cannot be conquered, and cannot ever lose his total power. The more I live my everyday life in the awareness that God is ultimately all in all, and that the contingencies of life in this world will never, ever be totally controllable by me, and the more I learn how to recognize and then let go of that which I cannot possibly change or control—turning it over to God to take care of—the more satisfying I will soon find my everyday life becoming. And most of all, if I have lived this way, I will not say that I will not fear death as it begins to draw close, and fear it enormously, but when it is finally immediately upon me I will be able to throw myself wholeheartedly into the arms of God, knowing that whatever happens, it will genuinely be what was supposed to happen.

What gives those who deeply live the true spiritual life their strange aura of power is their reliance, not on themselves and their own intellectual schemes and attempts to manipulate the world and people around them, but on that everlasting transcendent reality which lies totally beyond the natural realm. That strange aura of

unworldly power, which so strikes us with awe, can be seen in the profoundly spiritual men and women of Buddhism, Hinduism, Judaism, Sikhism, Christianity, and Islam. One can see it among some of the wisest representatives of Asian shamanism and Native American spirituality.

It is their recognition of the sheer necessity of that transcendent ground, and its everlasting existence, which is an important part of what gives their own personas such inherent power. It is a borrowed power, and not at all their own creation, which they themselves would be the first to own. But how could someone who has truly devoted his or her life to that which must necessarily exist for all ages, and counts everything else as of secondary importance to that, ever be truly threatened by any worldly or human force? If there is no conceivable way that any earthly power could threaten the existence of what I genuinely hold dear, then how could any earthly power hold my own innermost soul hostage to its coercive attempts?

You cannot ultimately bully or manipulate a truly spiritual man or woman, because you have no ultimate hold on him or her—this person, in the final analysis, *does not care that deeply what you do*. If you literally had the power to destroy the entire universe, God would still exist, and that would be enough.

Do not be seduced by those who would tell you that in a universe without God, we human beings could determine our own destinies. History makes clear to us that eventually, you will find in fact that you have allowed other human beings to control your destiny, and to pipe the tunes to which you must dance. And even if you avoid that, the blind forces of nature red in tooth and claw will finally dim your eyesight, slow your reflexes, wrinkle your skin and cause it to lose its tone, afflict you with diseases and aches and pains—and finally, those blind forces of nature which

you wish to worship *will kill you*. Nor all thy strength nor wit shall avail you to prevail against them. Place your treasure in heaven instead, for the divine ground of all things is the only thing that is everlasting, and can create all things, and can never be destroyed though the entire universe go up in flames.

Fourth Argument: Gradations in Truth and Value

TEXT OF THE FOURTH PROOF

The text is found in St. Thomas Aquinas, *Summa Theologica* I. q. 2 art. 3 which reads as follows: [50]

> The fourth way is taken from the gradation to be found in things. Among beings there are some more and some less good, true, noble and the like.
>
> But "more" and "less" are predicated of different things, according as they resemble in their different ways something which is the maximum, as a thing is said to be hotter according as it more nearly resembles that which is hottest; so that there is something which is truest, something best, something noblest and, consequently, something which is uttermost being; for those things that are greatest in truth are greatest in being, as it is written in Metaph. ii.
>
> Now the maximum in any genus is the cause of all in that genus; as fire, which is the maximum heat, is the cause of all hot things.

Therefore there must also be something which is to all beings the cause of their being, goodness, and every other perfection; and this we call God.

CHAPTER 17

Augustine on God as Truth Itself

Thomas Aquinas' *Summa contra Gentiles* (written in 1259–1264) and *Summa Theologica* (written in 1265–1272) were, as the titles indicate, *summarizations* of important theological arguments grounded basically in earlier Christian and non-Christian tradition. Aquinas' fourth proof, from gradations in truth and value, was essentially a short summary of an argument laid out a thousand years earlier by the great theologian Augustine. The full proof appears in the second book of Augustine's *De libero arbitrio* (On Free Will), which he wrote during the years 391–395, that is during the period when he was serving as a priest at Hippo Regius on the North African coast, prior to his consecration as the bishop of that port city in 395.[51] In this case it will be useful to look at the detailed proof in Augustine's version before turning to Aquinas' outline of its main points.

> Note: Augustine's proof also gave rise to another famous attempt to prove the existence of God: the ontological argument devised by Anselm in his *Proslogion*, written in 1078–9. Anselm tried to turn Augustine's discussion into a totally *a priori* proof based solely upon the logical principle of non-contradiction. In Anselm's argument, as we discussed in Chapter 8 of this book, one notes many pieces of phrase-

ology which he carried over from Augustine's version of the proof.

Augustine began by quoting the line from Psalm 53:1, "The fool hath said in his heart, there is no God." He went on to say that we must come up with some argument to show this fool that it is necessary that God exists.[52] If we take it that "that is God than which nothing is known to be superior," and show that there is something which is clearly higher than the human mind and reason, then this will be our God—either this, or if it in turn derives from something even higher, this will even more so be the power which transcends all else.[53]

The hierarchy of kinds of knowledge

So the crucial object is to show how (in a meaningful way) something could be "superior," "better," "more excellent," "more sublime," or "supreme." A hierarchy needs to be set up, in some way which makes sense. Augustine therefore starts (at the bottom) with the five senses—seeing, hearing, smelling, tasting, and touching—through which we have our immediate and direct contact with the world of nature. But even in animals, there is something higher than this: Augustine calls it an "interior sense." An animal whose eyes are closed decides to open them. A creature perceives something that it wants and moves to obtain it, or something that it does not desire and flees away from it.[54]

The modern learning psychologist Jean Piaget described the same kind of primitive thinking going on in very small children during their first two years, which he called "the period of sensory-motor intelligence." Human infants then begin (during the period between about two and seven years old) to learn to deal with words and verbalizable concepts in a more organized sense in the earliest form of "representational thought," as he termed it. In the Swiss

children whom he studied (subsequent researchers have shown that in other cultures and socio-economic groups all these stages can occur at different ages), it was during the period between eleven and fifteen years of age that they learned how to use the full range of "formal operations" involving purely abstract thought and speculative possibilities.[55]

What Augustine meant by that primitive "interior sense" (which both animals and human beings possess) was something much like what Piaget called simple sensory-motor intelligence. Augustine contrasted this primitive sensory-motor (nonverbal) thought with what he called "reason," by which he meant the ability of an intelligent adult to employ the full range of formal operations involving words and abstract concepts in thinking about issues.[56]

So in the hierarchy Augustine was setting up, at the bottom (1) was the raw sense data as conveyed by the nerve endings up to the brain. At a higher level (2) was the kind of sensory-motor processing of this data within the brain which allowed animals and small human infants to decide what they wanted to obtain and what they wanted to avoid, and to move their muscles in the appropriate direction. At a yet higher level (3) was the full reasoning power of an adult human, which allows us to think about the relationship between the sense objects, the way we are perceiving them, and the direction our primitive sensory-motor processing is pushing us to act, but also a higher level involving long-term goals, speculations about other possible responses, and the other higher reasoning processes which enable us to pass judgment on those more primitive levels:

> My own note (this is not Augustine): so for example, if I stick a pencil into a glass of water, my reasoning ability tells me that the pencil remains straight even though my eyes seem to tell me that the pencil is broken into two pieces at

> the point where it intersects the surface of the water. For another example, when the dentist comes towards me with his drill, my lower sensory-motor processing may be sending urgent messages telling my muscles to jump up and flee, but my higher reasoning processes tell me that I should sit quietly and let the dentist do his or her work, not because I am strapped to a table like an animal in a veterinarian's office, or like small children who are forcing themselves to sit there tearfully because mommy and daddy are making them do it (and will scold them if they don't), but because I know rationally that the pain I am now feeling will ultimately go away if I let the dentist work on my tooth.

It is meaningful to describe this as a hierarchy because each level (as we move upwards in the sequence) acts as a "kind of moderator and judge" over the lower levels.[57] So the question becomes, is there an even higher *fourth* level which we could regard (in this sense) as even higher than our individual human reasoning ability?

The fundamental principles of mathematics

Certain kinds of objective truths clearly function that way, Augustine says, thinking first of all about "number," that is, the fundamental principles of mathematics. Seven plus three equals ten, if anyone who knows how to add is doing the calculation, and doing it correctly. Some human beings are better at math than others, so that

> One can do it rather easily, another with more difficulty, still another cannot do it at all: although notwithstanding it offers itself equally to all who can grasp it . . . . nor does it cease when someone is deceived in it, but he is so much the more in error the less he sees of it, while it remains whole and true.[58]

We do not judge and correct these truths; they judge and correct us. In mathematics, I cannot say that seven plus three equals fourteen, or that the sum of the other two (non-right) angles of a right triangle must equal a hundred and twenty degrees, simply because I myself think so, or would like to believe so—both statements are simply untrue. In mathematics, "one does not correct as an examiner but only rejoices as a discoverer."

> We pass judgment on our minds themselves according to it, while we can in no way pass judgment on it. For we say of the mind, "It understands less than it should" or "it understands as much as it should."

The nearer our minds move to knowing what these immutable truths actually are, the better we say our minds understand. For this reason, we clearly regard truths of this kind as "superior and more excellent" than our own minds.[59]

Now the fundamental principles of mathematics represent a strange kind of knowledge. During the early twentieth century, some very good philosophers attempted to derive these principles directly from the basic principles of logic. Even the authors of the best of these attempts, however, ultimately had to acknowledge that they had failed. The most basic truths of mathematics seem unquestionably to be so, but they involve rules and propositions which go far beyond the requirements of basic logic *per se*. There is an "extra something" involved in the truths of mathematics.

Augustine himself pointed out that the principles of mathematics also cannot be drawn from observations from the realm of sense perception *per se*. The series of all cardinal numbers (1, 2, 3, 4, 5, 6, 7, 8, 9, 10 11, 12 . . .) is formed by starting with the number one, and then adding one to produce each successive member of the series. But our five senses do not, strictly speaking, ever show

us “one thing” in and of itself. If I put a single red apple down on the table and ask “How many apples are there?” you would undoubtedly answer “One apple.” But the image focused on the retinas of your eyes will produce the excitation of thousands of rods and cones, subsequently interpreted within the nerves leading from them to the brain (and in the lower levels of the brain itself), as a slightly irregular circular patch of red. Why “one” when there are in fact thousands of rods and cones involved at the beginning of this process, and many more thousands of brain cells temporarily altered at the other end?

The concept of “one-ness” (among the simplest of mathematical ideas) is an intellectual concept, not a kind of sense object *per se*. We do not learn what “one something” is by observing our own sense perceptions; we first must understand (purely in our minds) what “one” signifies in order then to interpret and organize the raw sense data that is coming in.

What kind of knowledge is this, and where does it come from? Augustine himself held to an epistemological theory called illuminationism, so in this part of the *De libero arbitrio* he argued that the concept of the number one arose through “an interior light which the corporeal senses do not know.”[60] But even if we do not agree with his theory at this point, we must nevertheless acknowledge that many mathematical concepts and rules—such as the concept of “one” and the rule that a straight line is the shortest distance between two points—go well beyond the merely logical in the simple sense, and also appear to involve an understanding that is not of the same sort as observations drawn from sense experience. I do not *have* to perform actual experiments to understand why a straight line drawn between two points must be shorter than any curved line—if I simply *think* about it carefully, it becomes clear somehow that it must be so.

Now one might ask—if it is the case that there are certain objective truths (which are sometimes totally abstract, and not drawn in any immediate way from direct sense experience) and that all intelligent people would be forced to admit that they were true—why all intelligent people do not seek the same goals. Augustine draws the analogy of the sun shining high up in the African sky. All human beings looking up there see the same sun—there is not a different sun in the sky for each different person who sees it—but they are not constrained by that to all do the same thing.

> Each chooses by will what he enjoys through the sense of the eyes: and one man willingly looks upon the height of a mountain and enjoys this sight; another the even surface of a field; another the convexity of valleys; another the greenness of woods; another the moving smoothness of the sea . . . . still the light itself is one in which the glance of each one who looks, sees and knows that which he enjoys.[61]

The unworkability of total skepticism

In the third century B.C., some Greek philosophers had begun holding a totally skeptical position on many of the great fundamental philosophical and theological issues. When Arcesilaus became the head of Plato's Academy at Athens (one of the most prestigious of the ancient philosophical centers during much of the ancient period) he introduced this skeptical approach there in trenchant fashion. The most read classical Roman prose writer, Cicero, upheld this kind of *Academic skepticism*, as it was called. Augustine himself had fallen into that same position in the period immediately preceding his conversion to Christianity. The notion that we cannot know any absolute truths about anything in this universe was a position still held by many in Augustine's world.

Over the course of the twentieth century, the acid bath of this kind of total skepticism ate deeply into the souls of many men and women, under various modern guises. Some were affected by the total moral relativism of some current sociological theories, others by a kind of nihilistic version of Darwinianism according to which only those with the sharpest teeth and nastiest claws (or the most fecund birth rate!) survived over their fellows, and others by a naive version of Freud's psychology which proclaimed that my own inner urges (whatever they might be) were the only guide I needed to follow in life. In what seems to me perhaps the most hopeless skepticism of them all, I see many physical scientists even being drawn in the last few years to the dismal view that the scientific theory which is eventually proclaimed as "correct" is more determined by the question of who currently controls the power centers within the scientific establishment than by which theoreticians can best explain the data.[62]

Augustine had managed to talk himself into a totally skeptical position when he was younger, and remembered where he had ended up: it is wise to heed his warnings now. *Everything* is not relative, and *all* truths are not subjective. You can cite Arcelaus all you want—or in our own period, Feuerbach, Marx, Durkheim, Darwin, Freud, and so on—but seven plus three still equals ten, and a straight line is still the shortest distance between two points. My office at the university was in a three story building: if I were to climb up on the roof and then step off the edge, I would undoubtedly kill or severely injure myself. The law of gravity is an objective truth. In *good* science, one is always pursuing this kind of truth, the sort that does not "cease when someone is deceived in it, but he is so much the more in error the less he sees of it."[63]

The place, however, where pathological skepticism is most apt to come out in the modern world is not in mathematics or the fun-

damental observations of the physical scientists, but in matters concerning what it means to possess true wisdom, and in matters of morality and ethics. Augustine had to contend with that kind of skepticism among the people of his age too. The fundamental argument he used in the *De libero arbitrio* against that kind of destructive moral skepticism was drawn from Plato's philosophy and the theory of the natural virtues which was presented there. Since very few people in the present century understand the theory of the four virtues which was so commonplace in the ancient and medieval world, it may be wise to quickly sketch out that theory.

Plato on goodness and virtue

To understand how these four cardinal virtues work in Plato's philosophical system, we must begin by making a **tripartite division** in the kind of processes going on in the human psyche.

> **1. The rational part:** This is equivalent to what a modern psychologist would call the conscious ego. It is the part of our mental processes where we evaluate situations rationally, consciously plan and lay out strategies for action, and think logically about life.
> **2. The spirited part:** This is the force within the mind which gives us the power to act assertively (and even aggressively if necessary), which gives us the strength to struggle towards difficult goals.
> **3. The appetitive part:** This drive could be most vividly described perhaps as the desire for the pleasures of a happy and totally unambitious peasant. It is the desire for food and drink and a comfortable bed, and physical pleasure in general. It is also the desire for relaxation and, above all, simple entertainment. The human need to spend some time simply being entertained was recognized by Plato as extremely important to the fullness of the good life.

This tripartite division enables us to describe three of **the four cardinal virtues**, which are related directly to these three parts:

> **1. *Sophia* = Judgment** (Latin *prudentia*, the virtue of the rational part): Thinking and planning before you act, keeping centered in your mind when caught in chaotic or painful situations. Thinking through to the logical consequences.
> **2. *Andreia* = Courage** (Latin *fortitudo*, the virtue of the spirited part): The inner strength to take on dangers and challenges, to take decisive action, to say "no" when others are trying to force you to act improperly. It is the inner power which allows a person to be a self-starter and gives the positive energy to the inward ambitions which are required to continue working at tasks which take months and even years to complete. But when totally out of control, this is also the force which produces explosions of blind anger, so although it is a necessary internal energy, it can nevertheless sometimes be difficult to master.
> **3. *Sôphrosunê* = Self-Control** (Latin *temperantia*, the virtue of the appetitive part): The ability to withstand hardship when necessary, to suffer hunger, heat, cold, and physical pain when required. The ability to keep on working without resting or dawdling when a job has to be done.

But these three virtues must be kept in balance with each other, which (in Plato's understanding) was where the fourth virtue came into play:

> **4. *Dikaiosunê* = Even Balance, Fairness, Right Living** (Latin *justitia*): There is no good English translation for this word, although I have given these three suggestions here. Early Latin writers used the word *justitia* to translate *dikaiosunê*, so in traditional English translations of Plato the word is commonly rendered into our language as "justice."

Why did the early Latin writers use the word *justitia* to translate this term? Because *justitia* was an abstract Latin noun derived from the word *jus*, which meant right or law. The etymology seemed appropriate, because the Greek noun *dikaiosunê* which they were trying to translate (and the related adjectival form *dikaios*) came from the Greek root *dikê*, which also meant right or law. However, the Greek adjective in particular often referred to the treatment of people in an *even*, *fair*, and *balanced* manner. As a psychological term, therefore, it seems to be much clearer to translate the name of this fourth virtue as being "even-tempered," "fair-minded," or "mentally balanced." Since in English, we refer to someone who is insane as being "mentally unbalanced," we could even translate *dikaiosunê* as "sanity."

The Charioteer and his Two Horses

Plato's central metaphor for describing the relationship between the four virtues was that of a chariot pulled by two horses: the charioteer is the rational part of the mind, one horse is a spirited thoroughbred race horse (high strung and nervous, but driven thereby to run especially hard and give his best), and the other horse is a placid old nag (who is calm and steady, but basically only wants to go back to the barn and munch hay as soon as he is able). This automatically gives us the first three virtues. Judgment: the charioteer must be the one who is fundamentally holding the reins and guiding the chariot, but he cannot pull it by himself, so he needs the two horses. Courage: the race horse gives drive and energy, but must be restrained from panicky and destructive action. Self-Control: the old nag calms the race horse down when he grows overexcited, and makes sure that the team gets fed and watered properly, but needs urging if the chariot is to be drawn anywhere productive. The fourth virtue, Even Balance, is then the

proper coordination between the guidance of the charioteer and the pulling of the two horses.

As Aquinas pointed out, the basic understanding of these four cardinal virtues resulted from a simple rational analysis of human life itself; one did not need any inspired book or special divine revelation to learn about these virtues and understand them. When arguing with people who were total skeptics about morality, it could be pointed out that these four principles represented a rational and objective description of some of the fundamental requirements of living life successfully and reasonably happily, which would be true in their essential nature for people living in any society at any period of history, even if the details of how these virtues were to be carried out in practice could differ in different cultures.

Plato's system interpreted in terms of modern psychological defects

In our own modern cultural context, we could list symptoms, which could easily be derived from the ancient theory of the four cardinal virtues, which would indicate (now as well as back then) that certain people were mentally unbalanced in very destructive ways.

DEFECTS OF THE RATIONAL PART

1. These people show no impulse control, but act on the desire of the moment in situations where their behavior gets them in continual trouble: quarreling, flirting in socially improper situations, walking off the job, refusing to work cooperatively with other people, and so on.
2. The person is living so deeply in a fantasy world that he or she cannot cope at all with the demands of everyday living.

DEFECTS OF THE SPIRITED PART

1. The person has been in continual trouble with the law because of bar room brawls and other physical attacks on other people, or is a wife-beater or child abuser who has done serious physical injury to innocent victims.
2. The person is married to a partner who continually inflicts physical beatings and gross psychological abuse upon him or her, and yet cannot summon up the courage to leave.
3. These people are extremely intelligent and talented, but have never accomplished anything. Sometimes the primary external and easily observable symptom is their inability to hold any job or position for very long. Or sometimes perhaps they are in a dead-end job which they hate and detest, and have the credentials to obtain a much more satisfactory position, but cannot make themselves start seriously job-hunting.
3. These people are so locked in depression and despair that they spend most of their time huddled in bed, and can hardly make themselves leave the house, let alone hold a job, form relationships with other human beings, or carry out routine household chores.

DEFECTS OF THE APPETITIVE PART

1. These people have had a string of jobs, none of which they held more than a few weeks, because every time their employers checked on them, they found them loafing or daydreaming.
2. Or perhaps these people are compulsive overeaters, who have put on so much weight that they can no longer leave the house. Their doctors tell him that if they continue to put on pounds, they will die from the weight of their own bodies (their heart and respiration will no longer be able to accommodate the sheer body mass), but they nevertheless cannot stop eating. Or perhaps they have destroyed their

health, their career, and all their close relationships by alcoholism or drug addiction.

3. These people's lives are dominated by an obsession with pictures of dead bodies, or accounts of torture and descriptions of weapons of violence, or the degradation of some other type of person (women, members of another race, or what have you), or child pornography.

4. These people flunked out of school because they spent all their time watching television, or talking on the telephone, or partying, or shopping for clothes and getting dressed up to go out to parties.

When there are gross problems, we can apply quite objective tests, involving numbers and hard facts, to establish that something is going wrong. It is not a matter of some nebulous subjective feeling.

Skeptics who try to argue for a total relativism on all issues of appropriate human behavior use various kinds of ploys and cons in their attempt to avoid looking at some of these truly central issues. Sometimes they focus on comparatively trivial issues, such as different funerary practices or dress codes in different cultures. Sometimes they look only at the surface, and refuse to see the true underlying issue: in the old days, when an Eskimo group was travelling during the winter, and one of their elderly people became too ill to travel, hold their bowels, and so on, it was in fact sometimes necessary to abandon that poor person to die, because otherwise everyone else in the group was going to die; it was in fact a horrifying and traumatic experience for the entire group, but one they could sometimes find no way of avoiding. At other times these relativists turn to what are obviously sick societies for their examples, or a clearly malfunctioning part of an otherwise basically healthy society.

Augustine on wisdom, goodness, and virtue

In arguing against the total skeptics of his own period, Augustine insisted that, just as there was one set of fundamental mathematical principles which would represent objective truth for all rational human beings, so there was also a kind of wisdom and truth about the supreme good which any rational person would be forced to acknowledge.[64] He used the four cardinal virtues which we have just discussed as an example of what he meant: JUSTICE (Even Balance) meant seeing the truth about what things in your own life must be subordinated, what things must be equally present, and how the various parts should be distributed. PRUDENCE (Judgment) meant the ability to choose wisely and thoughtfully in light of these truths, and *thinking* before you opened your mouth or acted. FORTITUDE (Courage) meant the ability to make yourself actually act on these choices, rather than giving in to fear, apprehension, and worry. TEMPERANCE (Self-Control) meant the ability to act in this way even if it involved pain, labor, and discomfort.[65]

Augustine went on to point out, that those who failed to achieve the supreme good invariably did so because they believed some lie or fantasy about the nature of life, or because they failed to consider the ultimate truths which they had to eventually confront.

Suppose one devoted one's life to accumulating material wealth, or power and control of some sort over other people, or the pursuit of vainglory, that is, continual praise and attention from other people. If one of these things were *all* that one cared about in life, and if one pursued that kind of life-goal with *an out-of-control passion*, then one would eventually end up in unspeakable inner misery.[66]

That is because one objective ultimate truth about being human is that human beings are finite creatures, which means for one

thing that they are always caught with severely limited powers in a very large universe, and which also means that they will eventually grow old and die. Another objective ultimate truth about the universe and life, is that the universe as a whole is involved in temporal process: not only do we finally grow old and die, but nations and empires rise and fall, people who have been famous become forgotten, and issues which seemed absolutely vital at the moment become lost in the past after the passage of a little time. Even the loftiest mountain peaks eventually erode away in the wind and rain, and even stars finally burn up all their internal nuclear fuel and die.

A very wise priest in my town (who had done a lot of work with the elderly) once commented that he had only come across two kinds of elderly people in his own experience: the bitter and the grateful. Putting Augustine's teaching in those terms, we could say that he was trying to point out that there are truths about life and the universe which are totally objective and completely unescapable; but achieving true wisdom about the supreme good enables one to live one's life in such a way as to end up profoundly grateful instead of sinking into terminal bitterness. And these fundamental truths apply to all people everywhere, in any period of history. As Augustine puts it:

> There is an immutable truth, containing all these things which are immutably true, which you cannot say is yours or mine or any one person's, but is present and proffers itself in common to all.

This is a kind of truth which is "superior and more excellent" than our own minds, for if we misunderstand it, or attempt to ridicule and disregard it, our lives will ultimately founder on the rocks of objective reality.[67]

Wisdom is the knowledge of the truth about what is actually the supreme good. Just as one person, by the light of the sun, may choose to work in his garden, while another decides to clean her house, and yet another goes instead for a pleasant walk, so this wisdom about the supreme good does not mean that all wise people must live their lives in the same way, while pursuing the same earthly goals. Instead, "this truth reveals all goods which are true, which people of understanding . . . choose singly or together to enjoy."[68]

God as the Truth Itself and the Good Itself

Augustine quoted John 8:32: "You will know the truth, and the truth will make you free"—free from being continually destructive to others, and free to seek ultimate goals which are achievable instead of tragically devoting ourselves to ultimately unwinnable contests.[69]

Truth Itself IS God. This may seem like a strange statement to many modern people, and yet it was for a long period of time one of the fundamental tenets of good Christian theology. It is a truth which is above our own minds, and exists independently of our minds. A long list of what we normally regard as divine attributes belong to it:

> That beauty of truth and wisdom . . . does not shut off those who come in a crowded multitude of hearers, nor does it move along in time, nor does it migrate in space, nor is it interrupted by night, nor is it blocked off by shadows, nor does it fall under the senses of the body. Of all the world it is nearest to all those turned toward it who enjoy it, it is eternal to all; it is in no place, it is never away; it admonishes abroad, it teaches within; it changes all who see it to the better, it is changed by none to worse; no one judges of it, no one judges well without it. And it is thereby clear that

> truth is without doubt more excellent than our minds, which are each made wise by it alone; and of it you may not judge but by it you may judge of others.[70]

Since God is the Truth Itself, and this includes the truth about what makes human life good, we may also say that ***God is the Good Itself.***

The Fourth-Century Logos Theology

Christian theology in the fourth-century—the period when Augustine's thought was first formed—was dominated by what is called the Logos theology. Many modern philosophers and theologians understand little or nothing about its basic tenets, and when medievalists study Augustine, they often forget the effect of this doctrine on portions of his thought. It was closely related to the pagan Neo-Platonism of that general period, although it changed some of the terminology and altered some of the pagan interpretations of Plato's meaning.

Pagan Neo-Platonism held that the transcendent realm was organized into three hypostases or substrata. The two uppermost strata are what concern us here. At the top of the hierarchy was what they called the One, the ultimate unity which embraces all reality. It was not a physical thing in the sense in which objects of sense perception in the natural world were delimited physical bodies. It was also above any possibility of being conceptualized in terms of intellectual categories and schemes. It was the ultimate Mystery behind the universe: we could know that it is there, but we could never fit it into our human intellectual systems and explanatory formulas and predictive rules.

The second stratum (the one immediately below the One) was called *Nous* (rhymes with loose, moose, spruce, and juice) by the pagan Neo-Platonists. This word came from the Greek root which

meant to know something, at the level of intellectual concepts and universal theories. Ancient Platonists called this the realm of the *noetika*, the Platonic ideas. The eighteenth-century philosopher Kant used the Greek passive participle from this same root, and called it the realm of the *noumenon* (as opposed to the world of phenomena which we beheld directly by sense perception).

In the fourth-century Christianized version, the One was called God the "Father," the ultimate generative and creative ground of everything else that exists, and *Nous* was called the Word (*logos*) or Wisdom (*sophia*) of God. The realm of ultimate Truth which Augustine was referring to in this proof was therefore what his contemporaries called the Word or Wisdom of God.

Now the eighteenth-century theologian John Wesley (the Oxford university classics and patristics scholar who founded the Methodist movement) made a very useful distinction here. The rise of modern science had made him especially aware of the necessity of precision on certain issues, and he was also affected by all the same intellectual currents of that century by which Kant was affected. God's *logos* was part of God, and could therefore not be known by human beings *as God knew it*; it was much like what Locke called the real essence of things, or what Kant called the noumenon.

We could not know God's *logos* as God knew it, but we could know the realm of law (what the ancient Greeks called *nomos*). Laws—whether scientific laws or moral laws—were attempts by the human mind to create models and images of this *logos* or ultimate divine truth. So when we say that God is Truth Itself, we must also say that our human understandings of this truth must always be only partial representations of the fullness of the divine Truth. Our human comprehension of this Truth is fallible and can always be distorted by our intellectual schematizations of it.

THE MYSTERIOUS GROUND
The generative and creative source of all else,
above all human conceptualization in any sense.
↓
mirrored at a lower
ontological level in
↓
THE LOGOS
The realm of the ideas, which derives its being
from that mysterious ground, and provides
the rational and logical structure to the natural
universe. What Kant called the noumenon.
↓
mirrored at a lower
ontological level in
↓
NOMOS
Natural law as our human minds understand
it at any given moment of history: our finite human
models and interpretations of the laws of nature
and the structure of the good life.

On the other hand, however partial and fallible and distorted our human understanding of the Truth Itself may sometimes be, that Truth stands outside us as something which truly exists in total independence of our minds, so that we may correct ourselves and better our understanding of it if we choose to grow and learn.

That which is loftier and more excellent

It is in the context of this Logos philosophy therefore that Augustine wrote the conclusion of his proof.

> You had conceded that if I should show you that there is something above our minds, you would confess that it is God, provided there were nothing still loftier . . . . For if there is something still more excellent, that rather is God: if however there is nothing, then truth itself is God.

If the realm of Logos and Wisdom—in which all ultimate Truth lies—is in fact the highest realm in existence, then it must be our God. If there is something higher yet, "you nevertheless cannot deny that God is."[71]

But since the Christian Logos theology holds that God as the ultimate ground of generativity and creation, and the divine Word and Wisdom, are all the same God, we do not have to make this choice. The transcendent Truth Itself, and the great ground of Mystery from which it is generated, are all God.

Augustine put the last part of his proof in this form because the pagan Roman Stoic philosophers were still being read during his period. The Stoics believed that the Logos was the supreme God, and denied the Platonic insistence that there was a realm of Mystery lying even beyond and behind that. So he was saying to his contemporaries, in effect, that this proof showed that they must at least believe in the existence of the Stoic God, even if they refused to believe in the existence of a divine realm even above that (as was the case during that period with the Christians and followers of the great Jewish philosopher Philo).

Aquinas

Now by the high middle ages, the old fourth-century Logos theology had been long dead in the Latin-speaking western Christian world, so Aquinas basically simply skipped that part of the proof. The portion that was important to him was the first section of the proof, in which Augustine showed that the existence of truths (both

about natural science, and about the nature of the good life for human beings) which stand outside of the human mind, shows that there must be some transcendent ground to reality at this level as well.

Aquinas' ***first proof*** showed that the brute matter and energy in the natural universe cannot account for the existence of this universe—this mass-energy must have been supplied from some infinite source. His ***second proof*** showed that such a universe could not initiate all of its sequences of natural processes solely from within itself. The ***third proof*** showed that the natural universe could not exist unless there was some transcendent ground which would necessarily exist no matter what contingencies occurred within the broad sweep of the universe which it created. Now this present argument of Augustine's, which Aquinas turned into his ***fourth proof***, shows that *at the abstract level*—the level which we conceptualize in our minds as the principles of mathematics, the laws of science, and the description of the good life for human beings—this transcendent ground must also exist.

> My note: not even the fundamental principles of mathematics, let alone the laws of physics and so on, can be *derived from* something like, say, the elementary rules of logic (even though, to make sense, these principles have to follow these rules of logic).
>
> Brute matter and energy, in and of themselves, cannot generate the fundamental principles of mathematics or the laws of physics. How could a large rock, a charged electrical battery, or a beam of light—or an electron or a neutron—generate the fundamental principles of mathematics or the laws of physics? Not even all the matter and energy in the universe could do this, because brute matter and energy can only exist in the real world when it is structured by the principles of mathematics and the laws of physics—that

> is, these principles and laws are *ontologically prior to* the matter and energy.
>
> To try to reverse this relationship would be equivalent to trying to lift yourself by your own bootstraps, or claiming that a daughter could give birth to her own mother.

So in Augustine's argument, Aquinas saw yet a fourth fundamental way in which what we observe going on in the natural universe (using our five senses, and observation and experiment) indicates that the universe itself cannot be the source of its own existence, but must derive its being from some external ground which is "super"-natural and transcends the natural realm.

CHAPTER 18

Aquinas' Fourth Proof: from Gradations in Truth and Value

Aquinas took the fundamental argument which Augustine had set forth in his *De libero arbitrio*, and gave simply a brief summary of it in the version which he drew up for his *Summa contra Gentiles*, although he did take pains to link it more closely to the question of being (which Aquinas regarded as the fundamental philosophical question). In that work he began by noting how Aristotle, in his *Metaphysics*, "shows that what is most true is also most a being." We can say for example that a particular piece of electrical apparatus exists, or a particular seam of coal extending under a mountain range exists, or a particular cluster of galaxies exists. If some of the things which I believe about that physical object are NOT true, then *these particular parts of the object do not exist*. If some of the truths about that physical object are unknown to me (in such a way that I am totally oblivious to my own ignorance), then *the full being of that object does not yet exist in so far as my knowledge of it is concerned*. To know the full truth about something would necessarily involve knowing what actually exists in regard to it, and what does not exist, and exactly how it is constituted, and how it works, so that I would then understand its full nature as a being and all that it means to say that it exists as that sort of being.

Truth, being, and the question of whether something does or does not exist are therefore closely related to one another. Furthermore, since truth itself has some kind of objective existence outside our own minds, truth itself must represent a kind of being—not the kind of being which a physical object has, but nevertheless a real being of its own.

Now even partial glimpses of the truth would still embody a certain amount of truth, Aquinas argues. In fact, even when we have quite mistaken ideas about something, if it is the case that:

> of two false things one is more false than the other, that means that one is more true than the other. This comparison is based on *the nearness to that which is absolutely and supremely true*.[72]

The fact that we may speak of one statement or theory as being better, or more accurate, or matching the experimental data more closely, or having greater explanatory power, shows that in scientific investigation and in the pursuit of knowledge in general, we must necessarily assume that there is some external criterion for truthful statements, and that that-which-is-actually-true exists totally independently of our human subjectivity and ignorance. The closer a scientific theory comes to an adequate statement of that-which-is-actually-true, the better the theory is.

But given the way in which truth and being are allied, and the fact that truth also has its own kind of being or reality, then if the first part of our proof shows that *something* which is *the absolute truth* must exist (even though we do not know it fully), "we may further infer that there is something that is supremely being. This we call God."[73]

In the *Summa Theologica*, Aquinas recognized that the crucial part of the argument was the observation that there could be grada-

tions in truthfulness and goodness (just as there were gradations in many other things as well, such as temperature). But the possibility of obtaining even approximations to the absolute truth, or approximations to the ultimate standards of goodness, necessarily implied that some sort of criterion of real truth and total goodness must exist.

> The fourth way is from the degrees that occur in things, which are found to be more or less good, true, noble, and so on. Things are said to be more or less because they approximate in different degrees to that which is greatest. A thing is the more hot the more it approximates to that which is hottest.
>
> There is therefore something which is the truest, the best, and the noblest, and which is consequently greatest in being, since that which has the greatest truth is also greatest in being.[74]

In terms of current scientific knowledge, the argument would be clearer if he had spoken not of heat but of cold, and had used for his example the statement that "a thing is the more cold the more it approximates to that which is coldest." In modern thermodynamics, there appears to be no inherent absolute maximum in terms of hot temperatures, but the third law of thermodynamics states that there is a necessary limit at the other end, called absolute zero, which has a value of -273.15^{o} C or -459.67^{o} F, and also states that this is a limiting concept, because even in an infinite number of steps, one can approach closer and closer to that temperature, but never actually reach it.

The mathematicians of Aquinas' period had not yet devised a full-fledged theory of an infinite converging series (a series which approaches a finite limit with more and more accurate approximations), let alone the concept of limiting functions, which was de-

veloped in the seventeenth century when calculus was invented. But Aquinas certainly understood the basic point: an infinite process which tends towards a limit can be of great practical utility, even if the process *per se* will never actually arrive at that limit.

In the first three proofs, Aquinas pointed out the fallacies in what were claimed to be infinite processes, but actually produced only pseudo-infinite regressions: cosmologies which were only covert perpetual motion schemes, claims that certain kinds of cause-effect chains could be without beginnings, and the assertion that one could produce a necessary being by linking together an infinite number of contingent beings. But in this fourth proof, he uses a reverse strategy and points out that certain kinds of infinite processes can produce useful results: namely (to put it in modern mathematical terms) *those which tend towards a limit*. This is exactly what modern physics and engineering has discovered. There are "good infinities" and "bad infinities," if we may phrase it in that way, and sorting out the difference helps us to see why some sort of transcendent higher power must exist.

In the long run, Aquinas reminds us, the pursuit both of scientific truth and of some good understanding of human life and how it is most satisfactorily lived, can make real progress. The fact that such enormous real progress can be made helps to show that this is a process tending towards a limit. Even though *our* minds may not be able to achieve that final goal of *perfect* knowledge, *the ground upon which that full and flawless knowledge would be based must necessarily exist*.

God as the ground of truth and goodness for all other beings

It should also be noted that Aquinas, in the conclusion of his argument in the *Summa Theologica*, not only referred to "some-

thing which is the truest," but also to something which is "the best" and "the noblest." It was Plato who first referred to the transcendent higher power as the *agathon* (the good) and the *kalon* (the beautiful, fair, morally beautiful, and noble).

So if God is the supreme Truth itself, then this necessarily implies not only that God is the supreme Being but that God's Truth is the ultimate criterion of the Good and the Beautiful itself. From the time of Augustine on, it was considered proper to describe God—almost to define God even—as Truth Itself, Being Itself, the Good Itself, and the Beautiful Itself.

It is in the area of truth and goodness, however, where I think this proof has its most compelling quality for many people. If truth actually exists, even if no human minds know it (or totally accurately understand it), and if goodness of some varieties actually exists, even if no human minds recognize it (or fully appreciate it), then truth and goodness have some kind of independent reality all their own. Now truth and goodness in themselves are not material things, but exist at what the Greeks called the noetic level, the level of reality which our human minds can only deal with in terms of abstract concepts. So one cannot simply add up all the physical things in the natural universe and produce a realm of noetic concepts. But this means that, as a consequence, the material universe with all its physical objects cannot in and of itself be the ground of truth and goodness.

If one tries to argue that the natural laws of the universe are the criterion of truth and goodness, we cannot mean the natural laws which we human beings actually know, because these are constructs in the human mind, and our minds often are mistaken on this issue or that. One would have to argue that one meant "the real laws, the ones which actually exist." But how could such a collec-

tion of what seem to be simply abstract noetic concepts exist all by themselves?

This proof drives us into having to acknowledge either (a) that the fundamental noetic structures which the human mind represents through abstract concepts (including what we conceptualize as the laws of nature, the root principles of mathematics, and the basic natural moral law) must themselves be part of the transcendent ground, or (b) that these noetic structures must arise out of the transcendent ground. Aquinas went with the second alternative and said that when we refer to God as the Truth Itself (*verum ipsum*) and the Good Itself (*bonum ipsum*) we mean that God is the source of the truth and goodness of all true being in the natural world.

There have been philosophers and theologians in the western tradition, however, who have regarded these noetic structures in their plurality as being the transcendent ground themselves, or as an intrinsic part of the transcendent ground (perhaps existing in the form of "thoughts in the mind of God"). Some have gone so far as to assert that when a scientist truly comprehends one of the laws of nature or fundamental principles of mathematics, this scientist is "thinking God's thoughts after him."

Some have argued instead that when a human being becomes fully aware of one of these basic laws or principles, that this is "God coming to consciousness through us," and that the divine ground is not a conscious personal being (in the human sense of that term) in and of itself.

Now this proof, simply taken by itself, does not allow us to decide which of these interpretations would be most justifiable. The crucial point of the proof however is that **pure science takes as its essential goal the pursuit of truth, and must hold that this ultimate truth which it pursues transcends all human subjectivity and ignorance.** If the truths which science pursues have no in-

dependent reality, then "truth" would become no more than whatever the dominant scientific pontiffs of any given period of history defined it to be. Therefore the truth which science pursues must be either an intrinsic part of the transcendent ground out of which all other things arise, or it must arise out of (and be guaranteed by) this transcendent ground.

CHAPTER 19

Science and Moral Values: How to Avoid Becoming Psychopaths

The Courage to Seek the Truth

The publication of Thomas S. Kuhn's *Structure of Scientific Revolutions*[75] had a very interesting effect on the scientific community. Up to that point, modern scientists had for the most part believed in a very simple-minded account of their own methodology. The scientist does experiments to collect data, then formulates a theory to account for that data. If the theory logically accounts for the actual data, and other scientists are able to replicate the experiments in their own laboratories and find the identical data, then the theory is assumed to be correct. If another scientist however comes up with an experiment which results in data which this theory is unable to account for, and devises a new theory which will account for both the old data and the new data, then the scientific community will immediately accept the new theory as the correct one, as soon as they have checked the experiments in their own laboratories.

But *The Structure of Scientific Revolutions* pointed out that scientists routinely find data in their actual experiments which do not match up with the reigning theories in their field. When an experiment comes out with a result which one cannot account for, one painstakingly attempts to redo the experiment in a different way, or

discover some factor which is producing the unexpected result. It is treated as a puzzle to be solved within the boundaries of the reigning general theories in that field, not as a refutation of those theories. As Kuhn's book observed, a reigning theory will not be questioned in practice, in any mature scientific discipline, until the puzzles accumulate to such an extent that the majority of scientists in the field finally begin to acknowledge that there must be some basic problem with the theory.

The Ptolemaic theory of the universe, which was devised at the end of the Roman empire and dominated the entire middle ages, assumed that the sun, moon, and planets all revolved in circles around the earth, and attempted to predict their paths through the sky by means of a series of epicycles, which did in fact predict where the heavenly body was going to be to a reasonable degree of accuracy much of the time. Attempts were made to add additional epicycles of various sorts to resolve the small discrepancies in the observed data, but no matter how complicated the system of circles revolving inside and outside other circles was made in the mathematical model, past a certain point, devising some tiny change that resolved one of the remaining discrepancies in one part of the data simply seemed to produce new discrepancies in other parts.

When Copernicus devised his theory that the earth and planets revolved around the sun, his mathematical model did not in fact match up with the observed data any closer than the Ptolemaic theory did. Scientists began looking at this new theory seriously however, because it accounted for the occasional retrograde motion of the planets more elegantly (as an intrinsic and necessary part of the model itself, rather than as an ad hoc addition to the basic model) and because it seemed worthwhile seeing if this new model could be refined and made slightly more complicated if necessary, in a way which would make it match the data. Everything that anyone

could think of had been tried to make the old Ptolemaic theory work with true precision, and the scientific community had finally reached the point of giving up on it.

Now one unfortunate result which arose from the publication of Thomas Kuhn's book on *The Structure of Scientific Revolutions* (which first came out in 1962) was the undercutting, in the case of some modern scientists, of the vital nerve of their pursuit of what they had long believed to be the purity of absolute truth. It is not uncommon nowadays to find scientists writing books in which what is almost a despair appears: Is what is currently regarded as the "true" theory no more than a sociological issue? Is "truth" simply defined by whoever controls the scientific establishment, by their grasp on the granting agencies or crucial university appointments? Is what we call scientific truth simply *invented* by the human mind? The author of *The Structure of Scientific Revolutions* was personally attacked as allegedly claiming that genuine truth was an illusion which we could never attain in reality.[76]

These are rather desperate conclusions, to say the least. I am dismayed myself to see the degree to which the courage and optimism which produced the scientific discoveries of the past few centuries seems to be collapsing quite quickly at this point in history. The conclusions which some are drawing from that book are wildly overdrawn. It has always been true that those who control a scientific establishment can sabotage a new theory for quite some time, and by that I mean sometimes longer than one person's lifetime to be sure, and at times, as in the middle ages, for literally centuries.

The pursuit of truth requires bravery, because it demands a commitment to something greater than oneself or one's own personal fortunes. If scientists are just now learning that there can be martyrs to science in our own world just as there were centuries

ago, this is not necessarily a bad lesson for them to learn. The history of the world since writing was invented shows that, as far as we can tell, truth will eventually win out. Would you rather tell the truth, or have prestige and money? Those who are fortunate find that they can tell the truth and have a certain reasonable amount of respect from many, and make enough money to live on even if rather modestly; but ours is hardly the first generation of human beings who have sometimes been confronted with that decision between truth and personal survival in rather bleak form.

Perhaps the more curious reactions to *The Structure of Scientific Revolutions* came from those who reacted angrily to it as a denial that we could obtain the pure truth about anything at all. The anger came from the fact, I think, that some people had deluded themselves into believing that the pursuit of scientific truth would eventually put them in the position of having godlike knowledge of the ultimate truths of all things, which also had the virtue of enabling them to dispense with the old superstitious nonsense of believing that there was a real God external to ourselves. They wanted to believe that science would ultimately enable human beings to become their own gods.

What is especially curious about this reaction is that the partiality of our human knowledge had already been pointed out long before, at the beginning of the modern scientific era, first by Locke in his statement that human minds could never know what he called the real essence of external objects, and then more trenchantly yet by Kant in his demonstration that the noumenon (things in themselves) could never be directly known.

> My note: a partial equivalent to this argument in the field of literary criticism is called the hermeneutical circle. We cannot read a piece of literature effectively unless we come to it with certain questions, and yet the fact that we are asking

> these particular questions can easily distort our whole perception of the work to such an extent that what we come out with as our "interpretation" of the work is much more a reflection of our own biases and presuppositions than it is an actual reading of the text.

Aquinas' answer to the fundamental issue was that knowing all the possible answers to all the possible questions[77] was, if not a truly infinite task, at least a task which far surpassed the capacities of the finite and limited human mind. Knowing all truth perfectly was an impossible task for human beings. But truth nevertheless existed as a limiting concept, and the pursuit of this truth would slowly converge towards that absolute limit if we pursued it vigorously over a long enough period of time.

In the present century, we can predict exactly where each planet will be in its orbit at any precise moment in time (except, oddly enough, for certain very minor perturbations in the orbit of the planet Mercury, which still remains a puzzle). We can split the atom, build color television sets and electron microscopes, and cure or prevent thousands of diseases which used to plague our ancestors. In numerous areas of knowledge, we understand far more about the way the universe works than people of earlier generations did. This demonstrates that *of course* it is possible to make *real progress* towards knowing the fullness of truth. This is not the time for the scientific world to lose its nerve.

If real truth does not exist—as a limiting concept, even though we can never do more than achieve closer and closer approximations to its purity—then you cannot even be a skeptic or proclaim yourself to be just a simple pragmatist. In their real lives, even self-announced total skeptics have to make decisions, which they make on the basis of the truth as they understand it. And as a theory, as Augustine pointed out, the skeptical claim that human beings can

know nothing with certainty is itself a claim to absolute knowledge about this one issue. Total skepticism is intellectual bankruptcy, the minute it is actually carried out with full logical rigor—it is more of an intellectual parlor game for dilettantes than a real philosophical position. And the claim to be just a simple pragmatist "who doesn't claim to know anything about all those fancy issues" still involves a person in having to make real decisions about real-life issues based on what that person *pragmatically* believes to be the truth—which also necessarily involves hidden intellectual presuppositions about what does and does not count for evidence in these pragmatic judgments.

Again we come back to Aquinas' central point. Of course we cannot know all truth with godlike perfection. But we can say that the truth not only exists as an independent reality wholly external to our own subjectivity, but that we can make enough progress towards approximating the great truths (and the little ones too) to learn how to live quite successfully and in a way that we find very satisfying at the deepest level. You cannot be God, but you can learn how to be a reasonably wise and happy human being!

We could raise an interesting speculation here. The beginnings of modern science lay in the century after Aquinas, when people like Jean Buridan and Nicolas Oresme began modifying the theories of Aristotle and Ptolemy on motion and the planets. In place of the Aristotelian theory of motion, they developed the theory of straight and curved impetus. Galileo later on discovered the principle of inertia by devising experiments to see whether that theory was in fact true. And so for centuries, scientific investigation made progress in the western world, firmly convinced that *truth existed*, that it was grounded in the very being of God itself, and that the human mind could learn to grasp better and better approximations of it.

Open atheism did not appear very often in the western world until the nineteenth century, and did not begin to become truly widespread until its growth over the course of the twentieth century. At precisely the point at which open atheism seems to have become triumphant in so many intellectual milieux, we see the beginnings of a collapse in the scientific community's faith in the existence of truth. Is it not possible that a real faith in a real God—the kind of divine ground which, in Aquinas' fourth proof, appears as the underpinning of all our human attempts to learn and to know—is a necessary prerequisite within a society which is going to be able to make continuing scientific progress over a series of generations?

God is also the Good Itself

In medieval theology, God was viewed not only as Truth Itself, but also as the Good Itself. By that they meant that, in the same way as we could come to more and more accurate knowledge of the truth about reality by observing and thinking, so also we could come to better and better understanding of the nature of moral goodness by becoming involved in serious observations and discussions about what was truly moral behavior.

The ethical dimensions of science

There can be overlap between the two pursuits, that is, searching for God as the Truth Itself and searching for God as Moral Good Itself. I worked as a laboratory scientist in a major research establishment of the Atomic Energy Commission here in this country during that period in the 1960's when large numbers of atomic scientists were first beginning to realize that there were profound ethical consequences to the things they were discovering and building. Scientists had traditionally up to that point viewed them-

selves as people who ideally engaged in a kind of pure research which was simply the pursuit of truth, wherever it might lie. But then there came to them in the 1960's a quite novel self-realization: if I help build a hydrogen bomb which could kill tens of thousands of my fellow human beings, then I will be ethically implicated if that weapon is actually used.

Nevertheless, because the scientific ideal has been that of "pure research" for so long, scientists are still capable of maintaining that science itself is innocent. Back in the sixteenth and seventeenth century, they would claim, religious people burned human beings at the stake and carried out hideous wars over religion. Now that we have battled so successfully against religion and belief in God, the world has become a much safer place for human life.

The principal problem with this argument is that the twentieth century, for example, saw greater atrocities, with many more human lives lost, than any century before. The Nazis murdered people with clinical precision using "scientifically designed" apparatus. As an eastern European Jewish friend pointed out to me, the fact that Jews were one of the principal targets had nothing to do with religion: a Jew could be totally non-practicing and unbelieving, or could even have converted to Christianity, and the Nazis would still kill them in the name of a so-called scientific racial theory. In Stalinist Russia, under the influence of what his followers claimed was a truly scientific economic and sociological theory (ruthlessly materialistic and rejecting all spiritual concepts as ideological claptrap), again multitudes of innocent human beings were sent to their death. Stalin's secret police used the most "scientific" methods available to interrogate prisoners. If one had the choice of being handed over to the sixteenth-century Spanish Inquisition, the Nazi S.S. troops, or Stalin's secret police, whom would you rather have torturing you? It is naïve to claim that the world has gotten

better and kinder because of modern science and the rise of modern atheism.

In the mid-eighteenth century, the French Enlightenment writer Voltaire proclaimed that "the world will never be safe until the last king is strangled with the entrails of the last priest." By the end of that century, Robespierre had taken over France for a brief but bloody regime which proclaimed atheism as the official state religion, and sent thousands to their deaths—but "scientifically" now, for the guillotine was invented by a French physician as a more "humane" way to execute people than those terrible religious and medieval people had used. This for the triumph of science!

I believe it to be time now to quit glorifying the notion that purely intellectualized scientific interests, devoid of any spiritual or moral dimension, is part of a praiseworthy manner of life. I think it is time now to realize that handing over our lives to people who talk only of materialistic and biological struggle, and who attack moral concerns and spiritual interest as fuzzy-minded outmoded superstition, is not a safe place for the rest of us human beings to be. The scientists—particularly when they attack and ridicule or ignore moral and spiritual values—are at least as dangerous to your and my life as the religious fanatics who seized hold of so many western European governments in the sixteenth and seventeenth centuries, and that is saying a good deal indeed.

In defense of the legitimate horror which people of Voltaire's generation had felt about the Protestant vs. Roman Catholic warfare of the immediately preceding period, I believe that it is time for all religious groups to go on the public record with explicit and widely promulgated statements, condemning the use of force or violence against any person for holding variant religious views, and that all religious groups can and must include in the materials which they use to teach young people a message about the absolute

obligation to show toleration towards people of other religious beliefs. Groups like the Roman Catholic Church, the Lutherans, the Swiss Calvinists, the Church of England, the Protestants of Northern Ireland, and the Ku Klux Klan all have dirty hands—smeared with the same kind of innocent blood which ran down the hands of the Nazis and Stalinists.

It is time for decent people to make a stand against the kind of religion which uses legal trickery and physical violence to attack people with other religious beliefs, and also against scientists who aid, abet, and even join in carrying out the equal horrors of atheistic regimes.

The Role of Values in a Personality Structure

It is in fact psychologically impossible for an individual to have a coherent personality system without some structure of values inherent in it. A convicted murderer in a state penitentiary may have one kind of value system: perhaps he regards his Uncle Scarface Al, who was a gangster and a murderer, as one of his greatest childhood heroes, and his Aunt Mary Rose, who went around all the time trying to be honest and compassionate, as a total loser and a failure as a person. This convict's value system may include the belief that if you let someone say or do such-and-so to you, and you do not at once attack that person with overwhelming physical violence, then you too are a total loser and failure as a person—unmanly, a sissy and a wimp, and a shameful person who could only be regarded with contempt by any of your heroes.

In the case of Mother Teresa of Calcutta, on the other hand, her value system obviously led her to the conclusion that, even if there was no way of saving the lives of many of the poor people lying in the gutters of that city as they died, a truly good person would at least provide them with a bed and something to eat and drink, and

allow them to die with dignity, surrounded by people who actually cared what happened to them.

If you sit down and listen to any person talk for long enough about his or her own life history (and also about the various decisions they are making in their everyday lives at present), you can build up a quite accurate picture of that person's real value system. You ask yourself, who were the real heroes and the ones whom they clearly regarded as the real villains in their personal life history, and (regardless of what the person *says* his or her values are) you observe what this person actually *does* in everyday life.

So we must listen to Augustine and Aquinas: not only does real truth exist, but part of this truth deals with the question of which values promote human life and give it a sense of purpose and satisfaction in the long run, and which values are invariably ultimately quite destructive to other people and also (for this "and also" is vitally important) necessarily self-destructive too by the time the whole tale has been told. In the Myth of Er, Plato warned us, before choosing a particular kind of life and its values, to look at how the whole life story would be played out, looking not only at its periods of temporary triumph, but at how that kind of life would inevitably end.

The American Revolution and the Declaration of Independence: the Laws of Nature and of Nature's God

When Thomas Jefferson wrote the Declaration of Independence which started the American Revolution in 1776, it began with the famous words:

> When in the Course of human events it becomes necessary for one people to dissolve the political bands which have connected them with another and to assume among the

> powers of the earth, the separate and equal station to which ***the Laws of Nature and of Nature's God*** entitle them ....

And Jefferson, who was a freethinker, nevertheless believed that what he called "the Laws of Nature and of Nature's God" made it clear

> ... that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness ....

Jefferson did not belong to any church. He did not say those words because he believed in the inerrancy of the Christian Bible.[78] But he did believe in a natural moral law, which honest and sincere men and women could partially grasp if they thought about their moral decisions at a deep enough level. He did not believe, for example, that people who were sincerely trying to be decent people, would be able to tolerate, at the moral level, a government whose leaders believed that they could automatically kill anybody in their country whenever and wherever they wanted. The whole basic framework of the United States government is built upon the principle that there are moral laws like this one interwoven throughout the natural realm.

This natural moral law was what Aquinas was talking about here in his Fourth Argument. And his argument was that if moral rights and wrongs were interwoven through all of our natural human activities, then they had to have been "built in" at the time our universe first exploded in the Big Bang.

Refusing to be dragged into the problem of theodicy

When we speak of God as the Good Itself, we must not let ourselves get tied up in the problem of theodicy—that is, the question

of why evil exists at all if God is good and loving. The kind of argument which Augustine and Aquinas set up to prove the existence of God had nothing to do with that issue at all. When they spoke of God as the Good Itself, they were not concerned with the problem of why evil things occur in the world, but turned their minds instead to asking whether and how human beings can learn the truth about what is the good life for humans, that is, the goals which we ought to be striving towards in our everyday lives.

We cannot know moral laws with absolute perfection

Can human beings ever know what is good and what is evil with absolute perfection? The talking snake in the garden of Eden led Adam and Eve astray with promises that he could give them that kind of godlike knowledge (Genesis 3:4–5). Would Eve in fact be poisoned and die if she ate the fruit from the tree of the knowledge of good and evil?

> The serpent said to the woman, "You will not die; for God knows that when you eat of it your eyes will be opened, and you will be like gods, knowing good and evil."

But in fact, we human beings cannot know the moral law with godlike perfection. Catastrophe struck after Adam and Eve decided to eat from the fruit of that particular tree. Afterwards, Adam blamed everything on Eve, and Eve herself blamed it all on God himself!

We human beings cannot know all the requirements of true morality *perfectly*, but we *can* know good from evil with a fair enough degree of approximation that, if we actually acted on what we already know (or should know if we had any sense), we could quickly start turning the planet earth back into the garden of Eden once again.

That was the great tragedy in that biblical story: as long as human beings make evasions and try to blame everything on someone else and refuse to take responsibility for their own actions, paradise on earth is permanently blocked from us, because of what we ourselves do to prevent ourselves from creating what would amount to a human-sized paradise on earth.

As a finite human being, I have very limited powers at most to change people, places, and things. The only area in which I have any real major control is over my own mind and attitudes and values, and the shape of my own personal life. So the only useful question I can ask is: how could I myself become a better person, more honest with myself, more in tune with the truth of my own kind of being, and ultimately more satisfied with my limited length of life upon this earth?

Since this also has to be a question of truth, it is vitally important to remember that there is an ultimate Truth to the universe, and that I can make meaningful progress towards realizing more accurately what this Truth is. If I do not work at solving this problem—where I must turn to that ultimate Truth as my guide—then it is pointless to attempt to solve any other problems, because I will end up resentful, bitter, angry, and frightened by the time my life is over, and I will not even know why I feel my life has been so futile and unsatisfying.

Kant's argument

The philosopher Immanuel Kant attempted to show that all the other traditional proofs for the existence of God were unworkable, but even Kant acknowledged the grudging possibility that there was one reason left for an intelligent person to believe in God: Kant created his great philosophical system above all to try to demonstrate that human beings had the freedom (however restrict-

ed) to make real moral judgments, but was forced to admit that making moral judgments was itself meaningless if there were no God.

He presented this argument only half-heartedly, and organized it poorly, in large part because he had (in the rest of his philosophical system) chopped off most of the limb that he was sitting on as regards this issue. But again, it is important that we remember that even Kant was obliged to confess that making a personal moral judgment was a meaningless exercise unless there existed some higher power (even though not necessarily the personal God of Judaism, Christianity, and Islam) whose activities would impinge upon our own futures depending upon how we made that moral judgment.

The moral ground of the universe

In other words, if you the reader do not *think* you believe that God (or any other kind of higher power) exists, but still believe that you have been in situations where you had to make a moral decision and felt that it was vitally important that you made the right one, then remember that moral decisions of that sort have to be grounded in *something* higher than ourselves, or the importance we ourselves are placing upon doing the right thing makes no sense at all: "Am I doing the right thing here? I'm not sure. But I have to make sure I make the right choice here." No one ever claimed that the traditional proofs for the existence of some higher power could show that the entire contents of the Bible or the Koran or the Bhagavad Gita were true. But would you be willing to admit that your own feelings and actions (if you are genuinely honest with yourself) compel you to believe that there is some kind of moral ground to the universe such that, if you yourself disregard it, you will not like yourself any longer? That is all which this proof

for the existence of God (in its moral dimension) attempts to demonstrate: that there is a moral ground to the universe, and that I can know enough about it to know that some actions on my part in some situations would clearly be unbearably bad, and others would be good in the sense that I would be willing to sacrifice other wants in order to make that decision.

Several days ago, a crazed ex-con in a neighboring town slit the throat of an innocent five-year-old child when he was in a blind rage about something, and then shot himself dead when the police came after him. I know a woman (now a psychiatric nurse) who was incestuously raped by one of her own male relatives from the time she was three years old—the memories of huddling under her bedcovers and hoping he would think she was not there, then falling into complete despair as the horror of his entry into her bed struck home—still plague her with their terror. Can you yourself stay morally neutral on issues like this? If so, you are a psychopath, and deeply mentally disturbed.

There is a moral ground to the universe, it transcends yours and my own subjective wants and likes and crazy impulses, and those who do not take *basic human morality* as part of the overall ground of transcendent truth are incredibly dangerous to all the rest of us.

Psychopaths

It is important to be clear on this last point. Some philosophy students believe that they are being clever and scientific by arguing that all morality is relative, that it is a product of being brainwashed by local social norms, and that any idea of right and wrong is simply subjective. Some people like liver and onions, they say, while others do not. Things of this sort cannot be argued rationally and philosophically, they believe: *de gustibus non est disputandum*, “there is no disputing about matters of taste.”

So we see modern day skeptics and atheists arguing that there are no moral rules or laws or objective principles at all. All claims of essential moral right and wrong in any area of life are illusory, they say. These rules are only the customs of one particular tribe or human society, and are customs which in fact differ all over the globe. They argue that these so-called divine laws only arise from sources such as corrupt priests claiming that they possess a holy book which is somehow infallible, so they can try to convince the ignorant and superstitious to put money in their collection plates.

I want to make the point as strongly as I can: ***anyone who seriously believes that all so-called moral imperatives are nonsense is a psychopath.***

It is strange to hear people bragging that they adhere to principles which would in fact be regarded as totally pathological in any serious psychological evaluation. But in fact, it puts you in the same category as those who have been diagnosed as bipolar (manic depressive), autistic, schizophrenic, and all the other kinds of mental disorders described in the American Psychiatric Association's DSM (Diagnostic and Statistical Manual). The modern term for psychopaths and sociopaths, as given in the current version of the manual (it went into its fifth edition, called the DSM-5, in 2013) is **antisocial personality disorder.**

People who label themselves as "humanists," if they take their position seriously, fall into this category. They portray themselves as attempting to follow what are the highest moral values currently being praised in their own particular human culture, but still deny that their desire to follow these principles is based on anything further than subjective human tastes. If they actually believed that, we would have to instantly describe their position as totally pathological: "I like peach pie better than apple pie," says one such person, "perhaps because I was brought up in the state of Georgia." But

what do they say if the other person responds, "Yes, and I believe that it would be wrong to take all the people in my country who are Jewish and send them off to die in chambers pumped full of poison gas, but I suppose it's only because I was brought up in the United States of America in the twenty-first century. It's O.K. with me if you want to do that to Jews." All I can say is that this is just sick.

We do not need to claim absolute, godlike knowledge in order to assert that we nevertheless do possess meaningful knowledge, about both science and morality

Let me be as clear as I possibly can here. Thomas Aquinas says that we can say that some behaviors seem clearly to be more moral than others. This means that there are in fact some standards of right and wrong which are an intrinsic part of the structure of our universe in the way in which it was created, even if our own human knowledge of these laws is not yet perfect.

Morality is no different from science in this regard. At the point in history when I am writing this, we know that neither Einstein's theory of relativity nor quantum field theory can serve by itself as the final answer to all the basic problems of physics, and in fact, physicists all over the world have been searching for years for a "theory of everything." But this does not mean that either the theory of relativity or quantum field theory is subjective nonsense. We still have only partial answers, but these work so well, we know that there is a perfect truth out there somewhere.

And according to Thomas Aquinas, the same thing applies to our knowledge of moral values. But this means, he says, that the creator of our universe built moral values into the basic structure of the universe in the same way that he built scientific laws into it.

And this in turn means that moral values had to have existed in some form even before our physical universe came into being.

John Wesley (one of the founders of the modern evangelical movement) said in one of his *Standard Sermons* that "the moral law is the face of God unveiled." That is one of the most important spiritual truths in the universe. What is God's personal character like? Well, what were the moral laws which he built into the universe from its very creation? How does he tell us that he wants us to behave, over and over again, in just about all the religions of the earth? And what kind of God would devise laws like those?

Fifth Argument: from Design

TEXT OF THE FIRST VERSION

In his *Summa contra Gentiles* 1.13.35 (written in 1259–1265) Thomas Aquinas presented this proof in one form, as what he called an argument

> . . . taken from the government of the world . . . . The argument runs thus. Contrary and discordant things cannot, always or for the most part, be parts of one order except under someone's government, which enables all and each to tend to a definite end. But in the world we find that things of diverse natures come together under one order, and this not rarely or by chance, but always or for the most part. There must therefore be some being by whose providence the world is governed. This we call God.[79]

TEXT OF THE SECOND VERSION

Thomas Aquinas devised a second version of this proof in his *Summa Theologica* (written in 1265-1274), see Part I. q. 2 art. 3:

> The fifth way is taken from the governance of the world. We see that things which lack intelligence, such as natural bodies, act for an end, and this is evident from their acting

always, or nearly always, in the same way, so as to obtain the best result.

Hence it is plain that not fortuitously, but designedly, do they achieve their end.

Now whatever lacks intelligence cannot move towards an end, unless it be directed by some being endowed with knowledge and intelligence; as the arrow is shot to its mark by the archer.

Therefore some intelligent being exists by whom all natural things are directed to their end; and this being we call God.

CHAPTER 20

Aquinas' Two Versions of the Fifth Proof

Aquinas' first version of the Fifth Proof: the argument from governance

In his *Summa contra Gentiles*, Thomas Aquinas presented this proof in one form, as what he called an argument (as we have just seen) "taken from the government of the world."

> The argument runs thus. Contrary and discordant things cannot, always or for the most part, be parts of one order except under someone's government, which enables all and each to tend to a definite end. But in the world we find that things of diverse natures come together under one order, and this not rarely or by chance, but always or for the most part. There must therefore be some being by whose providence the world is governed. This we call God.[80]

This was an ancient argument, originally drawn from the realm of political philosophy. In the theory of divine monarchy which began to develop in the period after Alexander the Great, and which was used to defend the divinization of various Hellenistic Greek kings (and later on, the divinization of the Roman emperors as well) it was argued that just as the cosmos was controlled by a

single king of the gods (whom they called Zeus or Jupiter), so the well-run state had to be governed by an absolute monarch who represented the rulership of God to his subjects.[81]

Aquinas simply reversed this argument—which was simple to do in a medieval world in which most governments were ruled by absolute monarchs (whether they were called kings, emperors, popes, dukes, counts, or what have you)—and used it to demonstrate that a well-run universe would have to have a single being in charge of it. Otherwise chaos would reign, as it did in medieval states when there was an interregnum or a wide-ranging dispute over the rightful holder of the throne.

A modern revision of this Fifth Proof: the argument from coherence

This, Aquinas's first version of the Fifth Proof, may at first glance appear to be a totally antiquated argument, no longer relevant in the modern world, but in fact it is quite a good one. Some of its observations were already having the effect, towards the end of the ancient world, of moving many pagan philosophical systems towards a *de facto* monotheism (such as Stoicism and Neo-Platonism).

If the proof is rephrased as an ***argument from coherence***, then the point it makes is a simple one: ***A universe which did not arise from a single, unified, coherent ground could not be composed of parts which could enter into any kind of relationship with one another.***

In the universe as modern physics has revealed it, every electron in the universe seems to have *exactly the same* mass and negative charge to a truly absolute precision. One electron is quite literally indistinguishable from another electron at that level. Every proton has *exactly the same* positive charge, and it is precisely equal

(though opposite in polarity) to the charge on an electron. This is a more amazing phenomenon than might appear to a non-scientific reader, because at the macroscopic scale no two things are ever truly identical to one another. The speed of light in a vacuum is *exactly the same* at all points in the entire universe—Einstein was motivated to formulate his famous theory of relativity because all experiments made by physicists, no matter how precise, had failed to show any discernable difference in the speed of light in a vacuum no matter where measured or under what circumstances.

The laws of nature are exactly the same for every single portion of the known universe. The law of gravity does not take a different form for each of the planets that orbit around our sun. Ohm's law does not define one particular mathematical relationship between voltage, current, and resistance in San Francisco, California and a different one in London, England. Chemists in a laboratory in Germany always find that the law of conservation of mass affects the reactions going on in their test tubes according to the same rules which govern those particular chemical reactions in a laboratory in India.

The universe therefore must have ***a ground of coherence***. This ground must underlie the entire physical universe. The sum of all the physical particles in the cosmos cannot themselves be this ground, because the ground must be of necessity *a priori* to their existence. We are driven back, once again, into being forced to postulate the existence of this strange transcendent ground underlying the natural universe, which possesses qualities different from that of any natural objects we know. This ground is what theists call God.

Aquinas' second version of this Fifth Proof: a teleological argument

When Aquinas rewrote this Fifth Proof for his *Summa Theologica*, he still called it the proof "from the governance of things," but he introduced a new element into it which turned it into a very different kind of argument. To understand what he had taken as his new strategy, we first need to review Aristotle's theory of the four causes.

Aristotle had stated that there were four fundamental kinds of "causal" statements, that is, answers to questions like who, what, and why. If an ancient Greek farmer were making a bed,

> 1. ***The efficient cause*** (which answered the question "who or what made it?") was the farmer himself.
>
> 2. ***The formal cause*** (which answered the question "what did he make?") was the traditional plan for a bedstead which was used in that part of Greece, which the farmer had in his mind as he was cutting and fitting the pieces together.
>
> 3. ***The material cause*** (which answered the question "what was it made out of?") was the oak wood from a tree on his property which he had chopped down.
>
> 4. ***The final cause*** (which answered the question "why did he make it, in order for what purpose?") was for him and his wife to sleep in.

Giving the *final cause* of an event was called giving a *teleological explanation*, that is, explaining what the *telos* was (the end or goal or purpose) which produced the activity.

Using this distinction, Aquinas argued that the universe displayed vast purposes at work, down to even small details of the

way in which inanimate objects acted and were related to one another:

> The fifth way is from the governance of things. We see how things, like natural bodies, work for an end even though they have no knowledge . . . . Now things which have no knowledge tend towards an end only through the agency of something which knows and also understands, as an arrow through an archer. There is therefore an intelligent being by whom all natural things are directed to their end. This we call God.[82]

Aquinas's first four proofs did not necessarily require a fully personal God

As we have seen in the preceding chapters, the first four proofs could be satisfied by a transcendent ground which was not at all a personal being. To view God as a totally impersonal absolute of some sort was perfectly feasible: not only did many ancient pagan philosophers think that way, but there were major medieval Islamic philosophers who regarded God in that fashion, and it has always been one strand within the Christian theological tradition (from the ancient world all the way down to theologians like Paul Tillich in my own lifetime).

Now it is true that in the case of two of the first four proofs, their arguments had a certain kind of additional attractiveness if one could describe God as a personal being who had free will and could freely make choices and decisions whenever and wherever he wanted to.

So *the Second Proof*, for example, the one from efficient causality, which dealt with the question of how chains of events were initiated, certainly took on a more vivid form if one could visualize a personal God suddenly deciding at some point to reach out his

finger, as it were, and ignite the Big Bang which produced our universe.

But the Second Proof per se did not strictly require this. It required only that there be some sort of ground of being which could act as an uncaused first efficient cause of all the subsequent events in our particular universe. If the ground of being did this periodically, like the decay of a radioactive substance periodically emitting neutrons, then there could have been an infinite number of universes created before our own came into existence. We would have no way of knowing whether this had been true, but one could argue that this could have been a possibility.

The *second part of the Fourth Proof*, which dealt with our human ability to perceive moral value, required that the ground of being from which our universe arose into existence provide a strong moral component to many of the kinds of decisions which we human beings would often have to make. It might seem strange to claim that a totally impersonal moral ground could somehow "think" or otherwise contain some sort of basis for strong moral principles before the universe had even been created—for how could something completely impersonal hold moral values? So the second part of this Fourth Proof might easily seem to absolutely require a highly moral personal God.

But one could argue that the concept of moral right and wrong applied only to personal entities like human beings. One could argue that the way events actually took place in the universe were proof in themselves that the ground of being was not bound to follow any kind of moral law. How could a warm, personal God with a deeply moral character allow such things as hurricanes, earthquakes, plagues like AIDS or the Black Death, droughts which caused thousands of men, women, and children to die of starvation, and crazed dictators who killed many more even than that?

So the first four proofs did not absolutely require that the ground of being was a personal being.

Many Christian theologians over the centuries have refused to portray God as strongly personal

In fact, many great Christian theologians over the past two thousand years have argued that God in himself was not personal, or was only weakly personal at best.

We might look for example at St. Denis (referred to in modern textbooks as Pseudo-Dionysius, a Syrian monk from around 500 A.D.). He and Augustine were the two most important theological influences on Thomas Aquinas. Augustine, in his *Confessions*, shows that he believed in a warmly personal God, who had led him and taken care of him every day for the whole length of his life. But St. Denis, in his *Mystical Theology* I-III, held the opposite opinion and said that God "was above all essence, knowledge, and goodness."

Meister Eckhart (c. 1260 – c. 1328) was a Dominican monk, like Thomas Aquinas, who was born only a generation after Aquinas. Eckhart said that whenever a human soul became conscious of God and God's power in the right kind of way, that God was "born" in that person's soul (just as God was born in a stable in Bethlehem a little over two thousand years ago). God became a warmly personal being only in and through those good human beings who let him come to full birth in their souls.

St. Bonaventure (1221–1274), in his great work called *The Mind's Road to God*, described how we could go to God through a kind of meditation in which we first rid our minds of all thoughts of physical things in the outside world, and then cleansed our minds of all intellectual thoughts, concepts, arguments, and ideas. We entered the realm where God dwelt, where there were no mate-

rial objects or rational ideas, and what we received there was a vision of God (of sorts at any rate): a confrontation with an absolute nothingness (at one level of observation) which was, metaphorically speaking, a kind of "grey blank," in that however indescribable, it was also a "something" as opposed to a descent into a dreamless sleep in which we lost all consciousness. It was likewise different from the unremembered darkness which the anesthetic plunged us into when we had a surgical operation. It is clear from this description that Bonaventure's God in our highest vision of him was not personal at all.

If Aquinas' Fifth Proof is interpreted as an argument from coherence, then no personal God is required at all

Aquinas' first version of his fifth proof demonstrated only the necessity that there be some underlying ground of coherence for the universe as a whole, which did not necessarily require that this ground be a personal God.

But a teleological argument did require a fully personal God

But when final causes and teleological explanations were brought into the argument, everything changed. Viewing the source of the universe as an impersonal ground of being was no longer possible. As Aquinas noted, in its revised form, the fifth proof showed that there must be "an intelligent being by whom all natural things are directed to their end."

Now as part of the birth of modern biology and chemistry in the eighteenth and nineteenth centuries, teleological explanations of natural phenomena began to be rejected wholesale. Stating that an acorn had as its final cause "growing up into a mature oak tree" did

not accomplish anything useful in giving a scientific explanation of how a seed sprouted and how a plant actually lived and grew. Although teleological arguments about God's existence certainly did not cease to be written and read, there was also widespread skepticism about the validity of these arguments. Too many of the people who continued to use this argument reduced it almost to the level of "God cleverly designed human beings with eyebrows so that dandruff would not fall into their eyes."

Already by the eighteenth century a different version of the argument from design had become widely used by the people called deists. Since this deist version had its own quite ingenious twist to it, it seems most useful to look carefully at that form of the argument in the next chapter, before turning back to the teleological version of Aquinas' proof in the chapter after that, and seeing how one could best argue for a God who provides final causation against a modern-day scientist who is a reductive naturalist and denies the existence of God.

CHAPTER 21

The Eighteenth-Century Version: Watchmaker and Architect

The Deist version of the proof: the divine Watchmaker

As we have seen in the preceding chapter, Thomas Aquinas' statement of the proof from design in his *Summa Theologica* stressed the notion of final causes so strongly that, with the rise of modern science in the sixteenth and seventeenth centuries, the proof had to be completely reformulated. The new scientific worldview completely rejected talk of teleological explanations and final causes.

The new version of the proof was closely associated with what was called the Deist movement which developed during the Early Modern period. Let us suppose (so this revised version ran) that some naked savages living on a jungle island—people who had never had any contact with western culture—were to find a pocket watch lying washed up on the island's beach. We should imagine here one of those large timepieces which began to be produced in Europe in the sixteenth and seventeenth centuries, where the back can be flipped open to reveal the gears turning inside and elaborately intermeshing in precise fashion as the clockwork mechanism operates under the tension of the mainspring. Now even though

these savages had never seen such a piece of machinery before, it would be clear to them that it could only have been built by an intelligent craftsman. These island natives might have seen pieces of driftwood washed up on the beach which had been shaped (by the chance erosion of water and sand) into figures that slightly resembled a bird or a fish or something of that sort, but never anything with the sheer intricacy and incredible precision of this strange object.

Similarly, if one looked at the way the universe itself operated under the guidance of the laws of nature, one could see an even more impressive interaction of utterly precise processes. Newton's laws of motion, for example, enabled one to predict the movements of the sun, moon, and planets to an even greater degree of accuracy than the very best humanly constructed timepieces of that period. The only reasonable conclusion one could draw was that the universe itself was created by an intelligent craftsman, and this higher power was the Supreme Being who had traditionally been called God.

The deists believed that the universe had been created by this Supreme Being at some point in the past.

> Note: most of them in fact followed the calculations made by the seventeenth-century Irish Archbishop James Ussher, who believed that he could prove that the creation of the universe had occurred precisely at nightfall (around six p.m. on a modern timepiece) on October 22, 4004 B.C. This was not essential to the deist position, however.

This author of the universe designed it to run according to the laws of nature—the ones which modern science was beginning to discover in such great detail—so that every event which happened in

our universe took place exactly as these laws specified with total mathematical exactitude.

The natural scientists therefore could not only investigate but explain anything going on within the universe itself without having to speak of God being involved—the only exception to this being that some of the more pious deists believed that on rare occasions the deity could intervene in the natural workings of the universe to produce a miraculous event which violated some portion of normal natural law.

The Natural Moral Law

The deists were strongly moral people, even though they rejected most of the elaborate moral and ritual rules of traditional religion as outmoded superstition and mindless rigidity. The deists believed that the hostility between Roman Catholic and Eastern Orthodox Christians—based as far as they could see on such trivia as whether one should cross oneself from left to right or from right to left, and whether one should use leavened or unleavened bread for the communion service—was incomprehensible to any reasonable person,[83] and the century and a half of warfare all over Europe between Protestants and Catholics, with large numbers of people being burned at the stake, and so on, was a moral affront to any truly humane and decent human being.

The Supreme Being had designed this universe so that there were moral laws in the same way that there were laws of physics. There were negative consequences for people who violated obvious natural moral laws, in the same way that people who tried to violate the laws of physics (by acts such as jumping off of church towers and the like) would be punished dreadfully for what they did by the automatic operation of those laws. The natural moral law was clear on all the basic issues to any sane human beings who

listened to their own deep inner conscience and used elementary common sense. How could a society survive if human beings were allowed to murder any other human beings whenever they chose? How could a society continue to function if anyone who lived in that culture was allowed to steal anyone else's possessions (a coat, a bed, a pair of shoes, a milk cow, or whatever) whenever they wanted?

It was this natural moral law to which Thomas Jefferson was appealing in 1776 when he wrote the Preamble to the Declaration of Independence, which began with the famous words:

> When in the Course of human events it becomes necessary for one people to dissolve the political bands which have connected them with another and to assume among the powers of the earth, the separate and equal station to which the Laws of Nature and of Nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation . . . .

(Thomas Aquinas of course had also believed that such a law existed, called in Latin the *ius naturale* or *lex naturalis*. The idea went all the way back to the Stoic philosophers of ancient Greece.)

To argue in defense of the Deist position, I would simply request readers to look at the worst slums in the larger cities of the modern world (on any of the continents), and then ask themselves what makes these slums such terrible locales in which to live? Is it not because so many people there are lying, stealing, robbing, assaulting one another, murdering, raping, rioting, and burning buildings down and looting them? The people whom they actually do the most harm to are themselves, because they totally destroy themselves in the process. There are places like that in the United States today where most young men do not survive past their twen-

ties, if they live that long. They live by committing continual violence and immoral actions, and die themselves in the same process.

Empirical data, based on observed facts and totally scientific in its own way, makes it clear that a group of human beings who consistently violate the natural moral law, suffer painful consequences just as much as a group of human beings who ignore natural biological laws by allowing their surgeons to perform surgery without washing their hands first. If one person gets away with breaking such laws temporarily without suffering serious consequences (some people in the American Civil War who had a leg amputated during a battle in tremendously unsanitary situations did in fact live to return home), nevertheless over the long term, a serious price will be paid by numerous people.

The most important thing that the deist argument accomplished was to restate, in more modern terms, the same conclusion which Aquinas had reached at the end of his second version of the argument from design: "There is therefore an intelligent being by whom all natural things are directed to their end. This we call God."[84]

This natural moral law permeated the entire universe. The divine author of this universe is therefore not some impersonal nature force, but a supremely intelligent being—and also an inherently moral being.

The Grand Architect of the Universe

The eighteenth century saw the flowering of the international Masonic movement: George Washington in America and the composer Mozart in Austria were two prominent Masons of that period, to give just a couple of examples of the kind of excellent people who were attracted to their movement. The Masons took over a good deal from the deist authors: the basic requirement for being a

good member was to believe in God, and to be willing to work at living your life in a wholeheartedly honest and deeply moral fashion.

They had no objection to members also belonging to one particular religious denomination or another, as long as they were clear on the principle that good Masons were tolerant of all men and women who believed in the one God and tried to live moral lives. A good Mason might say that "I myself prefer going to the Baptist church," but he would not say or even imply that Methodists, Presbyterians, or Jews who deeply believed in God and lived good lives were not equally loved and respected by God. Tolerance of different religious traditions was as important to the Masons as their emphasis upon actually governing your own life by the natural moral law, with its demand for total honesty and decency, accompanied with kindness and benevolence towards all other human beings.

Instead of speaking of God as the Great Watchmaker, the Masons preferred the analogy of referring to God as the Grand Architect of the Universe: we human beings were not mere cogs in a set of mechanically spinning works, but craftsmen selected to lay the stones of the great structure of the universe here on this planet on which we lived, with skill and intelligence. Our duty was to carry out that work of building up the world around us in positive fashion (and also making repairs wherever necessary) with hard work, a sense of pride in our jobs, and a conscientious following of the Grand Architect's plan for a moral and compassionate world for his creatures to delight in and enjoy.

But the fundamental deist understanding was still there: the natural universe was created by *an intelligent craftsman*, a personal being, and we human beings had the ability to discover *its design*, which was organized, beneficent, and highly moral. The argument

from design in this eighteenth-century version therefore carried out faithfully, I believe, one important part of Aquinas' original intention.

David Hume's counter-argument

This vision of God as an intelligent, deeply moral, personal being was not without its detractors, even back in the eighteenth century itself. One of the most famous attacks on this idea was a small book called *Dialogues Concerning Natural Religion* written by a Scottish philosopher named David Hume. The little volume first appeared in print in 1776. The character in the dialogue who represented the Deist point of view was made to lay out the watchmaker argument in its classic form. Then another character in the dialogue began to attack him: he could see no gears turning or springs uncoiling as he looked around at the world of nature. The deist answered that this was unfair, since the watchmaker example was a *metaphor*. His attacker then replied by saying that it seemed to him to be a rather strained and distant metaphor at best. To his own mind, the natural universe looked at least as much like an egg as it did like a pocket watch—oh, to be sure, he granted, the universe did not look very much like an egg at all, but it resembled an egg at least as much as it gave the appearance of a watch—so that if this kind of argumentation was allowed, it would be just as logical to say that the universe was laid by an enormously huge bird as it would be to say that we could prove that it had been created by an intelligent craftsman.[85]

The real point of the watchmaker imagery

David Hume was capable of being a quite humorous writer when he chose, but in this case his jesting remarks were extraordinarily juvenile; this was about the level of humor one could expect

from a group of obstreperous twelve-year-old boys. *Any* metaphor at all could be made to look ridiculous by fixating on one of the details and over-literalizing it. In the New Testament itself, when Jesus said in the gospel of John, "You must be born again to enter the kingdom of heaven," poor Nicodemus complained that he himself was too big to climb back into his mother's womb, whereupon Jesus had to explain the nature of the metaphor to him.[86]

The example of the pocket watch was intended to point towards processes which were complex and intricately intertwined, yet which were numerically totally precise and capable of being described in mathematical formulas. Expressions like $F = ma$ (Newton's second law of motion: force equals mass times acceleration) were intellectual concepts. One person could write them down in the Roman alphabet on paper and another person could read them, but only a being with a mind could intellectually understand what was written down. That is, a piece of paper with $F = ma$ written on it was a physical object, but the intellectual concept which it represented was not a physical object in the same sense. Only minds could hold intellectual concepts as *things having meaning*.

So the crucial question is, where were the mathematical laws of physics before human scientists discovered them? And why did all the physical objects in the material universe obey those purely intellectual concepts unfailingly? We could not claim that the reason that the Moon and the planet Mars both obeyed Newton's laws of motion, was because somewhere on a planet in a distant galaxy, Newton's laws had been written on a stone slab in a Temple of Science!

Someone who believes that the physical universe has always existed in some form might be able to argue the faint possibility that the universe itself is that which holds these mathematical laws in being, which would be the same as saying that the universe as a

whole has something like a mind or intellect (or something at least analogous to that). This would not be a wholly preposterous answer: pantheistic (and fancier panentheistic) doctrines of God have been around since the time of the ancient Stoic philosophers, and philosophers like Alfred North Whitehead and Charles Hartshorne have defended such views in the twentieth century. The ancient Greek philosopher Aristotle was not a pantheist of any variety, but he does seem to have held that God was some sort of a strange pure intellect containing all the intellectual concepts which shaped the material universe.

However, anyone who believes that the universe had a beginning in time (like the modern-day scientists who defend the big bang theory of the creation of the universe) will of necessity find it especially difficult to deny that there must have been some ground of all reality which pre-existed before the physical universe had come into being: a ground of being which had something analogous to a human mind, in the sense that it was able to contain *purely intellectual concepts* in some fashion where their *meaning* was apprehended.

The presence of meaning

One very interesting writer from our own time was Michael Polanyi (1891–1976), a physical chemist turned philosopher,[87] who told the following story:

> At the border between England and Wales you pass a small town called Abergele. Its railway station has a beautifully kept garden in which, sprawling across the lawn, you are faced with the inscription, set out in small white pebbles: 'Welcome to Wales by British Railways.' No one will fail to recognize this as an orderly pattern, deliberately contrived by a thoughtful station-master. And we could refute

> anyone who doubted this by computing . . . the odds against the arrangement of the pebbles having come about by mere chance.[88]

If we calculated—based on the area of the lawn and the number of pebbles—the odds that the small stones (if randomly distributed) could have fallen in such a way as to spell out that message by pure chance, the odds that this arrangement was a mere accident would be unbelievably low.

On the other hand, if that station master retired and his successor let the lawn go to rack and ruin, one might return to the site years later and find the little pebbles strewn all over the grass in no definable pattern. Whatever the random distribution was now, however, the odds of that particular meaningless arrangement having come about instead of some other random scattering, would be the same as the odds in the original instance.

> Now why this sudden change in our methods of inference? Actually, there is no change: we have merely stumbled on a tacit assumption of our argument which we ought to make explicit now. We have assumed from the start that *the arrangement of the pebbles which formed an intelligible set of words appropriate to the occasion represented a distinctive pattern*.
>
> It was only in view of this orderliness that the question could be asked at all whether the orderliness was accidental or not. When the pebbles are scattered irregularly over the whole available area they possess no pattern and therefore the question whether the orderly pattern is accidental or not cannot arise.[89]

Polanyi's point was that the discovery of what seemed to be *an intelligible and appropriate message* in a given situation allowed of only two possible interpretations: (1) it was an illusion because the

arrangement had occurred purely by chance, or (2) there was an intelligent author behind the message.

When Newton first began trying to understand the motion of the earth and planets around the sun, he had two pieces of prior interpretation which were especially helpful. Galileo had already worked out a good part of the mathematical laws of physics governing bodies moving under the force of gravity, and Kepler had devised some *ad hoc* mathematical equations which accurately predicted where the planets would appear at any given point in time (even though he had not been able to work out any larger reasons for why his equations took the particular form which they did). Putting his enormous intellectual abilities to work on the problem, Newton eventually came out with his laws of motion, and showed how Galileo's observations about balls rolling down inclined planes set up on tables and then falling to the floor, and pendulums swinging back and forth under the pull of gravity, could be used to explain Kepler's peculiar equations. The force of gravity produced by any object (whether the earth or the sun) affected the movement of any material object under the pull of that field according to exactly the same mathematical laws.

This was an intelligible and appropriate answer to the intellectual question Newton had been asking. The movements of the earth and planets *vis-à-vis* the sun were not random but expressions of a body of intellectual concepts which fit together in totally logical fashion. The closest analogy to this in our ordinary human experience was one human being sending a message (perhaps in a code or cipher or previously unknown language) and another human being figuring out how to decipher the message and finding it extraordinarily illuminating and helpful. To push this analogy a bit further, *the natural scientist is, metaphorically speaking, someone*

who is continuously engaged in the pursuit of trying to decipher God's handwriting in the great book of the universe.

Language and meaning

It is difficult to explain the *meaning* of the concept of *meaning* because, as this statement of the problem reveals, only someone who already understood what "meaning" meant could comprehend what the notion of the "meaning of meaning" could mean. The twentieth-century Cambridge philosopher Wittgenstein got deeply involved in this kind of often paradoxical sort of issue in his later writings. The ancient Greek word for meaning was *logos*, which has sometimes been defined (in this sense of the word) as the representation of an intelligible idea on one ontological level in another and different ontological realm.[90]

But examples may be better than definitions here. At one point, the people who work in the registrar's office at the university where I taught for many years were amused to receive a catalog through the mail advertising women's clothes with a "personally addressed" letter accompanying it. Somehow or other, their address had gotten onto the computerized list that this company was using to send out its promotional literature. The computer which composed the letter had simply followed its programming: it had addressed the letter to Registrar's Office, Indiana University, and so on, and then had begun the actual letter with the opening salutation "Dear Ms. Office." The computer had been programmed to deal with names like Mary Smith and Jane Jones, and so had treated the name Registrar's Office in exactly the same fashion. The computer was one which could accurately follow its programming, but had no ability to sense the *meaning* of what it was doing, with the humorous result which followed.

A truly good translation of any thoughtful work from one language into another also involves this same problem of meaning. Beginning language students can sometimes fall into the trap of believing that translation will become automatic once they learn *all* the dictionary definitions and *all* the rules of syntax for the language they are learning to translate. I once had a graduate student take an advanced reading course from me on translating first century Greek, a student who never did truly comprehend this fact, even after a full semester. We were working on Clement of Rome's First Letter, and she still believed that whenever her mechanical rules failed to make sense out of one of the real Greek sentences from that first century document, this was always and invariably because she herself had not "learned the rules perfectly enough yet." She maintained that position even when I would show her, by pulling out various good published English translations, that even the best modern scholars were unable to figure out exactly what the ancient Greek author had been trying to say in some particularly difficult sentence.

The difficulty of faithfully translating poetry from one language into another is legendary among good linguistic scholars, but in fact ordinary prose can also produce real challenges. There are sections of Aristotle's writings where every translator whose work I have ever looked at, even the very best, has clearly been forced to try to understand *in Greek* what the *meaning* was of the philosopher's statements, and then put together sentences in English which in some fashion conveyed *the same essential meaning*. Intelligent writers of ancient classical Greek had syntactical devices at their disposal, as well as a vocabulary which often did not correspond precisely with any words in the English language, which could therefore enable those ancient writers to express very complicated interrelations of ideas in a fashion which could not at all

be brought over into English in any mechanical word for word (or even phrase for phrase) method.

The truly striking thing therefore about the laws of nature which modern science has worked out, is that they are *meaningful* statements about the nature of reality. At this point in history, as far as modern science knows, human minds can understand meaning but computer programs can accomplish this only at trivial levels and with great stretches of imagination on the part of the human beings who claim that these computers are genuinely "thinking." The question of whether animals like dogs and cats and chimpanzees can understand meaning is partly a matter of definition: if one sets the definition of "understanding meaning" at a low enough level, one could probably argue that their minds are capable of doing this.

If at some point in the future someone finally built a computer whose microchips could understand the meaning of the data in that computer at an impressive enough level (and who can say whether this could not be accomplished some day?), it would not affect the basic argument I am making here, because then we would have a computer which everyone would be compelled to acknowledge could genuinely "think," and which therefore had a "mind" of its own. As far as I can see, only minds can comprehend meaning or create meaning.

Let us remember the conclusion which Aquinas reached at the end of his second version of the argument from design: "There is therefore an intelligent being by whom all natural things are directed to their end. This we call God."[91] The meaningfulness of the laws of nature forces us to the same conclusion today: they must be grounded in some kind of being which has a mind and can think—not necessarily a mind like a human being (or a dog or cat or super-computer), and not necessarily "thinking" in the same way as

brain cells or microchips do—but a transcendent being which nevertheless has to be put in the basic category of beings which have minds and can think. This transcendent ground to the universe, from which the laws of nature derive their existence and their power, is what has traditionally been called God.

The sense of meaning and the awareness of God

In Chapter 6 of his book *Gödel, Escher, Bach*, Douglas Hofstadter spoke about "the location of meaning," and about what kinds of things can be information bearers, and how information can be revealed. On one page he put a collage composed of meaningful messages written in a number of different languages and methods of writing: ancient Babylonian cuneiform, medieval Scandinavian runic writing, the beautiful script of a poem from India written in Bengali, and a reproduction of an inscription from Easter Island. The last inscription cannot be read, because even the best linguistic scholars have still not figured out how to decipher it. Up until a couple of centuries ago, no one in the modern world could read ancient Babylonian cuneiform or Egyptian hieroglyphic texts either. We are forced into a special facet of the problem of meaning, Hofstadter pointed out, when scholars attempt

> . . . the decipherment of ancient texts written in unknown languages and unknown alphabets. The intuition feels that there *is* information inherent in such texts, whether or not we succeed in revealing it. It is as strong a feeling as the belief that there is meaning inherent in a newspaper written in Chinese, even if we are completely ignorant of Chinese.[92]

The human mind is somehow able to sense the presence of meaning, and even be awed by it, even though the mind cannot fully comprehend what that meaning is.

The power of the argument for the existence of God which the eighteenth-century Deists devised is that it gives such a good way of explaining, not just why the laws of nature which modern science has discovered are so meaningful, but also why a perfectly ordinary human being, gazing up at the night sky, or out over a meadow filled with the first full blossoming of spring wildflowers, can be so struck with awe and the sense of something greater and more profound at work at a level that totally transcends the material world. We sense the presence of a message there, written in all the things of the universe, which is so grand and glorious that the human mind is almost overcome with astonishment and reverence. True scientists are among the most reverent of all human beings: they devote their lives with pleasure to honoring the truth and attempting to decipher that message of intelligibility and of larger, finer things which they see written in the great book of nature.

It is an enormous tragedy that some scientists (beset perhaps by their own personal psychological problems and hostility towards their own childhood upbringing) and some so-called religious people (frightened, ignorant, authoritarian, and in fact lacking in any *real* faith in the goodness and reasonableness of the real God) have created an atmosphere where all too many ordinary people nowadays believe that truly good scientists and genuinely devout religious people must be mortal enemies.

By the light of the same sun, one person carries out medical investigations which will one day save human lives, while another engages in loving direct care for those who are now ill. They are not two different suns, a scientific sun and a devoutly compassionate sun, but the same glowing orb which provides both people the light by which they work. Likewise, the strange universal ground which provides meaning to the natural scientist's work, and the loving God who inspires and empowers the person of true piety to

deal kindly with other human beings and help them in concrete ways, are not two different Gods. There is but one higher power who rules the universe, and those who seek the truth and those who act in love both show reverence for this power.

CHAPTER 22

The Appearance of Intelligent Life as Universal Goal

In a preceding chapter it was pointed out that Thomas Aquinas' second version of the argument from design made use of the idea of *final causes* and *teleological explanations*:

> We see how things, like natural bodies, work for an end even though they have no knowledge . . . . Now things which have no knowledge tend towards an end only through the agency of something which knows and also understands, as an arrow through an archer. There is therefore an intelligent being by whom all natural things are directed to their end. This we call God.[93]

Aquinas was of course a thirteenth century thinker. So the problem which eventually arose was that by the eighteenth century, teleological explanations of physical and biological processes were no longer popular among the scientifically minded, which in turn forced the argument from design to be put into a very different form.

With the rise of modern science in the eighteenth century, researchers quickly came to the conclusion that investigating the *telos* (the goal or final end) of a natural process had little intrinsic explanatory ability. It was true, as Aristotle had said, that the processes which began to take place when an acorn was planted in the

ground had as their end result (if everything proceeded smoothly) a mature oak tree growing in that spot. But a modern biologist finds that the "how" questions are much more interesting and informative: How do the biochemical processes within the acorn begin to change as it prepares to sprout, and what external conditions prompt it to begin that series of events? An acorn which falls on a large, flat rock will not attempt to sprout—how exactly does that act to inhibit the sprouting process? Once it has sprouted, how exactly do the biochemical and cellular processes within the plant draw nourishment and energy from the environment? Understanding the "hows" of these things not only gives us a good deal of detailed knowledge, but helps us to grow larger and stronger plants if, for example, we are re-planting an oak forest which has been logged.

The Stoic philosophical concept of *pronoia*

In the ancient Greek world, when thinkers wrote pieces about God's purposiveness and his goals in designing the universe they referred to these matters as God's *pronoia*. This Greek word is usually translated today as "providence," but it literally meant (*pro* + *noia*) having a certain kind of *noetic* (intelligible) structure built into something in advance. In terms of its extended meanings, it could refer to what is called *forethought*, devising an intelligent scheme which would ultimately end up by achieving the kind of basic goals which one desired. It could also mean making advance *provision* for some situation, with the idea of making sure that care and concern would be shown towards the wellbeing of those who received the benefits of those plans.

In the philosophical debates of the ancient Greek world, the Epicurean philosophers denied any kind of universal *pronoia*, while the Stoics defended the concept. The first group argued in

quite literalistic fashion that the universe was produced by the chance combinations of atoms moving randomly and colliding with one another. Everything was ultimately ruled by pure chance. The Stoic philosophers pointed out that this kind of explanation would be absurd if carried out systematically, because it was clear that, for example, the fact that eagles had keen eyesight, sharp bills for tearing flesh, and were also carnivorous were not three features that had just "accidentally" happened to coincide. The various creatures and things which made up the material universe were organized into a coherent ecological system (as we would put it today) in which every part of the system was logically interrelated to all the other parts. The physical universe had a *logos*, the Stoics said, where the word in this usage meant a logical (not a purely random) structure. The names of many of our modern sciences still reflect this ancient Stoic faith: bio-logy is the study of the *logos* of life (*bios*), physio-logy is the study of the *logos* of the human body's own natural processes (its *physis*), geo-logy is the study of the earth (*gê*), and so on.

This Stoic concept of *pronoia* both is, and is not, relevant to Aquinas' view of the universe as providentially created, which is the position Aquinas takes in his argument from design. At one level, it would clearly be absurd to argue in the present era that eagles and sharks and whales and giraffes and elephants have the characteristics which they do by "pure chance" in the sense that a creature with a long neck like a giraffe, massive legs like an elephant, wings like an eagle, and a shark's fins would be just as probable as the combinations which we actually observe. All these creatures have the features which they do because they fit logically (have a *logos*) within some niche within the ecological system. When the ecology of North America and northern Europe changed during the last ice age, elephants with long furry coats (mammoths

and mastodons) developed to fit those new climatic conditions, and then disappeared again when the ice flows retreated northwards once more.

But none of these observations, in and of themselves, prove that there is any kind of beneficence in the ground of the universe, or that there were preplanned providential designs shaping the course of the universe. A modern biologist has a whole host of much more useful ways of explaining all these different kinds of living creatures and their characteristics.

Taking the larger view

From Aristotle in the fourth century B.C. to Thomas Aquinas in the thirteenth century A.D., teleological explanations seemed to make good sense. Then the rise of modern science in the early modern world during the eighteenth century, changed the whole way that intelligent people looked at the world in fundamental ways. But then another new development altered the debate yet again: Charles Darwin's book *On the Origin of Species* (1859) introduced the idea of evolution. So in my present attempt to bring the teleological argument up to date, I will refer not only to the discoveries of the astrophysicists, but also biological conclusions drawn from observing the evolution of species.

1. Most present-day astrophysicists hold that the universe was constructed in such a way that planets of various sizes would automatically be aggregated from stellar materials, and trapped into orbits around stars, at locations all over the universe.

2. Most present-day astrophysicists seem to hold that there are basically two types of planets, one huge variety composed of large amounts of gaseous materials (like the planet Jupiter) and another smaller variety made up of mostly rocky and metallic substances (like the Earth and Mars). Of the second sort, some (like Mars) will

be too small to retain gases like oxygen, nitrogen, and carbon dioxide for long enough for life-forms to evolve, while others (like Venus) will be so close to their stars that temperatures will be too high to permit the development of life, and yet others will rotate in orbits too far away from their stars to provide the kind of warmth necessary for living beings to survive. Yet these astrophysicists are also agreed that planets having the kind of mass, atmosphere, and temperature gradients which we observe here on earth would still definitely appear in numerous parts of the universe as a simple matter of course.

3. The theory of the "fine-tuned universe": as some atomic and nuclear physicists and chemists have pointed out, if certain of the basic physical constants which appear within the laws of nature were only slightly different, then a universe would have been produced which either moved from birth to death too rapidly to allow life to develop on any planets, or which carried out its processes too slowly and at too low an energy level. The most interesting of these physical constants are the so-called dimensionless constants, which are not phrased in terms of centimeters or seconds or grams or any other units of measurement, but take the form of pure numbers, which are not simple integers but must be represented in the form of long strings of numbers, which appear to be totally arbitrary.

> One well-known example of a dimensionless constant would be the one called the fine-structure constant, which has the value of approximately 1⁄137.036.

There seems to be no logical reason why these dimensionless constants should have the numerical values which they possess instead of some other equally arbitrary figure, and yet if they were even slightly different, there could be no life in this universe.

4. A majority of present-day biochemists hold that conditions on a planet like the earth, in the period after the first oceans appeared, would be such that complex organic molecules (the precursors of life) would begin to appear within these seas, by chemical interactions which would occur between ingredients naturally present in the atmosphere and dissolved in these primordial oceans. Certain kinds of complex organic molecules have the ability to utilize chemicals from the solutions in which they exist, and create replicas of themselves. This is perfectly explainable in terms of the basic principles of chemistry and the geometries of certain kinds of molecules, but it means that, once a molecule of that sort appeared in the primordial ocean, it would begin to populate the water with innumerable replicas of itself and ultimately spread all over the globe.

Now it could be argued that the appearance of the first molecule of that sort would have been the product of pure chance in the ancient Epicurean sense, but given the enormous number of molecules in the primordial ocean, sooner or later molecules of this kind would inevitably be formed. It was only the precise time and place at which it happened that would be a matter of chance. And once having happened, the growth and spread of this kind of self-replicating organic molecule would have a *logos* (a logical inevitability) to it in the ancient Stoic sense. So the question of whether some kind of molecule of that sort would eventually appear was not a matter of chance, but was ultimately inevitable, and its ability to spread and grow was not a matter of happenstance but intrinsic to its own inner structure, and completely logically explainable.

5. As accidents occurred in the duplication of these primitive self-replicating molecules, some tiny portion of these accidents would necessarily prove fortuitous, in the sense that an even more highly organized and more efficient structure would appear, which

could spread faster and better than the older versions. And so these first relatively simple molecules slowly evolved into complex virus-like substances, then the primitive ancestors of single-celled creatures, then more highly evolved one-celled organisms, and so on. Most modern biologists would insist that this was a process which occurred as a necessary and inevitable result of the laws of chemistry, even though the precise routes and mechanisms involved acts of chance.

6. As life evolved on the planet earth into even more highly organized living creatures, the laws of nature and the characteristics of an inhabitable planet determined certain "trajectories" of development (if we may call them that) which proved to be successful life strategies over and over again.

(a) The development of wings in order to fly through the planet's atmosphere, in the very nature of things, conveyed certain advantages. Insects utilized this possibility first, as we discover in the fossils of the first ancestral dragonflies which hovered above the fern-filled swamps of the planet earth during its Carboniferous period. During the age of reptiles, some reptilian species like the pterodactyls developed the ability to fly on huge membranous wings. Then the first birds appeared, and began to spread all over the earth around 66 million years ago. They had an even more efficient design: by making use of the airfoil-like cross-section of their feathers they could use lift on their wings' upswing and fly more efficiently, and in addition, because they were warm-blooded, they could stay fully active even in cold weather. Bats showed that mammals could also develop the ability to fly and dart all over the sky. Flying fish and flying squirrels demonstrated that other varieties of life could derive at least some advantage from the power of flight, even if it was merely the ability to glide over to another nearby tree when attacked by a predator.

(b) Even after coming out of water onto dry land, various kinds of living creatures discovered that returning to the water still provided a useful evolutionary trajectory. In the case of the reptile family, ancient ichthyosaurs and modern-day alligators and turtles display the usefulness of this life strategy. Among the modern-day birds, diving ducks and cormorants to a certain degree, and penguins to an even greater degree, have adapted back to life as water creatures. Among the mammals, we run the gamut from sea otters (which can still function effectively on land if they have to), to seals (which are awkward on land at best, but still spend time there), to whales and manatees.

(c) But the most interesting and widespread of evolutionary trajectories has been the development of greater degrees of intelligence. This has hardly been the only trajectory in the history of life on earth, as we have just shown, but it has been proven to be an advantageous one over and over again. Fish are not exceptionally bright creatures, but their neural centers are much more highly developed than, say, primitive flatworms. Mammals ultimately supplanted reptiles at the level of the larger, more dominant lifeforms on this planet, at least in part because their brains were not only larger but also more complex and efficient at processing information.

In the jungles where chimpanzees live, they share the forests with small monkeys. Since the monkeys are lighter and quicker, if the monkeys discover a tree covered with ripe fruit, they can swarm over it and eat it all before the much stronger, but heavier and slower chimpanzees can take over. But the chimpanzees have larger and more highly developed brains: when the monkeys have finished eating the fruit on one tree, the entire troop simply wanders at random through the jungle looking for some other source of food. When the chimpanzees once discover that the fruit is ripe on

one particular species of tree, they systematically move on to all the other trees in their area which are of the same species.

7. Why do even small increases in brain-power prove so useful? ***Because the universe itself is an inherently logical place which is "intelligence friendly" in its basic nature.*** And so there are many present-day scientists who believe that, not only on the planet earth, but on other planets circling other stars in different parts of the universe, it would be inevitable that living creatures would develop with the kind of intellectual capacity which we see in the human species.

At one level, chance may be involved: It may have been nothing but pure chance which caused the lemurs (instead of some other earlier species) to evolve into monkeys and then into anthropoid apes and then into human beings. Why did not raccoons develop in that direction instead? They are extremely intelligent, and can already use their paws almost like human hands. Or perhaps pandas or mongooses? The actual direction evolution took may have been the result of nothing other than the pure accidents of certain favorable mutations combined with the geographical spread of the various species at certain particular periods of climatic change.

But note once again the opinion of so many current-day scientists that the ultimate appearance of *some* lifeform having the kind of intelligence which we see in human beings was a foregone conclusion, given the very nature of the universe itself. So we have a process in which chance may have played some role over and over again, but in which the basic shape of the outcome was totally predetermined.

So the creation of planets, the appearance of life on at least some of them, and the ultimate emergence of living creatures possessing a human level of intelligence was a predetermined eventuality which was built into the logical and intelligible struc-

ture of this universe from its very beginning. But this is precisely what the ancient Greek word *pronoia* meant at its most basic level: having a certain kind of *noetic* (intelligible) structure built into something in advance. The overwhelming majority of modern scientists (including especially those who most incline towards atheism) believe that the development of this universe was such that the appearance of truly intelligent life would be a goal which would ultimately necessarily be achieved by one route or another.

The moment one accepts this proposition however, one must also acknowledge the basic correctness of Thomas Aquinas' central assertion:

> We see how things, like natural bodies, work for an end even though they have no knowledge . . . . Now things which have no knowledge tend towards an end only through the agency of something which knows and also understands, as an arrow through an archer. There is therefore an intelligent being by whom all natural things are directed to their end. This we call God.[94]

Modern science already admits, at one level, precisely what Aquinas was arguing. The interactions between atoms and molecules in the drifting clouds of interstellar gas which made up the primitive universe did not know or understand anything, and simple organic molecules drifting aimlessly in a primordial ocean did not plan and think. The DNA in genes cannot set deliberate goals in that kind of fashion, because all any particular strand of DNA is constructed to do is to attempt to replicate itself as many times as possible. Yet we see overarching patterns of development and logical evolutionary trajectories which—these scientists already themselves assert—would inevitably continue until the goal of producing truly intelligent life was achieved somewhere in the universe.

Scientists who are also atheists might attempt to protest that these processes are all individually totally explainable in terms of the laws of science, with no God needing to be involved in any way or fashion, and that we are trying to cheat them or bamboozle them somehow into betraying what they know to be true. To this one can respond by pointing out that what Aquinas was invoking were not miraculous interventions into the ordinary course of nature, but the simple observation that this very same ordinary course of nature (which can be explained in totally scientific manner in piecewise fashion) displays *an overall course of development which is difficult to describe other than as somehow purposive and goal-directed*.

Let us remember once again the white pebbles spelling out the slogan "Welcome to Wales by British Railways" on the lawn of the railway station at Abergele on the Welsh border. At some point in an investigation one must admit that something which clearly can be read as *intelligible, logical, and purposeful* all three, must in fact be regarded as purposeful. There is nothing in the realm of our human experience which can carry out true higher-order purpose except an intelligent being. The evidence seems quite compelling that "there is therefore an intelligent being by whom" the overarching course of the history of the various kinds of beings which make up this universe "are directed to their end," that is, towards a logical goal which (ultimately) inevitably must be realized. As Aquinas put it, in the greater tradition of human thought over the centuries, "This we call God."

When Aristotle discussed the four types of "causes" in the context of a Greek farmer building a new bedstead, the final cause was the one which answered the question "why did he build it?" If we ask WHY the universe happened to be created in such a way that planets would be formed circling some of the stars, and that a

planet of the right mass at the right distance from a star would eventually develop life, and that the life on that planet would ultimately develop intelligence, then one perfectly intelligible answer would be to say that it was created in this fashion so that these intelligent living beings would be able to recognize God, and not only enjoy his universe, but show thanks and gratitude to him, and ask him for help and comfort, and serve (the best of them at least) as God's friends and children.

In the metaphorical biblical story of the creation, when the first man Adam turned to God and said that, in spite of the joys of having all the animals around, he was still lonely, God instantly understood and created Eve, the first woman. Why did the biblical God, in this symbolic story, seem to comprehend so quickly what it meant to be lonely and desire companionship? In those same first chapters of the book of Genesis, it said that God created the animals as well as the human beings "both male and female," and commanded them to go forth and multiply. Again, this biblical God seems to have intuitively recognized the desire of parents to have children whom they can love and care for.

The level at which dogs and human beings can best understand one another is not through spoken language, but through the shared message of common feelings. A dog which can understand almost nothing of a human being's words as intellectual concepts can nevertheless bridge the gap between their two quite different kinds of mind by the ability to read elemental feelings. Is it really just a metaphor only when we say that we human beings are God's "children" and when we describe biblical figures like Abraham and Moses as "friends" of God?[95] Or are these quite literal feeling-level statements of our relationship to God?

To repeat, this *looks* like a goal-directed universe, with an inherent goal built into it at the very beginning, and with the appear-

ance of something like human life as at least a part of that inbuilt goal towards which the universe would naturally evolve. But goal-directness implies purposiveness and personal intelligence on the part of the one who originally set the goal, even if later stages involve mechanical processes. This universe indeed *looks* exactly like one which would have been planned and created by a personal God. Can you, the reader, honestly come up with any other truly credible explanation of why the universe would look this way if it were not in fact so?

Part V

Concluding Thoughts

CHAPTER 23

Coming to Know God through Direct Experience

The philosophical proofs of God's existence necessarily have to remain at a very general and highly intellectualized level. That is the very nature of philosophy. But what most people are actually searching for is some more concrete way of discovering whether there is a higher power. I prefer to call these demonstrations rather than proofs, because they will call upon your own personal observations at what you may think of as more the feeling level than the logical, hyper-analytical level. The most important demonstrations require you to actually live the spiritual life on a daily basis for a period of several months at least—as a kind of "personal experiment on yourself," if you wish to call it that—but this experiment has to be carried out in totally honest and wholehearted fashion.

It is the essence of intellectual dishonesty and hypocrisy to condemn something which you have never seriously tried. And it is unscientific in the grossest possible fashion to cling so tightly to some particular intellectual theory that you refuse even to try doing some things which might disprove that theory. In fact, at that point you might ask yourself whether your so-called rational grounds for being an atheist are in fact *rationalizations* for some other kind of resentment or fear: walking the spiritual path (in all the great tradi-

tions) requires gaining real self-knowledge in order to "clear our eyes" so that we can see the divine.

The problems of knowing infinities, and knowing what other minds are thinking and feeling

That which is genuinely infinite cannot be a coherent object of human knowledge or perception in its fullness. In addition, the ground of all being which lies behind the observable phenomena of nature cannot be a direct object of simple human sense perception in any literal way. If we can see it, touch it, hear it, smell it, taste it—immediately and directly, through our external senses—then by definition this thing will be part of the concrete, material world of natural science. So we can only know God indirectly, through the transmitting medium of material things, and moreover, we can never know God more than partially.

This does not mean that we cannot know God at all. With another human being, I can see the outside of the person's body and get some notion of what that person is thinking inside, by looking at facial expression and body posture. I can learn even more about what that person is thinking inside—who he or she really is—by listening to the person talk, and learning how to understand the messages that person is transmitting. If the person speaks a language I do not already know (like Romanian or Swahili) then it may take a lot of work on my part to learn this strange new language.

Sometimes I can learn more about who the other person really is by observing what the other person *does*: is that other human being basically forgiving and compassionate? is this a person with a sense of humor and an ability to feel joy? someone willing to keep on going even when times are tough? But even then, I can never

perfectly know what another human being is thinking and feeling inside.

God must by definition be so totally different from a human being, that I should not be surprised if the task of deciphering his language and learning to observe his actions is even more difficult; nor should I think it anything odd if I can never flawlessly know what the mind of God holds. But those who work at it seriously can learn important things about the way God thinks, and above all, can gain the measure of God's heart, and learn to delight in God's love, forgiveness, compassion, helpfulness, and desire to give gifts that can bring us enjoyment.

Now since God is infinite (at least in effect), there is no possible way that we can know him in his fullness. On the other hand, let us write down the following series of numbers:

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 . . . .

These numbers represent an infinite series. They go on forever, and there is no way any finite mind could know all the members of that series. On the other hand, we *can know* a small part of that infinity (we have in fact just written down one small part of it above), and we *can know* that the part we do know is a portion of something which is nevertheless infinite.

First demonstration: the hint of the infinite

Our ancestors, thousands of years ago, knew that when they were alone in the jungle, and suddenly felt the presence of something huge and ominous, they should pay serious attention to this. Although the English language has no truly specific word for this particular kind of subliminal awareness, in German one can call it an *Ahnung*. This kind of mental sense saved many of our ancestors

from being eaten by leopards or gored by angry buffalos. I do not think it was a supernatural sense, but based on small subliminal clues over at the very edges of our perception: a bush with one of its branches trampled down, a silence in the jungle noises over to one side, a monkey acting peculiarly over on the other side of the path, and other tiny things of that sort. But it was a kind of non-specific sense, like "feeling hungry" or "feeling thirsty," which are responses to physical phenomena but do not give us the kind of detailed knowledge which we receive from the sense which we call "sight."

Most human beings have in fact felt the sense of God's infinity—while looking up at the night sky, or walking by themselves in a lonely forest, or gazing up at a magnificent mountain peak—but nowadays, people are not taught to pay attention to that sense, nor are they given any useful lessons in how to cultivate it. So all too often, we barely notice, and then go ignorantly on our way.

At the very beginning of the twentieth century, the greatest American psychologist of that time, William James, gave a series of lectures in 1901–02 in which he gave detailed accounts of the actual religious experiences of hundreds of people; he published all this in his great book, *The Varieties of Religious Experience*. One of the many autobiographical statements which he recorded gives an especially good account of what can be felt by those who learn to pay attention to their capacity to apprehend the presence of the infinite:[96]

> I remember the night, and almost the very spot on the hill-top, where my soul opened out, as it were, into the Infinite, and there was a rushing together of the two worlds, the inner and the outer. It was deep calling unto deep—the deep that my own struggle had opened up within being answered by the unfathomable deep without, reaching beyond the

> stars. I stood alone with Him who made me, and the beauty of the world, and love, and sorrow, and even temptation. I did not seek Him, but felt the perfect unison of my spirit with His.
>
> The ordinary sense of things around me faded. For the moment nothing but an ineffable joy and exultation remained. It is impossible fully to describe the experience . . . . The perfect stillness of the night was thrilled by a more solemn silence. The darkness held a presence that was all the more felt because it was not seen. I could not any more have doubted that *He* was there than that I was. Indeed, I felt myself to be, if possible, the less real of the two.
>
> Then, if ever, I believe, I stood face to face with God, and was born anew of his spirit . . . . Since that time no discussion that I have heard of the proofs of God's existence has been able to shake my faith . . . . My most assuring evidence of his existence is deeply rooted in that hour of vision, . . . and in the conviction, gained from reading and reflection, that something the same has come to all who have found God.

God is not just some abstract theory: God is grand and glorious, awe-inspiring and totally real.

Second demonstration: the sacred and the argument from common consent

Fifteen years after James' book, in 1917, one of the two best theologians of the early twentieth century, Rudolf Otto, published a work called *The Idea of the Holy*,[97] in which he pointed out that we actually apprehend more than simply the bare existence of something infinite when we have this kind of experience. What we sense is the presence of what he called the holy or the sacred. We can feel it when we walk into a church or mosque or synagogue;

we can sense it in a graveyard; certain kinds of religious books seem to be permeated with that aura. We feel awe and a sense of majesty. We sense incredible power, but also something mysterious and wholly other. It fascinates us, but it can also make us feel a sense of our own unworthiness. There are religions in the world which have one God, two gods, one God in three persons, many gods, and no God at all, but anything we would call a religion at all, is based upon a sense of the sacred. So the awareness of the holy or sacred is even more basic than any kind of concept of God. That is why it does not matter what *name* we put on the higher power or transcendent ground: what matters is that we learn to sense its hint of infinity and its intrinsic sacred quality.

In earlier centuries, some thinkers (like John Calvin for example) referred to this as the argument from the common consent of humankind: the fact that so many peoples of the earth have believed in gods over the vast course of human history—Jupiter and Venus among the Romans, Zeus and Artemis among the Greeks, Isis and Osiris among the Egyptians, Krishna and Durga in India, and so on—meant that there must be something significant to the idea that God existed. What Rudolf Otto added to this argument

> (1) was to make it even more general at one level: a common human recognition that there can sometimes be a sacred dimension to some reality which we perceive, even if we do not call it a "god,"
>
> (2) and more specific at another: it is the awareness over on the subliminal edges of our perception of something hidden which is far greater than ourselves.

If you, the reader, still find it impossible to view the ground of the universe as a personal being, there are nevertheless spiritual techniques for contacting this ground—and making it part of your own personal experience—which do not require you to personify

it. I have one deeply spiritual friend who simply starts every morning by fixing herself a cup of coffee and then driving her car to a nearby riverbank. She sits in her car and drinks her coffee and watches the river flow. She enjoys the antics of the ducks on the water, and the leaves and flowers which appear with the changing seasons, and allows herself to simply relax and be at peace with herself and with the universe. From that point on, she says, her day always goes much better. I have another deeply spiritual friend who spends every weekend (except during the coldest part of winter) sitting out in a small boat on a little lake for hours. He laughs when talking about it, and says "I tell people I'm fishing, and I do have a rod and reel out, casting a fly into the water, but actually I'm meditating." One of my very best friends over the years (the man who helped me write so many of my books) can sit on his front terrace and look at a single tiny little wildflower nestled in the grass, and "see God in the flower," as he puts it in all simplicity. Many of the Asian religions teach people to do the same thing while gazing peacefully at a small Japanese garden, or simply looking at a single flower or a simple but elegant Oriental vase.

To make this meditative technique work, we must learn to shut off the inner dialogue—the constant stream of thoughts running through our heads, where we are debating what decisions to make, worrying about future events, feeling sorry for ourselves or being racked with guilt or shame, rehearsing resentments about things other people did to us, trying to figure out how to make other people do what we want them to do, engaging in daydreams and fantasies, and so on—and learn to just be peacefully and quietly there. (Little things will still pop up in our consciousness, but we simply let these vagrant ideas and images float right back out of our minds again.) When we learn how to do it right, we will discover that when we have finished this period of meditation, it has quieted the

forces which disrupt our mental processes, given us a new clarity and focus on what we need to do next, and given us a calm inner energy which enables us to work better, more enthusiastically, and more productively at the day's work-a-day tasks.

Sensing the sacred in other human beings

The ancient pagan Roman author Seneca pointed out that we can sometimes apprehend this same quality of the sacred in another human being. When we encounter a man or woman who is deeply in tune with the sacred ground of reality, we can feel that same impressive, compelling awareness that we sense in a church or synagogue or holy temple. This can become an even more powerful awareness when a group of people meet for a common discussion of spiritual matters, in love and humility and total honesty: one can sometimes feel its quiet presence in small Protestant gatherings (say of Methodists or Lutheran Pietists or Mennonites), where it is called the presence of the Spirit. At Quaker meetings, it is felt within as the presence of what they call the Inner Light. At twelve step meetings it is called the spirit of the tables.

This kind of immediate encounter with the sacred via unconscious and semiconscious interpersonal relationships is especially important, because participating in such a group can help us enormously in growing spiritually and morally. When God speaks to us and sends us messages, he most often does it in the way that we can most easily and quickly understand: a deeply spiritual person speaks to us from the heart in a private conversation (or another member of the spiritual group to which we belong says something at one of our meetings) and what is said to us suddenly strikes home. I realize, the moment it is said, that this is a message about my own moral state, or who I am, or my own relationship to the

sacred ground, which is suddenly transparently clear and immediately relevant to where I am in my own life at that precise moment.

Atheists like to pretend that God is some far-off and distant abstract concept, of which I could never have any immediate personal experience. In particular, atheists like to pretend that the idea of God speaking directly to me must be nonsense, because it would necessarily imply that some deep, commanding voice suddenly spoke down from the empty sky, or something like that. This however happens to only a very few people. What is important is that God in fact speaks to us *through* certain of our fellow human beings on a regular basis: our central problem is that *we do not want to hear* what God is trying to tell us over and over.

We do not want to hear what God is saying because he is saying things like: "I love you and accept you just as you are. If you are miserable and unhappy, my greatest desire would be to help heal your wounded spirit." "What you are doing to yourself here is self-destructive—it will be literally suicidal in the end—will you not hear me when I speak to you out of love and ask you to stop hurting yourself?" "You have a personal moral responsibility here which is clear and evident—that other person is hurting, but you could help him." Whenever other people are talking to us like that—out of love, and not out of some obnoxious sense of moral superiority and the desire to criticize us, put us down, and control us for their own selfish purposes—that is in fact God himself talking to us. God does not himself have human lips and a human tongue, so he uses as his lips and tongue, the mouths of those among our fellow human beings who love him most.

Third demonstration: learning to see the hand of God's providence in our daily lives, Carl Jung's theory of synchronicity

This is the area where the spiritually ignorant are most apt to become confused: they start acting like God is some brain-damaged genii in a bottle who will magically fulfill all our own selfish desires if we just learn the correct ritual formulas and magical actions which are required to make him perform. We see people who are either ignorant and deluded (or who are sometimes total charlatans) preaching to us that if we just believe and do the right things (including usually giving them lots of our money), that we will be magically granted all the money and prestige which we want, that our diseases will always miraculously be cured (why do people who belong to these groups ever die at all if their system works that way?), and that those who follow their rules will never be on an airplane which crashes and kills everyone on board, or develop incurable cancer and die at a young age, or anything else of that sort.

The real direction of God's providence, however, is directed most of the time towards enabling our internal spiritual growth. The events which happen to us in our daily lives are messages (which we can slowly learn to translate) in which God teaches us how to become more humble, or how to become more grateful, or what the consequences are of our own anger or impatience, or what the marvelous gifts are which he *will* give us if we will simply trust him enough to let him guide us. Or they can be messages in which he sends us warnings about potential trouble we are about to get ourselves into, or encouragement when our courage and self-esteem starts flagging.

Many of these messages can come through what at the normal scientific level appear to be mere *coincidences*—but very strange coincidences indeed, which come so often (once we learn how to look for them) that it eventually becomes impossible to write them off as "merely" coincidences.

The great Swiss psychiatrist Carl Jung called an occurrence of this sort a "synchronicity." This was a seemingly chance event which, the moment it happened, suddenly produced a dramatic insight flashing forth in my mind, which enabled me to see and understand for the first time what the real source was of some personal psychological problem which had been making my life miserable, and undermining and destroying all my endeavors for years. And this insight would them enable me to start healing the pain and anger and despair which had been producing so much inner pain in my life. Jung used these synchronicities, whenever they appeared in the course of sessions with his patients, as an important tool in his psychoanalytic methodology.

(And on a few occasions, things happen which seem so unexplainable in scientific terms—even if they are not as spectacular as a man walking right across the top surface of a deep lake, or a jar of water being turned into wine—that we are forced to say that something miraculous has occurred.)

Now those who follow the true spiritual path for long enough reap gifts from God far greater than they would ever have even dreamed of praying for, free gifts from God's generosity and grace which repay them a thousand-fold for their efforts: God's providence always works for the true good of those who trust him. But God does not give any of us lives free of pain and suffering one hundred percent of the time—think only of the lives of Jesus, the prophet Elijah, Mohammed, Arjuna in his chariot in the *Bhagavad Gita*, or the first three things that the young Buddha saw when he

left his father's palace—and one of the most important things which God must teach us is how to handle these situations in the right kind of way.

Back in 410 A.D., a vicious German tribe called the Visigoths sacked the city of Rome, and people all over the western Roman empire suddenly began to realize with horror that civilization as they knew it was coming to an end. The central government began to crumble rapidly over the course of the next sixty years, and the dark night of the early middle ages began. What St. Augustine wrote at that time in his great book, the *City of God*, was a message, not about praying to some magical genii-in-a-bottle God, but about how the truly spiritual man or woman meets calamity:

> For as the same fire causes gold to glow brightly, and chaff to smoke . . . thus it is that in the same affliction the wicked detest God and blaspheme, while the good pray and praise. So material a difference does it make, not what ills are suffered, but what kind of human being suffers them.[98]

This particular kind of demonstration of God's reality is not one which is apt to seem very powerful to someone who is new to the spiritual life. But after two or three years of whole-hearted commitment to a spiritual tradition which deeply understands how God's providence actually works, most people come to find this one of the most convincing demonstrations of them all. Once they learn how to "practice the presence of God"—that is, how to listen for the subtle voice of God, and see God working anonymously in everyday events—and slowly come to find out at first hand how well their lives work (at the truly important inner level) when they simply trust God enough, their lives become totally transformed. Every minute of every day of a human being's life can become part of an ongoing dialogue with God.

Finding a personal God

It is through learning to read the messages in the course of our daily lives that we come to know a personal God: by noticing God's providential direction of our lives, and learning to hear him speaking to us through other people.

In the philosophical debate which has gone on during recent years over whether electronic computers could be built which could actually *think*, one simple but fascinating way of evaluating this has been proposed, called the Turin test. The human being doing the testing is put in one room, with a computer terminal and keyboard, and is allowed to type in any questions which he or she wishes. The terminal is connected to a second computer in another room, where there is either (a) another human being at the keyboard or (b) a program installed on that second machine which can actually imitate the thought processes of a human being's personal reactions. The argument goes that, if a computer can be built and programmed which can successfully convince any human being in such a situation that he or she is holding a conversation with another human being, then we *must* say (at the most meaningful and finally relevant level) that the computer is able to "think."

Those human beings who have practiced listening for God and looking for God's presence in their everyday lives over a period of years, regularly discover that they are involved in a relationship with what can only be described as a warmly personal being. Over thousands of years of human history, intelligent and competent people who have devoted the time to searching for this, have discovered that (in their estimation) God is not just some cosmic power-pack supplying energy to the universe, not simply a set of ideals about right and wrong, not just some distant, awe-inspiring glory, but responds to us in the manner of a nonhuman *person*

(from another and quite alien dimension) who nevertheless is continually reaching out to us and transmitting messages to us, and who wants to be our friend.

If an electronic computer could make many millions of human beings regard it as a fully personal being, after these men and women observed the way the computer reacted to everything going on around it, no one would seriously object to describing it as a computer which could be said to actually think. This is the sense in which it can be demonstrated that, though God certainly does not think or act like a human being, our relationship with him can become just as close and personal as that which we would develop towards another human being who was with us, standing right beside us, twenty-four hours a day and 365 days a year. And in fact, God is even closer to us, since another human being would not be able to instantly read all our innermost thoughts. This is an intellectually defensible definition of what one would mean by a personal God, but as with all the demonstrations being described in this chapter, you the reader will never be convinced by it until you do whatever is necessary to learn it for yourself through your own personal experience.

Fourth demonstration: the great Healing Power, and the image of God in the mirror of the soul

The things which cause us the most torment in our inner lives are issues where we already know what is right, but cannot in practice make ourselves act in that way. A mother screams at her children too much, and knows that she should not, but continually finds herself doing it anyway. College students know that they must study to pass their courses, but inevitably find themselves being sidetracked by watching television, talking with friends, and other things of that sort, until they have flunked out of school. Al-

coholics know they are drinking themselves to death, and destroying their jobs and their marriages, but cannot pull their hands away from the bottle. People who are severely depressed quite frequently know good and well (in one part of their minds) that their behavior is completely irrational and sick, even though they are powerless to pull themselves out of it.

Although secular psychotherapy can sometimes do some good in cases like these, and although we can use forms of self-talk and imaging and mild self-hypnosis to partially reshape our own minds by our own efforts, in my own observation the greatest transformations (in which the most serious problems are healed) come from engaging in the some form of prayer and meditation which is appropriate for that person, and participating in a spiritual group where there are people with experience and ability in handling the specific kinds of problems which we have. The formal proofs for the existence of God show that the mysterious ground of the universe must have (in effect) infinite power: the best kinds of spiritual disciplines show us how to open our hearts so that we can accept a little of this enormous and positive creative power into our own breasts.

If you talk to people who were destroying themselves until they had a conversion experience at a Protestant evangelical meeting, or to alcoholics and drug addicts who were killing themselves until they joined A.A. or N.A., or to Roman Catholics who turned their lives around when they started going to church again and working with a sympathetic priest or nun, or to people who were miserably unhappy until they found one of the Asian religions which taught them calm and acceptance (taking up an eastern religious tradition such as Vedanta Hinduism, Buddhism, kundalini yoga, or the Sikh religion)—these happy people will tell you of their own firsthand

experience of the enormous healing power of this strange force which comes from the creative ground of the universe.

When men and women join a good spiritual group and participate actively, they will discover after a few years that their lives have been put on a totally different plane—this can be a church or synagogue or mosque, or a yoga class or Zen meditation group, or an organization with the strong spiritual and moral teaching of the Masons—but they will have become more honest, more compassionate and loving towards others, less affected by anger and resentment, more courageous and less fearful, and stronger inside in every way.

What they are seeing in themselves is that their souls are becoming more like God. The Old Testament said that God created human beings in his own image, and this image of God in the human soul is what we are trying to clean off and restore in the good spiritual life. So if I plunge into the spiritual life in a truly committed fashion, and pick some genuinely effective type of spiritual discipline to shape my growth in the spirit, I will increasingly see what God in his enormous heart is truly like, mirrored in my own human heart.

This is why all the higher spiritual disciplines put such a strong emphasis on ideas like love, mercy, compassion, and other attributes of that sort. If we fill our minds all day long with thoughts and images of anger and resentment and self-pity and worry and anxiety, that is the image into which we shall grow. But if we turn on a regular basis to the proper contemplation of the mysterious ground of reality, then (whether we consciously plan this or not) we will find ourselves inevitably growing into the spirit of love, mercy, and compassion.

To a great degree, each person must experiment for himself or herself to find out what kind of spiritual disciplines work best for

them, and work out their own personal understanding of who God is. But the simplest test for discovering whether I have found a spiritual discipline which is a good one for me is to ask whether I am actually growing in love and serenity, and making real progress in dealing with my own worst character defects and destructive urges as measured by my external behavior.

So who or what is God really? If we turn to this mysterious ground in trust and open ourselves up to its extraordinary power, we will find out—in what we slowly start becoming and seeing mirrored in our own hearts—all that we need to know about who God *really* is. That is what we are fundamentally pointing towards when we say that God is good and loving.

Fifth demonstration: the extraordinary works of God

Both Protestant and Roman Catholic Christians believe that we are saved by grace alone: God acting directly on our souls to bring us to faith and change our behavior. On occasion, God's grace works directly within a human heart in an especially striking fashion, to make that human being (in some specific situation) do or say something which that person would never have done or said on his or her own.

There are more people than most folks would imagine, even in our modern world, who have on at least one occasion had what used to be called a divine vision, or experienced the divine light shining within them, and entered into that realm of sacred light. I have had several people (whom I know well) relate to me how they heard a heavenly voice speaking somehow inside their heads at some crucial moment in their spiritual lives. I know one man who speaks to God and hears God speaking back to him on a daily basis, like one of those figures from the stories in the Old Testament:

"Thus the Lord used to speak to Moses face to face, as a man speaks to his friend." (Exodus 33:11)

I have myself seen at least one unquestioned total remission of a fatal cancer (corroborated by x-rays and everything else) in a man who was deeply involved in the spiritual life. Dr. Bernie Siegel at Yale studied the phenomenon of spontaneous remission within cancer patients (all physicians know that it sometimes occurs in some mysterious fashion), and discovered that it only happened among patients who were engaging in some kind of daily spiritual prayer or meditation. And Siegel also found that his terminal breast cancer patients whom he could persuade to pray and meditate at least once a day, lived twice as long on average.[99]

I have known one woman who could sometimes genuinely read certain other people's minds at a distance (in terms of noting sudden shifts in their emotional state), and another woman who was able to predict certain things, though in a fairly nonspecific fashion (like a house fire from a defective electrical appliance in a house across the street which she had never entered) many hours before they occurred.

I do not have the slightest idea how to explain things like this, but I do know that anyone who has lived enough years on this earth will have encountered at least one or two truly strange occurrences which our science cannot explain. Perhaps God does this every once in a while because it is the only way to achieve his purpose in that situation, or perhaps simply to keep us human beings humble.

Now it could be argued that these anomalous occurrences and occasional fissures breaking the surface of our intellectual systems (and revealing a brief glimpse of the infinite abyss behind that external façade), do not necessarily *prove* the existence of God in any proper philosophical way: perhaps what they accomplish at the

basic level is simply to demonstrate that our human intellectual systems do not know all the answers. But even this is extremely important.

People who insist that everything *must* follow the rules of science and that science must be able to explain *everything* are terribly rigid and fearful people, frightened above all of anything which might imply they were not in total control. Reductive naturalism is a control neurosis, which falls into denial or pseudo-rationalization or an explosively uncontrolled anger-filled defense mechanism when it is challenged. It is a neurotic response to one of the three most primal existential anxieties: the elemental *Angst* which arises when we are forcibly confronted with the fact that we are never in total control of the course of our own lives, and never can be.

So let us use the proofs for God in the right way: not as some additional rigid system for forcing everything into the constricting bounds of our tiny little human intellectual systems—a way of turning God into just another of our mechanically rationalistic theories—but instead let us use these proofs as revolutionary manifestoes which can strike the shackles off our spirits and allow them to be free again. The only real human freedom comes from tearing holes through the fences of the barbed-wire theories and stone-wall prohibitions of blindly restrictive and manipulative rules, so that our spirits can roam free once more across the prairies of the infinite.

CHAPTER 24

The Spiritual Dimension of Thomas Aquinas's Life and Works

Thomas Aquinas was born in Italy around 1225, the youngest son of Count Landulf of Aquino, a powerful and influential nobleman. Aquino was on the west coast of Italy, about half way between Rome and Naples. Thomas' family was not only related to the royal family in France; he was also a second cousin of the German emperor who ruled the Holy Roman Empire up in central Europe.

As a younger son, Thomas would not inherit his father's title and possessions, so the family arranged for him to go, when he was only five years old, to the Roman Catholic school at the monastery of Monte Cassino. This famous institution, which was run by the Benedictine order, was located only 11 miles from Aquino along the major road which runs down the west coast of Italy. The monastery, which was situated on top of a rocky hill, had been founded by St. Benedict himself around 529 A.D., not long after the fall of the Roman empire gave rise to the Middle Ages.

The family intended to use their influence to have Thomas (when he was older) named as abbot of this, the oldest and most prestigious of all the European monasteries. He would live in a palace, waited on by servants and surrounded by wealth and pos-

sessions. When Thomas was around fifteen, he went to the newly founded University of Naples to continue his studies.

While he was there, he became inspired to turn his back on all his family's position, wealth, and power, and join the Dominican Order. The Dominicans (founded in 1216) and the Franciscans (founded in 1209) were two newly appeared, extremely radical religious orders: the Franciscans (whether as individuals or as a group) could own no property at all, while the Dominican Order was only allowed to own the houses where the monks lived, and buildings for worship if they were responsible for them and served there as priests. Both groups were expected to beg on the streets for their food. The Dominican Order had been founded by St. Dominic only nine or so years before young Thomas was born, so the radical and novel spirit of the group still burned with its original fervor—they had certainly not yet become the kind of respected, "establishment" group which they are in the present-day Roman Catholic Church.

Thomas announced his intention to join the Dominicans in 1243, the year his father died; he was only eighteen years old or so at the time. His aristocratic family was totally horrified. His mother had him seized by her knights, and imprisoned him in the family castle at Roccasecca for fifteen months. There is a legend (though it is probably not true) that she sent one of the local prostitutes in to visit him at one point, to try to tempt him into appreciating some of the sensual pleasures of this world at a more serious level.

But young Thomas was even more stubborn than his family, so in 1245 he was released from the castle and allowed to journey up to Paris: the university there, along with the one at Oxford, were the two most brilliant theological and philosophical centers in Europe during the high middle ages. He stayed there around three years, then went to spend four years at Cologne. Either at Paris—

or certainly after he got to Cologne—he became a student of the great Dominican theologian and philosopher Albertus Magnus. He then taught and worked at a number of places, but spent most of the last fifteen years of his life in Italy, in the period when the Renaissance was almost ready for its first blossoming. Because he taught so many young students, Aquinas had to have been aware of what some of them were going to create in Italy not too many years after his death.

The ancient Greek philosopher Aristotle and (after Aquinas' time) the rise of modern western atheism

The Dominicans, as we have said, were one of the two most radical religious groups within the Roman Catholic Church at that time, while the most radical philosophy of the period was represented by the philosopher Aristotle (384–322 B.C.). The latter had been an ancient Greek, of course, who had written many centuries earlier, but very few of his works were translated out of the Greek during the aftermath of the Roman empire's collapse, so medieval thinkers had (up till that point) known relatively little about Aristotle's major works on physics and metaphysics. In the twelfth and thirteenth centuries however, Arabic Neo-Platonic translations of Aristotle and commentaries on his thought began coming into western Europe (via the Arabs in Spain and Sicily).

Aristotle was a pagan of course, who probably had believed in a multitude of gods, and certainly taught that the material universe had always existed, and that the human soul was simply the form of the body, which could have no reality or existence apart from its flesh and bone. The Arabic commentators argued, however, that Aristotle could be turned into a monotheist of sorts: the problem was that their Neo-Platonic/Aristotelian God was simply a blind

creative force of nature, which had no will (could not make decisions) and could have no conscious awareness of human beings as distinct individuals.

The Catholic hierarchy was horrified that students were reading these ideas, and tried to solve the problem by ordering good Catholics not to read Aristotle at all. The ban was blithely ignored by the free-thinking students at places like the university of Paris, so Albertus Magnus put young Thomas Aquinas to the project of recasting traditional western European Christian thought into Aristotelian terms. The object was to do this in a way which would preserve the most important spiritual insights of the medieval monastic teachers in this new kind of terminology, without turning everything over to the impersonal, hyper-scientific view of the Arab philosophers.

This was the official explanation given for the theological system which Thomas created in his *Summa contra Gentiles* and *Summa Theologica*, but in my own reading of those two works, I believe that Aquinas realized already (there in the thirteenth century) that much more was ultimately going to be at stake. The five proofs for the existence of God which he gave were not necessary for arguing with Arabic Neo-Platonic versions of Aristotle: these Muslims already accepted the existence of a higher power which would satisfy the fundamental requirements of those proofs. But I think that Aquinas foresaw that, as more pagan Greek and Roman literature came to be known in western Europe (for if he had lived into his seventies, he could have seen the first dawning of the Italian Renaissance), Europeans would ultimately start to become skeptical about whether God existed at all.

This is why the strongest impact of Thomas Aquinas' thought came, not in the later middle ages, but in the late nineteenth and first half of the twentieth century, when western atheism had come

completely out into the open, and was flourishing not only in Europe and North and South America, but also in all those parts of Africa and Asia where the Communist movement had established a foothold. The Roman Catholic Church turned back to Aquinas at that time, and began reviving his writings, because he had foreseen so accurately that total atheism would be the ultimate outcome of currents which were already beginning to be vaguely stirred in Italy during the last years of his life.

The official name of the Dominican Order is *Ordo Predicatorum*, the Order of Preachers. They were founded to go and preach and serve as missionaries in areas which were profoundly hostile to Christianity. It has been said that Thomas viewed himself as an "intellectual apostle," that is, someone who was called out by God to go and preach to men's and women's *minds*, in contexts where the prevailing intellectual culture was hostile to good spirituality.

I do not myself know of any thinker, from any period of history, who has had both a detailed memory for and totally competent understanding of, such an incredible range of human intellectual knowledge. He understood that the unique nature of his own mind was an extraordinary gift which God had given him, which had to be used appropriately. God would not have put a Thomas Aquinas here on earth, I believe, had he not known that there was a special kind of task which only such a person could carry out. And Thomas set himself to this task with a total commitment and zeal—if one looks at the amount that he wrote in his very short lifespan (he died before he turned fifty)—we can see that only someone with the fervent devotion of one of the saints could have accomplished so much in so little time.

Traditional Catholic Spirituality

He wrote all his books while living in Dominican monasteries: we need to remember that in these institutions, at eight times during every twenty-four hour period,[100] the monks all gathered in their chapel to recite the offices. They chanted psalms (going through the entire book of Psalms every week), sang hymns, prayed, and—since the Dominicans were the Order of Preachers—heard sermons. We must remember that in the process of writing down everything which he authored, Thomas had to pause after every few pages to take time out to pray and be in immediate personal contact with God. Perhaps that is one of the best ways to read his books and truly understand what he knew to be at stake: to pause every once in a while and pray, and remember that God is real, and God is immediately present to our hearts and souls, and that these are not just abstract intellectual concepts which are being discussed, but an attempt to think about what we actually do when we pray and attempt to live the real spiritual life.

We must also remember what a distorted view we get of his thought if we read only Thomas' own works: his assumption throughout his writings is that his reader has thoroughly read such major earlier Christian writers as St. Augustine, for example. When Aquinas writes about love, he assumes that his readers have read the passionate proclamations of Augustine in his *Confessions* and *City of God*.

In the revival of Thomas Aquinas' thought which took place in Roman Catholicism at the end of the nineteenth century, students in parochial schools and Catholic universities were unfortunately all too often taught Aquinas without Augustine or the major medieval spiritual writers. And to make matters worse, when these Catholic students were given selections from Thomas' *Summa*

Theologica, they were drawn almost entirely from the first part, and the first part of the second part. The whole second half of the *Summa* was almost totally ignored: but that is where Aquinas talked about salvation by grace alone, and the theological virtues of faith, hope, and (above all) *love*, which lead us into a realm far surpassing anything which we could understand through bare reason and logic alone. So Aquinas was partially distorted into a palely intellectual figure, devoid of passion and commitment, who seemed to talk about a rationalistic religion devoid of grace and love.

Meister Eckhart and Dominican preaching

There has been a revival of interest in the United States in recent years in the sermons of Meister Eckhart. He was one of the those great Dominican preachers of the sort whom Aquinas listened to continually. Eckhart was of the generation after Thomas, but most of the motifs in his sermons were part of the old monastic tradition of John Scotus Erigena and Hugh and Richard of St.-Victor which Aquinas would have heard preached in his day. Eckhart preaches continually about *God being born in us* as we pursue the true spiritual life and grow spiritually. He speaks of how we can see God even in a tiny caterpillar crawling on a leaf.

Grace does not destroy nature but perfects it

Above all, St. Thomas Aquinas was the theologian of grace. His central principle was that "grace does not destroy nature but perfects it." It was not the spirit of either-or but both-and. His basic attitude was very different from many kinds of Protestantism, and also totally different from the distorted kind of Catholicism which is world-hating and world-denying, and delights in pain and self-

torture apparently for its own sake, and tells people not to use their reason or their common sense. It was grace, Aquinas maintained—the spirit of a compassionate and loving God who gives freely to all who ask—which was able to take human societies everywhere and turn them into a proper context for the true flowering of authentic human life. It was grace which could take secular psychology and psychotherapy and turn it into the path towards real love (both for ourselves and for others). It was grace which could take a sensible and rational philosophy of life and turn it into the supporting skeleton of a living and breathing spirituality.

We cannot be required, Aquinas insisted, to believe anything on faith alone which is clearly contradictory to the fundamental principles of reason, logic, and real human experience. But we can be asked to take the leap of faith and put our trust in invisible things that go totally beyond the bounds of reason's yea and nay: we can be asked to have faith in the power of love, the reality of hope, and the willingness of God to come to our aid, and heal us, and make us whole again.

Will studying the philosophical proofs for the existence of God bring you to salvation if you understand them only at an abstract intellectual level? Of course not, and Aquinas made that point perfectly clear: we are saved by grace and faith and love. But can the addition of *divine grace* clothe these proofs in the garments of real spiritual commitment and an immediate awareness of God's presence all around us in every moment of our everyday lives? That was the whole point of what Aquinas was trying to teach us and preach to us, and his mission was to do that over and over until we could get it down into our guts and actually feel it. He came to be an apostle to our minds, but he told us over and over again that nothing he had to preach was worth anything at all until we also

opened up our hearts to something which was in fact even higher and better.

I earnestly hope that this little book of mine will come to be read in the same spirit.

NOTES

1. Paul Tillich, *The Courage to Be* (New Haven: Yale University Press, 1952).

2. See Glenn F. Chesnut, *The First Christian Histories: Eusebius, Socrates, Sozomen, Theodoret, and Evagrius* (Paris: Éditions Beauchesne, 1977; second edition, revised and enlarged, at Macon GA: Mercer University Press, 1986).

3. For a full account see Jane's Saddlebag, Big Bone Lick, Kentucky at http://janessaddlebag.com/thomas-jefferson-and-big-bone-lick/ (as of August 26, 2017). The state of Kentucky was split off from Virginia and made a separate state in 1792.

4. Aristotle, *Physics*, ed. and trans. Philip H. Wicksteed and Francis M. Cornford, Loeb Classical Library (Cambridge: Harvard University Press, 1957 and 1934) 3.4.203 a 1–b 3.

5. *Physics* 3.4.204 b 12, 3.5.205 a 9.

6. *Physics* 3.5.204 a 8–35. Aristotle also accused the Pythagoreans and Plato of treating the *apeiron* (the infinite or unbounded) as an *ousia* or independently existing substance in itself.

7. *Physics* 3.4.204 a 2.

8. *Physics* 3.6.207 a 14.

9. *Physics* 3.4.204 a 7.

10. *Physics* 3.6.206 b 34, 3.6.207 a 7.

11. *Physics* 3.4.203 b 16, cf. 3.6.206 a 9.

12. *Physics* 3.5.204 b 7.

13. It would perhaps be fairer to say that ancient Greek mathematicians and logicians knew that certain kinds of operations would, if carried out to infinity, approach a definite limit but would never reach it—see for example *Physics* 206 b 7—but did not realize that this kind of operation could be employed for any kind of useful purpose.

14. On chronological time, see *Physics* 3.4.203 b 16, 3.6.206 a 9, 3.6.206 a 26, and 3.8.208 a 20. On *genesis and phthora*, see *Physics* 3.4.203 b 16 and 3.6.206 a 26.

15. *Physics* 3.4.203 b 16 and 3.6.206 a 26.

16. *Physics* 3.4.203 b 16.

17. *Physics* 3.6.206 a 14 and 3.5.204 a 8.

18. *Physics* 3.6.207 a 25.

19. *Physics* 3.8.208 a 15.

20. Alasdair Wilkins, "A brief introduction to infinity," at https://gizmodo.com/5809689/a-brief-introduction-to-infinity (as of May 3, 2018).

21. My own interpretation of Parmenides' theories was that he was attempting to distinguish between ultimate reality itself and the realm of sense perceptions, which he called the realm of *doxa* (i.e., what only seemed to be true).

He called ultimate reality *to eon* (the Ionic Greek form of the neuter participle of the verb to be, equivalent to the phrase *to on* in the Attic Greek of Plato and Aristotle). This phrase could be translated as "what is," "that which is," or simply as "Being" itself. This ultimate ground of being was closely similar to what Thomas Aquinas called God and what Hindu Vedic authors called Brahman. It "was ungenerated and deathless,/ whole and uniform, and still and perfect." (Parmenides fragment 8.1–4) "Not ever was it, nor yet will it be," that is, the supreme Being had neither past nor future, but dwelt in an eternal now. "It is now together entire,/ single, continuous; for what birth will you seek of it?/ How, whence increased?" (Parmenides fragment 8–21)

The world of sense impressions, on the other hand—the world in which we lived our everyday existence—was a realm of *doxa* (that which only seemed to be), or as the Hindu Vedic tradition called it, the realm of *maya* or illusion. The fact that our attempts to make logical sense of the world of *doxa* involved us in continual impossible paradoxes, proved (Zeno believed) that it was not the real world, but simply a delusion or illusion of our minds.

I prefer Thomas Aquinas' method of dealing with this. Yes, God in his ownmost Being was above all human description and analysis, but in the world of sense impressions, we could tell the difference between attempted scientific explanations which were closer to the truth, and those which clearly fell further from the truth. This clearly observable difference proved, Aquinas said, that there were absolute truths structuring the world of material objects and human sense perceptions, even if we could not know them perfectly.

See the *Stanford Encyclopedia of Philosophy*, s.v. Parmenides at https://plato.stanford.edu/entries/parmenides/ (as of May 5, 2018).

22. Glenn F. Chesnut, *God and Spirituality: Philosophical Essays* (Bloomington, Indiana: iUniverse, 2010). In that book I discussed (among other things) the distinction between God's eternal *ousia* and his temporal operations, as that distinction was made by the ancient Cappadocian Fathers, along with the kind of process philosophy which was developed by Alfred North Whitehead and Charles Hartshorne in the twentieth century.

23. Seneca, *Naturales Quaestiones* 1, preface, 13, trans. Thomas H. Corcoran in the Loeb Classical Library (Cambridge: Harvard University Press, 1971).

24. Ibid.

25. Augustine, *On Free Will*, ed. and trans. Richard McKeon, *Selections from Medieval Philosophers*, I. *Augustine to Albert the Great* (New York: Charles Scribner's Sons, 1929), 2.15.39

26. Psalm 14:1 and its variant version, Psalm 53.

27. Anselm first laid out this argument in his *Proslogion* (written during the years 1078–9, while he was prior of the monastery of Bec in Normandy): the description of God as "that than which no greater can be conceived" (*id quo nihil maius cogitari possit*) was given there as the basic starting definition. In the other propositions (three through four), I am not quoting Anselm directly, but giving my own summary of his line of thought. Count Gaunilo, who was living as a monk at the monastery of Marmoutiers, near Tours, wrote a short work, humorously entitled *In Behalf of the Fool* (*Liber pro insipiente*), in which he attacked Anselm's

reasoning. Anselm responded to this with a work called *Liber apologeticus pro insipiente* (*A Defense against "In Behalf of the Fool"*) in which he defended and further elaborated his arguments.

28. St. Thomas Aquinas, *Summa Theologica*, 2nd rev. ed., trans. by the Fathers of the English Dominican Province, 1920, available online at http://www.newadvent.org/summa/ (as of March 20, 2018). The Five Proofs are found in Prima Pars, Question 2. The existence of God, Article 3. Whether God exists?

29. Aristotle, *Physics* 3.1.200 b 33. See also John Herman Randall, Jr., *Aristotle* (New York: Columbia University Press, 1960), p. 189.

30. Thomas Aquinas, *Summa contra Gentiles* 1.13.5–8. Eng. trans. as St. Thomas Aquinas, *On the Truth of the Catholic Faith: Summa Contra Gentiles*, Book One: *God*, trans. Anton C. Pegis (Garden City, New York: Image Books/Doubleday & Co., 1955).

31. *Ibid*., 1.13.3.

32. *Ibid*., 1.13.11–12.

33. *Ibid*., 1.13.14.

34. Thomas Aquinas, *Summa Theologica* I, q. 2, art. 3.

35. Italian text from Dante Alighieri, *The Divine Comedy: Paradiso*, 1. Italian Text and Translation, trans. Charles S. Singleton, Bolligen Series 80 (Princeton: Princeton University Press, 1975), Canto 33.142–45. The translation is mine: unlike many modern English versions, I do not believe that the word *igualmente* can be rendered as implying that the wheel was "moving evenly" or rotating smoothly "without jarring." Both the ancestral Latin form *aequalis* and the modern Italian form *uguale* have only two basic meanings: they can mean something level (in the sense of flat), which would make no visual sense here, and in a far more common usage, can refer to one thing which is *equal to* or *the same as* something else. I take the latter reading, and repunctuate the line.

36. I. P. Sheldon-Williams, "The Greek Christian Platonist Tradition from the Cappadocians to Maximus and Eriugena," in the *Cambridge History of Later Greek and Early Medieval Philosophy*, ed. A. H. Arm-

strong (Cambridge: Cambridge University Press, 1967), pp. 421–533, see espec. pp. 431, 442, and 459.

37. Although the Cappadocians and the other great Greek patristic theologians of the fourth century had shown how to use the Neo-Platonic concepts of the One and *Nous* to give an appropriate metaphysical status to the first two elements within the trinity, and had insisted that the Spirit could not be subordinated to some only quasi-divine level, they had not worked out a way to correlate the Christian doctrine of the Spirit with anything within the traditional Platonic metaphysical terminology. Augustine's stroke of genius was the realization that where Plato had gone wrong was in taking the formative metaphysical force of *Erôs* (Love) and regarding it not as a *theos*, but instead reducing it to the status of a mere *daimôn*.

38. St. Thomas Aquinas, *Summa Theologica*, 2nd rev. ed., trans. by the Fathers of the English Dominican Province, 1920, available online at http://www.newadvent.org/summa/ (as of March 20, 2018). The Five Proofs are found in the Prima Pars, Question 2. The existence of God, Article 3. Whether God exists?

39. Aquinas, *Summa Theologica* I, q. 2, art. 3.

40. Aquinas, *Summa contra Gentiles* 1.13.33.

41. First, second, third, and zeroth.

42. The Five Proofs are found in the *Summa Theologica* in the Prima Pars, Question 2. The existence of God, Article 3. Whether God exists?

43. Aquinas, *Summa contra Gentiles* 1.13.25.

44. See, for example, Aristotle, *Physics* 3.4.203 b 16 and 3.6.206 a 26.

45. Aquinas, *Summa Theologica* I, q. 2, art. 3.

46. *Ibid*.

47. Augustine, *De civitate Dei*, ed. B. Dombart (Leipzig: B. G. Teubner, 1909), 15.7, cf. 5.25. English translation adapted from Marcus Dods' translation, *The City of God*, (New York: Modern Library, 1950). See Glenn F. Chesnut, "The Pattern of the Past: Augustine's Debate with

Eusebius and Sallust," in John Deschner, Leroy T. Howe, and Klaus Penzel (eds.), *Our Common History as Christians: Essays in Honor of Albert C. Outler* (New York: Oxford University Press, 1975), pp. 69–95.

48. Since the appearance in 1948 of the articles by Hermann Bondi and Thomas Gold, "The Steady-State Theory of the Expanding Universe," *Monthly Notices of the Royal Astronomical Society* 108 (1948) 252 and Fred Hoyle, "A New Model for the Expanding Universe," *Monthly Notices of the Royal Astronomical Society* 108 (1948) 372.

49. Glenn F. Chesnut, *Heroes of Early Black AA: Their Stories and Their Messages* (San Francisco and South Bend: Hindsfoot Foundation, 2017) in which Harold Brown's story is reprinted from Glenn F. Chesnut, *The St. Louis Gambler & the Railroad Man* (Bloomington, Indiana: iUniverse, 2005).

50. The Five Proofs are found in the *Summa Theologica* in the Prima Pars, Question 2. The existence of God, Article 3. Whether God exists?

51. Peter Brown, *Augustine of Hippo: A Biography* (London: Faber & Faber, 1967), p. 74.

52. Augustine, *De libero arbitrio* 2.2.5, as found in Augustine, "On the Free Will (Book II, 1–46)," in Richard McKeon (ed. and trans.), *Selections from Medieval Philosophers*, 2 vols. (New York: Charles Scribner's Sons, 1929–30), 1:11–64.

53. Aug. *De lib. arbit*. 2.6.14.

54. Aug. *De lib. arbit*. 2.3.8, also 2.5.12.

55. John H. Flavell, *The Developmental Psychology of Jean Piaget* (Princeton, New Jersey: D. Van Nostrand, 1963), p.86.

56. Aug. *De lib. arbit*. 2.3.9 and 2.4.10.

57. Aug. *De lib. arbit*. 2.5.11–2.6.13.

58. Aug. *De lib. arbit*. 2.8.20.

59. Aug. *De lib. arbit*. 2.12.34, with McKeon's translation slightly reworded.

60. Aug. *De lib. arbit*. 2.8.21–24.

61. Aug. *De lib. arbit*. 2.9.27, also 2.7.15–16. The use of the sun as an analogy here is basically coming from Plato's parable of the cave at the end of his *Republic*.

62. In this last case, as one of the possible interpretations of the theories in Thomas S. Kuhn, *The Structure of Scientific Revolutions*, 1st ed. (Chicago: University of Chicago Press, 1962).

63. Aug. *De lib. arbit*. 2.8.20.

64. Aug. *De lib. arbit*. 2.9.25–26.

65. Aug. *De lib. arbit*. 2.10.29.

66. Aug. *De lib. arbit*. 2.9.26. This was one of the great central topics later on in Augustine's *City of God*, see Glenn F. Chesnut, "The Pattern of the Past: Augustine's Debate with Eusebius and Sallust."

67. Aug. *De lib. arbit*. 2.12.33 and 34.

68. Aug. *De lib. arbit*. 2.9.27 and 2.13.36.

69. Aug. *De lib. arbit*. 2.14.37.

70. Aug. *De lib. arbit*. 2.14.38; 2.14.39 on God as Truth Itself.

71. Aug. *De lib. arbit*. 2.15.39.

72. Aquinas, *Summa contra Gentiles* 1.13.34.

73. Ibid.

74. Aquinas, *Summa Theologica* I, q. 2, art. 3.

75. Thomas S. Kuhn, *The Structure of Scientific Revolutions*, 1st ed. (Chicago: University of Chicago Press, 1962).

76. See preface to the second edition of Kuhn's book (University of Chicago Press, 1970).

77. Cf. Bernard Lonergan, *Insight: A Study of Human Understanding* (London: Longmans, 1957).

78. For his very critical account of the traditional story of Jesus, see Thomas Jefferson, The Jefferson Bible, entitled *The Life and Morals of Jesus of Nazareth: Extracted textually from the Gospels*, completed in 1820.

79. Aquinas, *Summa contra Gentiles* 1.13.35.

80. Ibid.

81. See the sections on Hellenistic divine kingship in Glenn F. Chesnut, *The First Christian Histories: Eusebius, Socrates, Sozomen, Theodoret, and Evagrius* (Paris: Éditions Beauchesne, 1977; second edition, revised and enlarged, pub. at Macon, Georgia: Mercer University Press, 1986).

82. Aquinas, *Summa Theologica* I, q. 2, art. 3.

83. See for example the deist Voltaire's humorous critique in *Zadig* (1747): "For fifteen hundred years there had been in Babylon a great dispute which had split the empire into two stubborn sects. The first claimed that one should always enter the temple of Mithra with the left foot: the other held this custom in abomination, and never entered but with the right foot. They awaited the day of the Festival of the Sacred Fire to see which sect Zadig would favor. The universe had its eyes on his two feet, and the whole city was in a state of agitated suspense. Zadig entered the temple by jumping with his feet together, and proved later in an eloquent speech that the God of heaven and earth, who has no respect of persons, does not esteem the left leg more than the right, or the right more than the left."

84. Aquinas, *Summa Theologica* I, q. 2, art. 3.

85. David Hume, *Dialogues Concerning Natural Religion* (1779).

86. John 3:3–6.

87. Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy*, rev. ed. (New York: Harper & Row, 1962), Acknowledgments, p. xv. He held the Professorship of Physical Chemistry at Manchester University until he was invited to deliver the Gifford Lectures for 1951–2 at the University of Aberdeen; Manchester then graciously allowed him to turn his full time to his philosophical pursuits while retaining a professorial appointment at their university.

88. Polanyi, p. 34.

89. Ibid. p. 35; italics mine.

90. As for example in the Neo-Platonic philosopher Plotinus (c. 204/5 – 270). In our own modern period, we can see a famous psychiatrist using this idea in the same way in Viktor Frankl, *Man's Search for Meaning: An Introduction to Logotherapy* (1946).

91. Aquinas, *Summa Theologica* I, q. 2, art. 3.

92. Douglas R. Hofstadter, *Gödel, Escher, Bach: An Eternal Golden Braid* (New York: Random House/Vintage Books, 1979), p. 164. Language collage on p. 168.

93. Aquinas, *Summa Theologica* I, q. 2, art. 3.

94. Ibid.

95. For the "friends of God" motif see Exod. 33:11 ("thus the LORD used to speak to Moses face to face, as one speaks to a friend"), 2 Chron. 20:7, Isa. 41:8, and James 2:23. Compare also John 15:12–15, where the divine Christ figure calls those who follow his commandment of love "my friends." Theologians as diverse as Eusebius of Caesarea in the fourth century A.D., and John Wesley in the eighteenth, have taken "friendship with God" as the goal of the true spiritual life, compare also the closing sections of St. Teresa's *Interior Castle*.

96. William James, *The Varieties of Religious Experience: A Study in Human Nature*, Gifford Lectures (Univ. of Edinburgh) for 1901–2 (New York: Modern Library, 1994), from Lecture III, "The Reality of the Unseen," pp. 76–7. See also Glenn F. Chesnut, *Images of Christ: An Introduction to Christology* (San Francisco: Seabury Press/Harper & Row, 1984), ch. 4, "The Vision of God," pp. 50–67.

97. Rudolf Otto, *The Idea of the Holy: An Inquiry into the Non-Rational Factor in the Idea of the Divine and Its Relation to the Rational*, 2nd ed., trans. John W. Harvey (Oxford: Oxford University Press, 1950). My reading of Otto's ideas sometimes reflects the German original rather than Harvey's translation: *Das Heilige: Über das Irrationale in der Idee des göttlichen und sein Verhältnis zum Rationalen*, 11th ed. (Stuttgart: Friedrich Andreas Perthes, 1923).

98. Augustine, *City of God* 1.8.

99. Bernie Siegel, *Love, Medicine and Miracles* (New York: Harper-Collins Publishers, 1986).

100. Lauds, Prime, Terce, Sext, None, Vespers, and Compline, plus the night office.

BIBLIOGRAPHY

Aquinas, Thomas. *Summa contra Gentiles* 1.13.5–8. Eng. trans. as *On the Truth of the Catholic Faith: Summa Contra Gentiles*. Trans. Anton C. Pegis. Garden City, New York: Image Books/Doubleday & Co., 1955.

_____. *Summa Theologica*. 2nd rev. ed., trans. by the Fathers of the English Dominican Province, 1920. Available online at http://www.newadvent.org/summa/ (as of March 20, 2018).

Aristotle. *Physics*. Ed. and trans. Philip H. Wicksteed and Francis M. Cornford. Loeb Classical Library. Cambridge: Harvard University Press, 1957 and 1934.

Augustine. *The City of God*. Trans. Marcus Dods. New York: Modern Library, 1950.

_____. *De civitate Dei*. Ed. B. Dombart. Leipzig: B. G. Teubner, 1909.

_____. *On Free Will*. Ed. and trans. in Richard McKeon. *Selections from Medieval Philosophers*, I. *Augustine to Albert the Great*. New York: Charles Scribner's Sons, 1929.

Brown, Peter. *Augustine of Hippo: A Biography*. London: Faber & Faber, 1967.

Chesnut, Glenn F. *The First Christian Histories: Eusebius, Socrates, Sozomen, Theodoret, and Evagrius*. Paris: Éditions Beauchesne, 1977; second edition, revised and enlarged, pub. at Macon, Georgia: Mercer University Press, 1986.

_____. *God and Spirituality: Philosophical Essays*. Bloomington, Indiana: iUniverse, 2010.

_____. *Images of Christ: An Introduction to Christology*. San Francisco: Seabury Press/Harper & Row, 1984.

_____. "The Pattern of the Past: Augustine's Debate with Eusebius and Sallust." Pp. 69–95 in John Deschner, Leroy T. Howe, and Klaus Penzel, eds. *Our Common History as Christians: Essays in Honor of Albert C. Outler*. New York: Oxford University Press, 1975.

Dante Alighieri. *The Divine Comedy: Paradiso*. Italian Text and Translation. Trans. Charles S. Singleton. Bolligen Series 80. Princeton: Princeton University Press, 1975.

Flavell, John H. *The Developmental Psychology of Jean Piaget*. Princeton, New Jersey: D. Van Nostrand, 1963.

Hofstadter, Douglas R. *Gödel, Escher, Bach: An Eternal Golden Braid*. New York: Random House/Vintage Books, 1979.

Jane's Saddlebag. Big Bone Lick, Kentucky. At http://janessaddlebag.com/thomas-jefferson-and-big-bone-lick/ (as of August 26, 2017).

James, William. *The Varieties of Religious Experience: A Study in Human Nature*. Gifford Lectures (Univ. of Edinburgh) for 1901–2. New York: Modern Library, 1994.

Kuhn, Thomas S. *The Structure of Scientific Revolutions*. 1st ed. Chicago: University of Chicago Press, 1962.

Lonergan, Bernard. *Insight: A Study of Human Understanding*. London: Longmans, 1957.

Otto, Rudolf. *Das Heilige: Über das Irrationale in der Idee des göttlichen und sein Verhältnis zum Rationalen*. 11th ed. Stuttgart: Friedrich Andreas Perthes, 1923.

_____. *The Idea of the Holy: An Inquiry into the Non-Rational Factor in the Idea of the Divine and Its Relation to the Rational*. 2nd ed. Trans. John W. Harvey. Oxford: Oxford University Press, 1950.

Parmenides. *Stanford Encyclopedia of Philosophy*. At https://plato.stanford.edu/entries/parmenides/ (as of May 5, 2018).

Polanyi, Michael. *Personal Knowledge: Towards a Post-Critical Philosophy*. Rev. ed. New York: Harper & Row, 1962.

Randall, John Herman, Jr. *Aristotle* (New York: Columbia University Press, 1960.

Seneca. *Naturales Quaestiones*. Trans. Thomas H. Corcoran. Loeb Classical Library. Cambridge: Harvard University Press, 1971.

Sheldon-Williams, I. P. "The Greek Christian Platonist Tradition from the Cappadocians to Maximus and Eriugena." Pp. 421–533 in the *Cambridge History of Later Greek and Early Medieval Philosophy*. Ed. A. H. Armstrong. Cambridge: Cambridge University Press, 1967.

Tillich, Paul. *The Courage to Be*. New Haven: Yale University Press, 1952.

Wilkins, Alasdair. "A brief introduction to infinity." At https://gizmodo.com/5809689/a-brief-introduction-to-infinity (as of May 3, 2018).

About the Author

The author did his undergraduate degree and half of a doctoral degree in physical chemistry and nuclear physics, as well as holding a job as a laboratory scientist at a plant that made rocket fuel, and employment doing experimental work with a subatomic particle accelerator at a U.S. Atomic Energy Commission laboratory.

He then changed fields, and earned a Bachelor of Divinity degree in theology from Southern Methodist University. He subsequently won a Fulbright Fellowship to Oxford University in England, where he did his doctorate in theology. He taught ancient history, medieval history, and religious studies (including lectures on the philosophical issues of those periods and areas of thought) at the University of Virginia and Indiana University. In 1978-9, he won a Rome Prize (*Prix de Rome*) in Classics and spent a year as a Fellow of the American Academy in Rome. He was later Visiting Professor of History and Theology at Boston University in 1984-5.

His earliest book, *The First Christian Histories* — a major study in ancient Platonic philosophy and the philosophy of history — went through two editions (1977 and 1986), became a classic in its field, and is still in print today. In it he described how the Christian historians of the Late Roman Empire dealt with the pagan historical theories of their time, which saw a universe under the control of implacable Fate and blind Fortune. These new Christian historians revised the western understanding of history to include human free will and creativity, and portrayed human history as the continual struggle between true reverence for a higher power (what Plato had called the Good and the Beautiful Itself), and the mindset of those men and women who had been snared by the hatred of everything that was good, and an actual love of evil and doing harm to other people.

After his retirement from Indiana University, he became director and senior editor of a small publishing house, the Hindsfoot Foundation, which prints works by some of the finest scholars in their fields. He divides his time today between Indiana and the San Francisco Bay area.