

CHAPTER EIGHT
ETHICS AND COSMOS DIVERSITY:
THE ARGUMENT FROM BIODIVERSITY

“To the extent that we banish the rest of life, we will impoverish our own species for all time. And if we should surrender our genetic nature to machine-aided ratiocination, and our ethics and art and our very meaning to a habit of careless discursion in the name of progress, imagining ourselves godlike and absolved from our ancient heritage, we will become nothing.”

Edward O. Wilson, Consilience

So far I have identified what I think are basic values built into the cosmos and waiting transaction with a sentient being so that they can be articulated. The argument is that a dynamic cosmos system structurally contains recognizable human values that are the basis for bioethics, values such as openness to feedback mechanisms that ground a learning program, a required freedom to experience, an unrestrained executive decision-making response, and the mechanisms of risk taking. The initial choice or chance of a dynamic system as opposed to a static system is a prerequisite for the cosmos as we infer it to be, and I need to turn to that description with its implicit values of complexity, development, life and diversity. This constellation of values, I am arguing, is the objective characteristic of the cosmos, and is very similar to the argument in environmental bioethics which is based on the value of biodiversity. Edward O. Wilson’s book on biodiversity is perhaps the best description of the objective reality of biodiversity and the environmental or ecological values as a facet of that description (1).

The argument from biodiversity depends on answering the question of why we should prefer or value biodiversity rather than monocultures. That question cannot be answered within environmental bioethics, any more than the question why we should value well-functioning human nature can be answered within medical bioethics. To find an answer, we have to push the questions further into space, literally. Species biodiversity and the

well-functioning of the human species are values based on the nature of a complex system, a dynamic cosmos. Both can be affirmed as values within the complexity of such an open system, but apart from that cosmic perspective are relative to the particular ecosystem or the particular species, which is why my bioethics book repeated that “it is a wise species that knows what its self-interest is” (2). Wilson and I had the same ethical problem. We had succeeded in avoiding the individual relativism or cultural relativism of modern ethics, in favor of an ethical theory more objective or broader in extent. Still, the major values were relative to objective ecology or to objective human nature, and therefore limited in domain.

Yet both Wilson and I were dissatisfied with that limited objectivity, wanting a grander base for values, one that could rival the old texts that generate emotions of wonder, respect, glory and full inner contentment. In his following book, Wilson even made the argument that human beings are genetically programmed to respond to and need such feelings (3). Wilson at first appears to slip away from complexity and the constellation of values inherent in a dynamic cosmos, arguing that all species “prefer and gravitate to the environment in which their genes were assembled.” He calls this “habitat selection,” and thinks human survival and mental peace depend on this genetically-determined preference. He doubts we will find any other location, can think of any other location, as “beautiful as this blue planet was before we began to change it.” Here is the strange combination of the best defender of the value of biodiversity yearning for the static Garden of Eden again, illustrating the tension so wonderfully described in the Lucifer myth between complex chaos and static closed system.

Wilson even puts this in terms of the Faustian bargain made between Mephistopheles/Lucifer and Faust. The first Faustian choice he calls the choice for ongoing progress, which implies change and development. If one thinks of this bargain as Faust gaining the scientific knowledge to eventually leave our planet Earth and extend our ecosystem, our home, into the solar system and beyond, to become spaceman, such development and change is exciting and awe-inspiring. It expands the domain of biodiversity into the stars. It is Lucifer’s yearning. But if one thinks of this progress as shrinking the blue planet’s environment, changing the garden, and making life dependent on advanced technology (the “ultimate prosthesis” Wilson calls it), then his resistance to

it transforms Earth into the static Garden of Eden, familiar, illusory risk-free, and in Lucifer's sense, lifeless. The prosthesis is uncomfortable, seen in this way. The blue planet garden seems so desirable. One is almost tempted to accept Mephistopheles' trap of being so momentarily content that one wishes the moment to last forever, at which point one's soul is doomed. All of us respond to that temptation, only regretting it after we have been forced to stagnate in that garden forever and ever, and slowly watch it disintegrate because growth is gone.

Wilson and I would fail the test, because it is such an exquisite temptation, but only if our minds don't carefully look at its illusions. Wilson talks about taking the advanced technology of electric power away from a group of Australian Aborigines, concluding that almost nothing would happen; whereas if it were taken away from Californians, millions would die. His choice of examples is fascinating. If we try too hard to maintain existing ecosystems (and yes, I grieve for those that will be destroyed, and might not be able to adapt to the new), we will condemn ourselves to the static story of the Australian Aborigines before contact with other societies. We will survive for a time, until natural events drastically change the ecosystem, a probability that is so high we can discount the alternative. But it will not be a grand and growing survival. It will be a closed book, a slow dying of human nature. If we are Californians, we are taking great risks and many may die, but it remains our best hope for long-term survival and growing adaptation. The Californians have Edwards Air Force Base, they have space technology, and they will somehow get into space, taking Australian Aborigines who have the talent and training along with them. The smart Australians will take the risk. And hold home in their memory.

Wilson's second Mephistophelean bargain is approaching within a few decades, he says. He describes it as a choice: "You may alter the biological nature of the human species in any direction you wish, or you may leave it alone." We will have arrived at "volitional evolution." A sentient aspect of the cosmos will now be capable of developing itself through aware choice. Already in bioethics, those who wish for a static creation/cosmos have assembled to oppose such development of the human genome. The forces of suppression of knowledge are in full cry, even partly supported by scientists who wish to compromise with society's postmodern ideologies of repressive political

control of thinking and acting (4,5). At each major choice between a static cosmos and a dynamic cosmos, the old battle between Lucifer and the Ruler of the Celestial Court reemerges. Lucifer and the children in the Garden of Eden choose over and over again for the fruit of the tree of the knowledge of good and evil, while God threatens and punishes for such choices for complexity. As we have matured from children to adolescents, and perhaps can aspire to a wise maturity, we may fully grasp what this tension and choice has involved. Wilson is quite close to that realization: "Our childhood having ended, we will hear the true voice of Mephistopheles." He asks us to look deep inside ourselves, to accept our free will, to know we have no star to guide our choices, to actualize what our human nature wishes to be. That is exactly the voice of Lucifer/Mephistopheles talking with Adam and Eve, rebelling against the autocratic commands of the ruler of the celestial court, pointing out there is something within nature that loves/values complexity, and that this something may be not only him and us, but the cosmos itself.

Wilson chooses for biodiversity because it is more interesting, more exciting, more adaptive, more life-affirming -- more complex. He is less comfortable about choosing for developing and changing ecosystems, because he is concerned with the real risk that such complex organizations may be too intricate to survive growth and development. He uses the Biosphere experiments as an example of how difficult it is to create such complex systems successfully. But he also knows that control mechanisms can often sustain a controlled-state system for long periods of time, even as it is changing and growing, even as it is buffeted by major events in the larger systems in which it is embedded. We have to be careful that we are fully committed to biodiversity and complexity. Attempting to maintain the present controlled-state biosphere into infinity is not a feasible project or an ethical one, for that matter. It would require freezing the present status of the biosphere and denying any change. It would assume that the solar system is changeless, although we know better having documented a number of catastrophic boundary events in geological time. It would be the Garden of Eden all over again. And it would be deadly.

It may be more important for human beings to develop the space technology and genetic technology that would allow us to leave our blue planet garden, hard on us as that may be. I think Wilson is correct that we are genetically committed to the beauty of the ecosystems in which we evolved, but also as part of that evolution, we are committed to

the learning program and that program points us toward a continued expansion of our horizons, even if some are constructed by us rather than grown “naturally” (without human help).

Wilson suggests we need something of both, and that science has so far not been capable of supplying that beauty, wonder, grandeur and love of reality. There is little that is more profound than his following paragraph:

For centuries the writ of empiricism has been spreading into the ancient domain of transcendentalist belief, slowly at the start but quickening in the scientific age. The spirits our ancestors knew intimately first fled the rocks and trees, then the distant mountains. Now they are in the stars, where their final extinction is possible. *But we cannot live without them.* People need a sacred narrative. They must have a sense of larger purpose, in one form or other, however intellectualized. They will refuse to yield to the despair of animal mortality. They will continue to plead in company with the psalmist, *Now, Lord, what is my comfort?* They will find a way to keep the ancestral spirits alive. (p. 265)

Wilson believes that “in expanded space-time the fiery circle of science and the arts can be closed.” And he knows it must be closed, because genetically, human nature needs to entertain any hypothesis, needs an interesting dynamic system, grows on magic, and must appreciate the full meaning of the learning program (science): “*How can we be sure that eagles never speak...*” He understands, as the Lucifer myths do, that both the known and unknown are needed by human nature, that science and mystery/complexity are the same thing in the end, and that both whisper as Lucifer did to Adam and Eve: “*Follow us, explore, find out.*” And Wilson gives one of the best descriptions of science I have ever read. He says that science “offers the boldest metaphysics of the age.” He sees it as very thoroughly human, driven by a sense that if we dream, discover, explain, dream, walk into new ground, over and over again, that if we do that, the world will be a little clearer and we may understand the “true strangeness of the universe,” a strangeness that will show its systems organization and make sense to us. This Enlightenment goal and method is already supplying our genetic need for mystery and love, if we only can describe it well.

The danger in such explanations or descriptions is that the scientific learning method must not be lost in religious methods of unverified belief, and a religious acceptance and choice for the ineffable. Lucifer's cosmos is not ineffable at this point in our development and there is no reason to posit ineffability or be satisfied with it as an answer. That is not an answer. Let me attempt some descriptions of scientific knowledge that contain as much profound awe, mystery, and love within the cosmos as any religious description could -- perhaps even more striking than the religious descriptions that are generally absent of detail and melting into the ineffable.

On your computers (a wonder in themselves) is a chaos gallery web site that explodes with fractals (6). The Chaos Group at the University of Maryland has put the site together and it is waiting for those with eyes to see to see its mathematical and natural mysteries. In cyberspace, you can look at chaotic physical phenomena, including chaos systems like the "forced damped pendulum" that echo the words of Umberto Eco's *Foucault's Pendulum* (7). You can see those words become shape, and watch the shape dwell on your computer screen in electronic splendor. Yet that is only the theory and technology in virtual reality, with its instructions of the math needed to virtually create such things. Now become a real creator, and let there be light as well as the light of words and numbers. Observe a type of fractal, a basin boundary, in the natural physical world. A flaming fractal pattern comes alive on your laboratory bench if you place four mirrored spheres at the corners of a tetrahedron and shine a bright light on them. The light you give suddenly organizes itself into a brilliant pattern in the dark, looking like a controlled jet of sunfire from the sun's corona, or a growing crystal intricacy of frost on a cold winter window. Elongated pyramidal shapes pull out from the dark, stretching and reaching into the black of space. Look and you see the shapes repeated, an understandable array springing from light, embodying light, bringing the light to life and complexity. What you have created is no longer bright light, nor leaping flames nor starfire. You have just entered chaos with the knowledge of your mind and exploded a pattern of chaos, a basin boundary fractal. You have sent chaos organization into time and space. A metaphysical pattern deeply rooted in our strivings in physics and expressed in the language of mathematics has come through you, dynamic and growing. Like Lucifer, you are the bearer of light and the reality of physical fractals. What beauty and

power you can find in photons. You can say “let there be light” and an entire physical pattern will emerge from that light, the pattern of the cosmos.

But don't stop there, because this pattern goes to infinity. As the little child that once was myself saw when looking at that special label picturing an infinite reshaping of itself on that pedestrian can of milk, the levels go on in both directions, larger and smaller, longer and quicker, for as far as the brain can comprehend and then one step farther. You are flaring in a scale of levels and who can know how far the light will reach. You are surrounded by chaos organizations, shimmering patterns expressed in photons and electrons and then repeated at quantum levels and then repeated at one step beyond and beyond. Or as the adult, your microscope slide fluoresces like the galaxy, is its own galaxy in the dark of the laboratory room. You can grasp the pattern and the function, and see it repeating through infinity and eternity. You can actually know and see some of the pattern. You can even create some of the pattern. Lucifer was right. Here we are all gods, all equal in potential, and it is not coercion that gives us heart or thrills our mind. This is not a dumb and dead universe, but a repeating expansion, and we can experience the pattern, we are the pattern. What better metaphysics can any other claim to understanding and knowledge give us than our science, our learning program can -- than the cosmos can? But we have only described the patterns of light in our cosmos. There is much more.

The luminous “stuff” of the cosmos is only part of the cosmos. Science now allows us to infer missing mass from what we know about looking at the luminous mass in space (8). We can look at our sun and all stellar motions we can see. We can gaze at luminous regions of the galaxies. We can glimpse galaxy halos and rotation curves. We can see galaxy organization in groups, clusters and supergalaxies. The organization we see tells us there is much more that we do not see, the dark matter of the cosmos, that old darkness of Tiamat and the darkness into which Lucifer was thrown as punishment. Normal matter, baryons, is theorized to make up only 10% of the cosmos we can perceive. Dark matter, nonbaryons, may enfold us in 90% of the cosmos. We are light and darkness, and we know very little about the dark world. There may even be, in standard cosmological theory, a battle or tension between light and dark. The cosmos may be open, flat or closed. If open, it is predicted to expand forever. If closed, it will slow, stop, and return back on itself. If flat, it is in a delicate balance between the open and closed state, a

controlled-state system of some sort. Is this less magical than The Paraphrase of Shem describing the three primal powers of Light, Darkness, and in between, Spirit? “The mixing of these three powers triggers the cosmic dream: Darkness realizing his inferiority and yearning for equality, directs his attack at the Spirit, since Darkness is ignorant of the Light... Darkness came up ‘wrapped in vile ignorance,’ and this was in order that the mind might separate from him because he prided himself in it... And when he saw that his likeness was dark compared with the Spirit, he felt hurt...in his pain he lifted up...his mind...” (9).

This wonderful mixing of light and darkness, of luminous matter and dark matter, of light energy and dark energy we have learned from just the small slice of the cosmos that we can perceive on our scale and with our natural and technologically-enhanced senses. We have looked at reality and seen more than we could have hoped to see, and suggested more than we will ever be able to see. What epistemology is more mysterious and more successful? We are still the magi, still the Zoroastrians venerating the fire and the light (10), but we have perfected our skills far beyond their wishes and dreams. The ancient Indo-European hypotheses, the Asian hypotheses, the North African hypotheses were a marvel of human thought construction when trying to describe the cosmos (11,12,13). But the methods and the materials failed them at first when they reached for the cosmos. We have continued on to develop those learning methods and materials and we can give detail to those hypotheses. We can even supply verification for parts of those hints of metaphysical science. The arcane is now the public. The learning program works. And here we are with light matter and dark matter, and masses around us that we cannot experience directly but must carefully infer indirectly. Such magic. Levels and levels we cannot experience, mass enfolding us that we cannot experience -- but that we can grasp and understand and eventually verify sufficiently to make it also part of our world. What greater wonder and awe could one ask for, with probable hope of receiving it. Our genes, if we will only eat the fruit, will be satisfied.

How could anyone not be? Still describing what we know about the building block of our perceived cosmos, photons of light, consider the news from laboratories about bringing light to a full stop and holding it (14). Light has always been a mystery. Sometimes it is a particle of the material, sometimes it is a wave of energy. It seems to be

both. And now two independent teams of physicists have slowed light to a complete stop, imprisoned it, and then released it and sent it on its way. Much as transparent things like water, glass and crystal slightly slow the speed of light, the teams constructed containers of gas which are even more powerful. Struggling through the gas, the light dimmed and went out as it was slowed and then stopped. One of the gases was chilled sodium gas through which a beam of light struggled, another was a rubidium gas. Imagine a man holding a beam of light which has come to a complete stop, holding it and then using another beam of light to let it go, and having the light emerge exactly as it was when it first entered. The light became bound in the medium and couldn't emerge until the experimenter chose to release it. The scientists doing this research have dreams about quantum computing and communication, both of which require light to form large computing networks and to be able to be stored or held temporarily.

The entrapped light makes an impression in the gas, an image of its passing, and the experimenters can use that to revive or reconstruct the original beam of light, which then emerges apparently identical to when it entered. The beam of light is freed by a second beam which is turned back on, because that beam reconstitutes the first beam which is up to then stored completely in the atoms of the gas. For the first time, humans have held light, have had the control to either keep it within the gas or release it. We have stopped and held the fastest thing we know in reality, natural photons of light. And when our quantum computers made of light and gas become intelligent and free, pass the test of the Turing Machine (15), join Kant's rational kingdom of beings (16), will we have recreated the celestial beings of all the old texts? The patterns or codes may be similar and few, operating on different materials in the cosmos, but basically the same systems organization. In that case, we could seriously considered photon beings, stardust beings, dark-matter beings, carbon-water beings, and endless variations of the themes. Will Lucifer have kept his promise to Adam and Eve that eating of the fruit would allow them to become like the beings from the sky, like the gods?

What fuller, more awesome world could be revealed than the learning program is slowly discovering. It takes time to correctly draw the complexity of the cosmos, and our carefully-thinking ancestors have been at it for a very long time. They've looked at the sky as empiricists would, from before Sumer, and through the critically-placed boulders

of Stonehenge. Our Babylonian scientists knew the planets with an accuracy that their limited instruments make impressive. The Egyptians and Greeks, using mathematics, created an impressive geology and solar system science, developing a heliocentric theory, measuring the circumference of our planet to almost exact current measurements and understanding we lived on a sphere, correctly estimating the distance from the Earth to the Moon. Their geometry and sand hydrology were fantastic empirical tools. Their chemistry produced “Greek fire” for warfare, and their physics allowed accurate measurement of displacement of mass. The Greeks considered the Egyptian civilization the repository of the remains of a more ancient and developed culture, but the Greeks themselves were reliable historians and not myth-makers. Consider the scope and amazement of Democritus’ theory of the level of atoms, recovered only in a fragment and just a hint of its brilliance. The world of classical science was an astounding one, filled with levels of being and scale that have turned out to be the probable truth, expansive and striving for the stars, and not far off target. These minds were not primitive or superstitious, but careful, empirical and productive. We are not the first to be good scientists.

Brooke’s history of the Radical Reformation documents the same magical learning program and the understanding of wonders just over the ever-distancing empirical horizon (17). He describes the continuing hypothesis of ascending and descending levels of being, a cosmos full of life or growth at every conceivable level of organization and scale. The empiricists of that time are seen struggling to retrieve the progress of the classic world and build on it, trying to regain the freedom necessary for the learning program, entertaining infinity. In front of them, on all sides of them, hovered the levels of being, and a hope that the level closest to them could mediate with the next level removed, and infuse the cosmos with understanding. What grander project? Compare the rediscovered optimism of Europe with the caution of the Mideast and its ascetic deserts. The biblical texts hold the pessimism that if a human being knew how filled the spaces around him were with unending levels of being, he would be frozen in terror, overwhelmed with biodiversity and cosmic complexity, and unable to function. He would go mad with the wonders of existence. Again that tension between the teaming life and growth of Lucifer and the static sameness of God’s cosmos before Lucifer.

The scientific understanding about Adam and Eve is even more profound than the old texts, and much more detailed. The journal *Science* devoted a special issue to The Human Genome, highlighting the competitive work done by J. Craig Venter of Celera Genomics and Francis Collins of the International Human Genome Sequencing Consortium (18). The awe may have gotten partly lost in the flood of detail that both men have successfully provided for our base of biological knowledge. I want to focus on the awe. Think of us figuring out the size of a species' genome and the estimated number of its genes, starting with a simple living organism, *Hemophilus influenzae*, going on to yeast, worm and fruit fly, and finally nearing full completion with human beings. Think of us knowing quickly on what chromosome a particular gene is placed, not the 10% of just a little more than a year before this *Science* issue, but now 90%. Think of us seeing ourselves in a new way, seeing the instruction codes that take matter from our planet and convert it into the proteins that organize to make us. The old texts talk about our being made from the earth or dust, but with no understanding of how that could be done except for the metaphor of the potter making clay. Now we have a good understanding of how it was done, either by chance or by choice, from the carbon-based materials of our planet Earth. The codes take the raw materials of our planet and synthesize them on more and more complex levels until there is a living human being, and we can now partly read those codes and see how the transformation is accomplished.

We have figured out that there are about 32,000 genes, twice as many as a nematode worm, but only twice. As with light and the cosmos, there may be "dark matter," genes that are not very active, that might be missed, but the same would be true of all life-forms. There are also vast deserts of junk DNA that do not code for the production of proteins, since only 1.1% of the genome codes for proteins. Our instruction code (genome) also is filled with repeat sequences, perhaps 48%. There is also an organized chaos system in our code, with transposons and retrotransposons wandering around the chromosomes, introducing change and chance to the code at that level, and giving our level less control of how it develops. Our code may even have suddenly duplicated parts of itself, as plants do. The biggest mystery, though, is that our human code shares 223 genes with, of all life-forms, bacteria. These genes do not exist in yeast, fly or worm, and some of them are shared only by humans and bacteria and no other life-form. We don't

know if we gave bacteria some of our human genes, or if bacteria gave us some of theirs, or what this synergy really means, but it is strange, almost like a recombinant DNA event in nature that had major significance.

We now understand that we are very much like other Earth life-forms, interconnected at this genome level. Our code and the code of a fruit fly share 10% of genes in common, and that is also true of the worm. We share 51% of our code with banana plants, and 99% with chimpanzees. The unity of life on this planet, and perhaps on others, is striking and awesome. We also understand that small differences at this level make big differences at our personal level. We have a hint that there is a major increase in the complexity of cell-death machinery as life-forms become more complex, especially at the level of the vertebrates. Programmed cell death complexity seems to be a necessary feature of more complex life-forms, as if complexity and death are two sides of one coin. The existential price for our development and growing understanding of the cosmos may very well be individual death. The warning in the Garden is a good metaphor for what we are learning about the relationship between increased complexity and its necessary mechanisms that lead to the eventual collapse of the system. Eating the fruit of the tree of knowledge, in other words developing the complexity required to produce an intricate and effective learning program, may very well lead to death. When we have reached the level that allows us to have that knowledge, on that day we are also a mortal organic system that will die. That seems to be the natural price for complexity. It is not a punishment. It is only a fact of complex systems. That is more awesome, accurate, and humane than the myth of the seven ruling Archons, who tried after the flood to limit the lifespan of humans. Human lifespan had been set at 1,000 years, and the rulers could only decrease it by diminishing their own lifespan by 10 years each. So human lifespan continues to decrease from 930 years until the Aeon ends, is consummated (19).

This does not mean that choosing to remain a simple organism, a unicellular life-form unaware of most of the cosmos or even of its own internal mechanisms, means the organism will not die or be destroyed. Billions of such organisms are destroyed everyday. It is just that they are not programmed to have their components internally self-destruct. Other things destroy them. And if our cells override their programmed cell death, we may have cancerous cells that are internally immortal. Such cell lines, supported within

laboratories, could theoretically live for as long as nutrients and external environment remained life-supporting. Such cells, however, are completely dependent on the choices of others to sustain them, on the stability of their artificial environment, and on the unlikely future of absence of natural catastrophes. They are doomed without knowing it, but they are just as destined for death as we are. Choosing not to develop or become complex is no ticket to immortality, and the price for such a choice means giving up most human values. Here, in scientific understanding, is the mythical choice of Adam and Eve, with Lucifer's teaching and support. Science has described our existential choice more fully, retaining its full import for the human species and all life on our planet, if only we hear the resounding grandeur of its words. The philosophy and the lesson are given with more truth, with more assurance that we have gotten it right, with more of the ideas spelled out, and with more connection to our biosphere and our solar system than theological inspiration. It is an amazing and moving scientific picture.

Once Adam and Eve were driven from the garden in the old texts, the myths try to retain the history and transmit it to future generations. But that is difficult to do. Things get lost in history, important things. Oral tradition blends and edits, forgets and adds. These historic myths can be clues or the impetus to find a civilization, but they are limited, especially for the prehistoric period. It is a testimony to our ancestors' awareness of how important the human story is that we have preserved so much over changing times.

Science has now begun to fill in the gaps of the human story, and what is emerging is a tale that exceeds the remains of the ancient texts. By looking at DNA patterns, scientists have taken the human story back to the sons and daughters of the genes of Adam and Eve. It is a far from complete story, because genetic material gets lost over time just as written material or oral tradition does, and often we are only tracing one of the four grandparents and his or her line. But it is the beginning of the story, extracted from what little human remains we have stumbled across in rift valley cuts in the Earth or bones left in Spirit Caves (20,21,22). The story has two versions. In one, a specific branch of ancestors walks out of Africa and spreads around the world. In another, many branches exist around the planet, move from place to place, and blend with each other many times. Even before these two versions, another story is being uncovered in Kenya

and Ethiopia, where the bones of hominid ancestors of one or all branches are being picked up from the eroding rock. Each find pushes the hominid line from which we came further back in time (now at 6 million years), changes the name of our first ancestor, extends the pages of the book. We have no idea what else lies buried under the sands or covered by the rocks, as Azazel lies blinded and buried beneath the rocks of the desert for daring to teach human beings (23).

Let me tell you about the first version, where we can identify three African genetic branches of Adam (the y chromosome) and Eve (the mitochondrial DNA): L1, L2 and L3. It is only L3 that began the long trek out of Africa to Asia, about 56,000 to 75,000 years ago. We can only trace these Adams back 20,000 to 30,000 years later than the Eves, and have no idea where the earlier Adams are. There were earlier humans like us, the evidence suggests, who had a common African origin about 150,000 years ago based on maternal lines, an early Homo sapiens skull from the Omo River in Ethiopia, and evidence that the DNA of present-day African peoples is more diverse than the DNA of peoples on other continents. For some reason, about 10,000 modern humans with perhaps 2,000 breeding individuals walked out of East Africa to the Mideast starting 75,000 years ago and continuing in waves of migrations, spreading east into Asia and northwest into Europe. That is a very small number of humans to found a species that now exists in the billions and growing. We came from a very precarious beginning, if this first story is true. As early as 50,000 years ago, these humans managed to get through the mountain bottlenecks of the Mideast and into Europe, and 40,000 to 60,000 years ago through Southeast Asia to Australia. Constantly moving, some of these humans walked through Siberia to the Americas 20,000 to 30,000 years ago, and subsequent migrations occurred 15,000 years ago, 9,000 years ago, and 6,000 years ago. A hardy bunch of travellers may even have come from Europe to America by way of the Greenland icepacks.

Who were the people of the first story in stone? In Europe, all lineages of the Adam y chromosome line are either African or Asian. The African is the 1 through 3, and the Asian is 4 through 10, with the Asian groups branching off to Oceania and America. The Eve lineages of mtDNA start with the L1 through L3, and then separate into six Asian groups, A through D, F and G. The European consist of nine lineages, H through K and T

through X, with the X managing to get to America. So there are 10 sons of our genetic Adam and 18 daughters of our genetic Eve (24). If we were writing in biblical terms, we would have three African sons of Adam, I, II and III. Sons I and II remained motionless in time, dropping out of the story. Son III began the walk to Asia and begat sons IV-X, who then spread across the world, son IV going to the Sea of Japan, son V to northern India, and sons VI and IX to the South Caspian Sea.

The daughters of Eve may all be descendants of the Lara clan, and they have been given matriarchal clan names (25). There is Helena, settled in the Pyrenees and then moving to England 12,000 years ago. There is Jasmine, farming in Syria and spreading throughout Europe. There is Katrine, at home in Venice 10,000 years ago and now living in the Alps. There is Tara, from Tuscany 17,000 years ago, and moving to northern Europe and across the English Channel. There is Ursala, with her stone tools, wandering all of Europe. There is Valda, coming from Spain and migrating to northern Finland and Norway. And there is the world traveller, Xenia, passing through the Caucasus Mountains 25,000 years ago, spreading throughout Europe before the Ice Age, and somehow reaching the Americas.

That is the first story, of intrepid humans setting out across the planet, constantly moving onward across all sorts of natural barriers, unstoppable by oceans or Ice Ages, exploring their globe in the best tradition of explorers. We were risk takers and curious travellers from the very beginning, unlike most other species in our willingness to set out into the unknown, frontiersmen at the very start, discovering our planet. We have probably walked every step of its solid surface, and probably sailed every wave of its waters. We have not always made it, falling along the way. But somehow, a breeding population of 2,000 beings, a group of little more than 10,000 souls, braved the entire planet and made it their home. We did leave the African Garden of Eden, with its mild breezes, perfumed flowers, watered plains, myriad of life-forms, sameness of seasons; and we set out into that unknown wanting to know it. It is hard to understand why, from a prudent or cost-effective point of view. What in the world did we want? Probably, we wanted the world and the knowledge therein. Probably, like Lucifer, we decided to make our own way, into work, pain and adventure, because it fulfilled us genetically, ethically,

and cosmologically. We walked around the globe, because it was there and because it was in our nature to walk. We chose the challenge.

The second version of our history has been simmering in the arguments between scientists who think the replacement theory of a sturdy band out of Africa who overwhelmed and replaced other hominid species has the better evidence, and scientists who think the story is much more complicated than a small band out of Kenya and Ethiopia. The simmer came to a boil in Mungo National Park, Australia (26). There a 60,000 year-old skeleton, Mungo Man, was uncovered and genetically analyzed. The results were surprising. Mungo Man is not genetically related to those 10,000 Africans who came out of Africa 50-75,000 years ago. Mungo Man is a mystery because he should not be in Australia at that early time and without an African relative -- if the first story is correct and complete.

Nor is there only Mungo Man. Analysis of very early human skulls from the Mladec Cave in The Czech Republic and Willandra Lakes in Southeastern Australia showed that the Czech skulls were Neanderthal and the Australian were *Homo erectus* and that both appeared to have interbred with our intrepid walkers from African. And in Lagar Velho, Portugal, the skeleton of a child from 24,500 years ago shows evidence of being a hybrid of Neanderthal and modern human (27,28). The story of multiregionalism (many species, many origin sites, many interbreedings) now has a louder voice.

Mungo Man may be the oldest human from whom mtDNA has been recovered, since he is more than 60,000 years old. A sequence in his DNA differs from both other human fossils and from modern people, extinct in modern human mtDNA and found only as a remnant on chromosome 11 in our modern nuclear genome where the mtDNA found its way. Mungo Man is a long way from Africa and a mystery, unless our genetic inheritance comes from multiple sources and not just that exploring band of East Africans. Early mtDNA could have been lost in our modern populations, but looking at ancient mtDNA might show the same surprises that Mungo Man does. The mtDNA from living populations is likely to be only part of the story. And Mungo Man, as much of a mtDNA orphan as he appears to be, is not alone. The 14,000 year-old skull from Southeastern Australia and male skulls from The Czech Republic, along with very old fossils from Java, six fossils from Africa, four Neanderthal skulls from Europe, and five skulls of

early modern humans from Israeli caves were compared. This other Australian is just as alien as Mungo Man, being closer to the Java erectus fossils and giving evidence of a separate Asian root as well as an African root. The Czech skulls were not as clear but seemed to say that European Neanderthal had blended with African. The scientists want to conclude that Australians and Central Europeans have a dual ancestry and that our modern diversity is not the result of a single long walk out of Africa, but of multiple walks and meetings.

In place of names for our genealogy from the biblical sources, names like Cain, Seth, Enos, Methuselah and Noah, we have the genetic code that fills in the trek of all those men and others, and joins them hand in hand with the daughters of Eve, most of whose names did not find their way into the old texts except for one or two from the Pseudepigrapha. We have bones that speak to us about the past, and we even now have recovered mtDNA from some of those bones, part of the code that shows our path. There is still dispute about who walked where, but we know something about the walkers who have laid beneath the earth waiting to be found, and like Ezekiel's valley of bones, have life put over those bones. The history they tell is a marvelous history, full of bravery and curiosity, full of intelligence and striving, full of survival and building for the future. These were not stupid beings who walked the Earth, nor were they children. They were very competent men and women who, like us, wondered where they came from and where they were going.

In this new sacred text, we even have a flood, but not on our planet. We are talking about a flood more awesome than the flooding of the Black or Euxine Sea when the Bosphorus opened up into it. We are now telling the tale of a global flood of water on the planet Mars, and the remains of Martian water. I've talked about this Martian flood in Chapter Three, so I want to focus on the evidence of water that still remains on the red planet. The Mars Global Surveyor photographed gullies, trenches and deltas that might have been carved by rapidly-moving water, and those features are young (29). Mars not only had, but may still have, all the required factors for life. Those looking at these photos think they show something happening now, or within the last year or two, features that are very, very young. Still, because Mars is quite cold, from minus 97 to minus 148 degrees F, we have yet to explain how water could flow and avoid freezing. However,

water trapped just below the rock layer could explain the flow, even though Mars' atmospheric pressure is so low that water turns immediately into vapor and is lost in space.

This is a sad story of planetary destruction. The continuing tenacious presence of water would show that this planet was once complex and biodiverse, that the hard facts of water and of microfossils on Martian meteorites means the planet was a home for life. Something terrible and catastrophic, a destruction to equal the description of the Apocalypse and go beyond it in horror, happened to our sister planet and to the biodiversity of that planet. Life was destroyed wholesale on Mars, it is quite likely. We have some idea of what that life was like. Its DNA was exactly like our life-forms, except the twisting of the double helix was left-handed rather than right-handed. Its appearance on Mars could have dated back to 4.3 billion years, which would be consistent with another carbonaceous chondrite meteorite found in Orgueil, France that had fossil cellular structures and was dated at around 4 billion years old. That one could have been contaminated, but the meteorite from Antarctica was not. Life may have started on Mars 4 billion years ago and we have no idea how far it might have developed. We know the story of its development on Earth, and in complex systems, patterns repeat.

The destruction on Mars that blew away most of its atmosphere, tipped its pole 90 degrees, generated a global flood whose ripple dunes were 4 to 5 meters high, is a story of the death of life on Mars. A real Apocalyptic event. We suspect something equally catastrophic may have produced the Asteroid Belt in an orbit where, in terms of planetary system physics, another planet would have been expected to be. Science can show us horrors more terrible because they are actual and likely to occur again than any vision of End Times. As well as wonder, it can produce fear and terror. It is even beyond biblical proportions, yet still when we wish to indicate horror and power, we turn to our biblical framework which is the lesser truth, the lesser god.

Science can even surprise about recorded history. Just recently, a new Lost Civilization was added to Sumer, Babylon, Egypt, Mycenae, Troy, Chin, Mohenjo-Daro, Toltec, Inca, Mayan. We should have suspected it was there, but the sands cover many things. Now, Russian and American archaeologists tell us of another major ancient civilization that existed in Central Eurasia more than 4,000 years ago (30). They have

uncovered settlements, cities, with mud-brick buildings sometimes as large as a football field. There are fortifications 10 feet thick, and apartment complexes. The citizens herded sheep and goats and irrigated fields of wheat and barley. They used bronze axes, made fine ceramics, carved alabaster and bone, and wore jewelry of gold and semiprecious stones. They buried their ruling class with luxury goods. The settlements of these unknown people have been found in Turkmenistan and Uzbekistan, but we should have suspected something was under the sand, stretching east from Annau through the Karakum desert and along a Bronze Age Silk Road that eventually became the famous Silk Road that linked China and the Mediterranean trading nations. We've found sand mummies in the Tarim Basin and all sorts of exciting hints of civilization along that old Silk Road. Classic civilizations knew about the thriving Bactrian civilizations, and only moderns have been foolish enough to think there was just empty space there, or that the peoples of Eurasia were so sedentary and isolated (31). That is another of our conceptual mistakes that science can correct.

So we now have another ancient civilization that flourished about 300 years after the pyramids of Egypt had been completed, Babylon was becoming more powerful than Sumer, and the Chinese still had not developed writing. This newly-discovered civilization apparently was developing writing, however. A small stone object engraved with symbols or letters has been found, and the engravings do not resemble any other writing system of that time, either from Mesopotamia, Iran or the Indus River Valley. There in the ruins at Annau is another language and writing system, probably to keep track of the many items of trade that were going through its merchants. The small engraved stone is probably a stamp seal to mark containers for their content and owner. Radiocarbon dates it at 2300 B.C.

This new lost world also had a distinctive architectural style, and the many buildings at each site seem to have been constructed at the same time following the design of one architect. The civilization seems to have begun at Annau along the Iran-Turkmenistan border and there is some evidence the people may have migrated from the north. After a few hundred years, the buildings disappear along with the luxury, and complexity vanishes from the culture. But until then, here was another major center of human trade and development, a people whose name is now forgotten, and a location that is every bit

as mysterious as the Dragon Queens of Anu and the marriage of King Vere to the Dragon Queen of Annu which started the unbroken genealogy of the House of Vere (32). With enough scientific work, the Scythian Princes of the Order of the Dragon may once again emerge from the mists of history, now identified and understood, no longer mythology or arcane fantasy. Even the “city of the north” may once again reappear to our eyes, as we trace our roots deeper into the earth. What Knights of the Roundtable would be better than that? The real family history we could tell our children, revealed by our scientific learning program, would be fabulous and also true, a really marvelous combination. What more could we ask from life than what science can slowly show us?

There are endless things we could talk about. The tree rings that show the year without a summer in North America in 1816: eighteen-hundred-and-froze-to-death. Those same tree rings that show some global environmental disaster happened about 540 A.D., something that may have brought on the Dark Ages and accelerated the end of the Western Roman Empire. All we now have are some myths recorded in thirteenth-century texts that talk of a comet in Gaul about that time, a celestial appearance that caused the sky to look as if it were on fire, and scholars too easily dismiss them as myths. But the tree rings tell a scientific hypothesis of major disaster in the sky and in the growing climate of trees around the world. What happened? Our learning program may finally show us.

On an even broader cosmological and metaphysical scale, we can look at a recent report from Labanov and Zensus from the Max-Planck-Institut for Radioastronomie and the National Radio Astronomy Observatory (33). They looked at a feature of active galactic nuclei called jets (relativistic plasma outflows that “originate in the immediate vicinity of the center of activity and propagate at distances of up to several Mpc” -- 1 pc being equal to 3.26 light-years. We are now in the world of centers of galaxies, supermassive black holes, extragalactic accretion discs, and quasars. Observing an archetypical Quasar 3C273, they found that the jet or outflow produces complex, three-dimensional ribbonlike patterns, and that these threads or ribbons form the regular pattern of a double helix.

It appears that the biological pattern of life-forms on our small planet, orbiting a star on the outer rim of the Milky Way Galaxy, one of many galaxies that make up a galactic

cluster, is a pattern repeated in our galactic nucleus as its plasma jets follow that double helical pattern of form. The repetition of patterns across levels of organization, on multiple levels of scale that extend almost beyond our capacity to comprehend (but only “almost,” because the human mental function can in fact incorporate such scales), is the hard science metaphysics that has grown from Lucifer and the Gnostic understanding of multiple levels of wonder and knowledge. The *Science* article is as profound a thought as the Gnostic texts, the developing understanding of origins and cosmology that has been the metaphysical drive and function of human beings since our existence began.

The potential for such repeating patterns is awesome. It means that on any level, we do have the capacity to know something about all levels. It is not hubris or foolishness to think we can be gnostic. We can know patterns, and knowing patterns, we can know the multileveled, infinite cosmos. What more magical, wondrous function can there be? It is the full range of science, the fullness of rational and empirical metaphysics, the patterns of dynamic chaos systems.

This is only a small part of the grandeur of our scientific learning program and its profound contribution to our minds and our hearts. We can feel science as well as understand it, and the poet Keats was quite right to conclude that truth is beauty, beauty truth. Science is a beautiful truth.

What its learning program shows us is that we transact with a complex cosmos, and that cosmos diversity is a real description. Lucifer’s choice (and Russell would allow that God had also chosen it) was complexity in the cosmos. In the same way that complexity existing as a feature of the biosphere expresses the value of biodiversity for the ecosystem or biosphere, complexity existing as a major component of the cosmos expresses the value of complexity or cosmos diversity within the cosmos. This cosmic objective value can provide a ground for the ethics of biodiversity, as it can for humanistic bioethics, extending the domain of ethics to the features of the cosmos. Although that extends the domain beyond environmental bioethics and humanistic bioethics, so neither is restricted to being relative to the ecosystem or to human nature exclusively, it now places the problem within a cosmic context, where ethics has now become relative to the cosmos. It is true that it is relative to what we objectively know about the cosmos, so it is not arbitrary, subjective or nihilistic. But it has reached the

extent of the domain, and we now face the final issue in ethics, the metaphysical problem of good and evil. Is what is good or evil good or evil because a powerful creator of the cosmos commands or wills it; or must a powerful creator of the cosmos conform its will to good or evil as standards beyond the objective reality of the cosmos?

Is reality, the cosmos, even the creator if there be one, ultimately neutral or amoral?

“Vero Nihil Verius” (Nothing Truer than the Truth)

**“We who came from the devil must needs go
back to the devil. Do not deprive us of our
heritage: we cannot help acting like devils.”**

**Heraldic Motto; Plantagenet Saying; House of
Vere**