

PAUL A. LAVIOLETTE, PH.D.

EARTH UNDER FIRE

HUMANITY'S SURVIVAL
OF THE ICE AGE



EARTH UNDER FIRE

Humanity's Survival
of the Ice Age

Paul A. LaViolette, Ph.D.



Bear & Company
Rochester, Vermont

ACKNOWLEDGMENTS



I would like to thank my father and mother, Fred and Irene, for the long hours they spent helping me edit this manuscript. I would also like to thank my sister Mary, Larry Svart, Carol Camelot, and others for their editorial assistance. Finally, I would like to thank Professor George Lendaris, Loyd and Rona Murray, Marion and John Franc, Tom Abshier, and Ellen Barr, whose support along the way I valued greatly.

CONTENTS



[Cover Image](#)

[Title Page](#)

[Acknowledgments](#)

Chapter 1—[CIPHER IN THE SKY](#)

[Message from the Past](#)

[The Science of Cosmogenesis](#)

[The Riddle of the Sphinx](#)

[The Encryption of the Cosmic Microwave Temperature Gradient](#)

Chapter 2—[THE GALACTIC CONNECTION](#)

[The Galactic Center Indicators](#)

[Was the Galactic Center Visible in Ancient Times?](#)

[Cosmic Procreation](#)

[Activity in the Core of Our Galaxy](#)

[Cosmic Benchmarks](#)

Chapter 3—[THE CHARGE OF THE BULL](#)

[Galactic Superwaves](#)

[The Blue Star](#)

[The Eye of Re](#)

[The Temple of Dendera](#)

[Distant Thunder](#)

[Ice Core Evidence of Prehistoric Cosmic Ray Volleys](#)

Chapter 4—[COSMIC DUST INVASIONS](#)

[Arrival](#)

[The Age of Darkness](#)

[The Battle of Horus and Set](#)

[Horus's Nearly Fatal Sting](#)

[Validation](#)

[Discovery of the 15,800-years-B.P. Cosmic Event](#)

[Dusty Aftermath](#)

[Venus: The Star That Smoked](#)

Chapter 5—[THE AGE OF ICE](#)

[Thermal Freeze](#)

[Dark Clouds Up Ahead](#)

[Ragnarok \(the Twilight of the Gods\)](#)

[Fierce Winds](#)

Chapter 6—[THE CONFLAGRATION](#)

[The T Tauri Effect](#)

[Lunar Evidence of an Active Ice Age Sun](#)

[The Canyons of Mars](#)

[The Myth of Phaethon and the Sun Chariot](#)

[Other Myths about the Burning of the World](#)

[Terrestrial Evidence for a Prehistoric Global Warming and Solar Outburst](#)

[Solar Storms and Geomagnetic Flips](#)

Chapter 7—[THE GREAT EXTINCTION](#)

[In Search of a Cause](#)

[Glacier Waves](#)

[The Mystery of the Frozen Mammoths](#)

Chapter 8—[FLOOD LEGENDS AND CIPHERS](#)

[Atlantis and the Flood](#)

[Thus Spake Zeus](#)

[Asgard and the Bifrost Bridge](#)

[A Zodiacal Date for the Flood](#)

[Flood Legends from Asia, Oceania, and the Near East](#)

Chapter 9—[FLOOD LEGENDS FROM THE AMERICAS](#)

[American Indian Legends](#)

[The Barasana Star Lore](#)

[Archaeological Evidence for the Flood](#)

Chapter 10—[TESTIMONY IN THE SKY](#)

[The Galactic Radio Background Emission](#)

[Supernova Remnant Signposts](#)

[Do Superwaves Trigger Supernovae?](#)

[Extragalactic Evidence for Superwaves](#)

Chapter 11—[CYCLES OF DESTRUCTION](#)

[Geocosmic Cycles](#)

[The Days of Brahma](#)

[The Journey of the Hopi](#)

Chapter 12—[PROPHECIES](#)

[The Day of the Lord](#)

[The Revelation of Saint John](#)

[The Fátima Prophecy](#)

[Future Vision](#)

Chapter 13—[REQUIEM](#)

[APPENDIX A: Coordinates and Proper Motions for Key Constellation Stars](#)

[APPENDIX B: The Duration of Galactic Core Explosions](#)

[APPENDIX C: Attempts to Move the Scientific Investigation Forward](#)

[Getting the Word Out](#)

[Subsequent Investigation Attempts](#)

[Glasnost](#)

[Predictions and Their Later Verification: Chronology—1979 to Present](#)

[APPENDIX D: Chronologies](#)

[Footnotes](#)

[Endnotes](#)

[Bibliography](#)

[Other books by Paul A. LaViolette](#)

[About the Author](#)

[About Inner Traditions • Bear & Company](#)

[Books of Related Interest](#)

[Copyright & Permissions](#)

But the day of the Lord will come as a thief in the night; in which the heavens shall pass away with a great noise, and the elements shall melt with fervent heat, the earth also and the works that are therein shall be burned up.

SECOND EPISTLE OF SAINT PETER (3:10)

ONE

CIPHER IN THE SKY

It is impossible to reflect on the changed state of the American continent without the deepest astonishment. Formerly, it must have swarmed with great monsters; now we find mere pigmies, compared with the antecedent allied races. . . . The greater number, if not all, of these extinct quadrupeds lived at a period and were the contemporaries of the existing sea-shells. Since they lived, no very great change in the form of the land can have taken place. What, then, has exterminated so many species and whole genera? The mind at first is irresistibly hurried into the belief of some great catastrophe; but thus to destroy animals, both large and small, in Southern Patagonia, in Brazil, on the Cordillera of Peru, in North America, and up to the Bering Straits, we must shake the entire framework of the globe.

CHARLES DARWIN

Message from the Past

Almost every culture preserves myths describing humanity's endurance of terrible past events involving major loss of life on a global scale. Stories tell of endless days of darkness; of murky forms in space occluding the stars, the moon, and even the sun; of temperatures high enough to ignite wooded hills; of vast deluges covering all but a few mountain peaks.

Nothing in our modern experience comes close to matching these stories of global disaster. So, understandably, many have considered these ancient legends to be wildly imaginative tales. But could there really be much truth to them? If so, what could have caused these catastrophes and what evidence is there that they occurred? As we shall discover in the pages that follow, there are indications that our prehistoric ancestors actually did endure a series of traumatic natural catastrophes, the most recent of which was one of the worst disasters to afflict the human race. Modern findings indicate that these catastrophes were triggered by intense volleys of cosmic ray particles originating from the core of our Galaxy.

Although astronomers and geologists have accumulated a large amount of data relevant to this galactic cosmic ray phenomenon, for a long time they had misinterpreted this evidence and, hence, remained unaware of the phenomenon's past occurrence. In fact, we would still be overlooking these catastrophes were it not for a warning message prepared thousands of years ago. Although we may not have been aware of it, we have viewed portions of this ancient message many times while looking up at the clear night sky, where it lies emblazoned across the heavens, encoded in the symbolic figures of ancient star constellations.

Brief acknowledgments that the constellations were designed to communicate such a message are to be found here and there in the literature. For example, the mythologist Oral Scott writes:

It has been suggested that perhaps a patriarch of the ancient world, wishing to preserve for posterity an imperishable record of some great event or crisis, chose this means of doing so, and by his arrangement of the star groups, wrote into the sky a message that would endure forever.¹

Of all the known constellations, the twelve situated along the ecliptic, the path followed by the Sun and planets, form the heart of this ancient message. These, of course, are the constellations associated with the lore of astrology. Esoteric tradition teaches that astrology conveys a highly advanced science formulated in very ancient times. Astrologers have long presumed that this science concerns primarily how the positions of the

planets in the signs influence human personality and life events. Yet there appears to be another side to astrology that only now, aided by the advancement of science, are we in a position to fully understand. Regardless of whether one believes that “planetary energies” shape human personality at birth or influence our daily lives, many may be surprised to learn that astrology’s symbols convey a highly sophisticated astronomical and geological message, one that informs us and future generations about one of the most horrible disasters to afflict the human race—the occurrence of an explosion of our Galaxy’s core. Moreover, it warns us that this tragedy could repeat.

Ancient sages crafted their lore of astrology so that it expressed this Galactic warning through easily graspable personality archetypes and universal symbols. They may have decided to hide this message in metaphor to ensure that it would be faithfully communicated over hundreds of generations, even though its meaning might not be understood by its conveyors, for to fully comprehend the various facets of the phenomenon it presents, one must have some understanding of modern physics, astronomy, and nonlinear chemical kinetics. If there once lived people who had this kind of knowledge, the transmittal of such technically advanced information would have required the uninterrupted functioning of a system of higher education together with an adequate number of students and teachers having a high degree of aptitude and interest in these subjects.

Nevertheless, as history has shown, civilizations rise and fall, successive advanced cultures often being separated from one another by long “dark ages” of intellectual regression. In the course of even one such hiatus, much of the technical advancement of the previous cycle of civilization could be lost. Consequently, a technically advanced body of knowledge probably would not survive for very many generations. Moreover, one such dark age was probably already in progress at the time the zodiac message was formulated, since related legends describe the occurrence of global catastrophes that devastated populations worldwide and precipitated a complete collapse of civilization.

By encrypting these ideas into a system of star constellations and myths, these ancient patriarchs could ensure that the content of their astrological cipher would be conveyed undistorted through the millennia. The lore of

astrology, as well as the myths about its zodiacal characters, is easily understood by the average person and is amenable to being transmitted by word of mouth. Thus incorporated into a culture's oral tradition, intervening generations could accurately reproduce the technical "text" encoded within, even though they would be unaware of its substance. Then, one day, when civilization had again attained a sufficiently high level of advancement, the cipher might be understood, its riddle solved, and its message finally unmasked.

A body of knowledge properly encoded in the form of a cipher could potentially bridge any language barrier that would arise between generations far removed in time. In the aftermath of a devastating global catastrophe, former languages would have been forgotten and new ones formed. Some legends specifically refer to such a linguistic divergence. For example, the story of Babel found in the Book of Genesis relates that the survivors of the Flood, Noah's descendants, became widely scattered over the face of the earth. Where they once spoke a common language, they soon came to speak different languages not easily understood by one another.

Astrology succeeded in bridging the language barrier by coding its message in a way so obvious to future scientists that its decoding presented as few problems as possible and left the least room for error and ambiguity. The art of designing such a cipher is termed *anticryptography* to distinguish it from *cryptography*, which seeks to design messages that can be understood by only a few select individuals who share the secret of the cipher's encoding procedure.² Curiously, the same techniques used in cryptography to inhibit communication can be employed in anticryptography to facilitate communication.

Modern scientists have used such symbolic communication techniques in the design of time-capsule messages intended for communicating with future Earth civilizations. One example is the message engraved on the plaque carried aboard the Lageos orbital satellite. The plaque displays three maps of the Earth, showing its slowly drifting continents as they were configured about two million years ago, as they are placed at present, and as they will be configured about three million years from now when the satellite crashes back to the Earth's surface. An arrow in the contemporary map points to Florida, indicating the satellite's original point of departure.

Provided that Earth's future inhabitants know the rates of continental drift, they can determine the approximate date when the continents were arranged as shown in the second map, and thereby determine when the satellite was originally launched.

Communicating thousands of years in the future with a descendant race is similar to communicating with a civilization elsewhere in the Galaxy in that in both cases, the message creator has no foreknowledge of the message recipient's language. However, in either case, the authors of the message may surmount the inherent language barrier by expressing their message in allegorical terms using universally understandable symbols. The message carried aboard the Pioneer 10 spacecraft, launched in 1972 and now speeding out of the solar system, was designed in this fashion. It carries a fifteen- by twenty-three-centimeter gold-plated plaque engraved with the pictographs shown in figure 1.1. Together, these compose a ciphered message designed to inform beings from another planet of our whereabouts in the Galaxy, should the spacecraft one day be intercepted. Since the Pioneer 10 message uses anticryptographic techniques similar to those found in the astrological cipher, it is instructive to take a further look at this message.

Ciphers often use a set of symbols called a key to help the recipient translate the message. In the case of secret military communications, the key is usually kept in a code book, which is closely guarded to prevent it from falling into enemy hands. Transcultural communications, on the other hand, incorporate their key into the message itself to make it as easily accessible as possible. The Pioneer 10 plaque displays the key to its message in the upper-left-hand corner. This consists of two circles connected by a horizontal line marked with a symbol indicating the binary number "one."³ After some thought, knowledgeable recipients would conclude that this dumbbell symbol refers to the unique 21-centimeter wavelength that characterizes the radio emission radiated by electrically neutral hydrogen atoms, a common constituent of interstellar gas.^{*1} Furthermore, they would realize that they should use 21 centimeters as the message's standard unit of length measurement and 0.704024 nanoseconds, the period of this wave's oscillation, as the message's standard unit of time measurement.

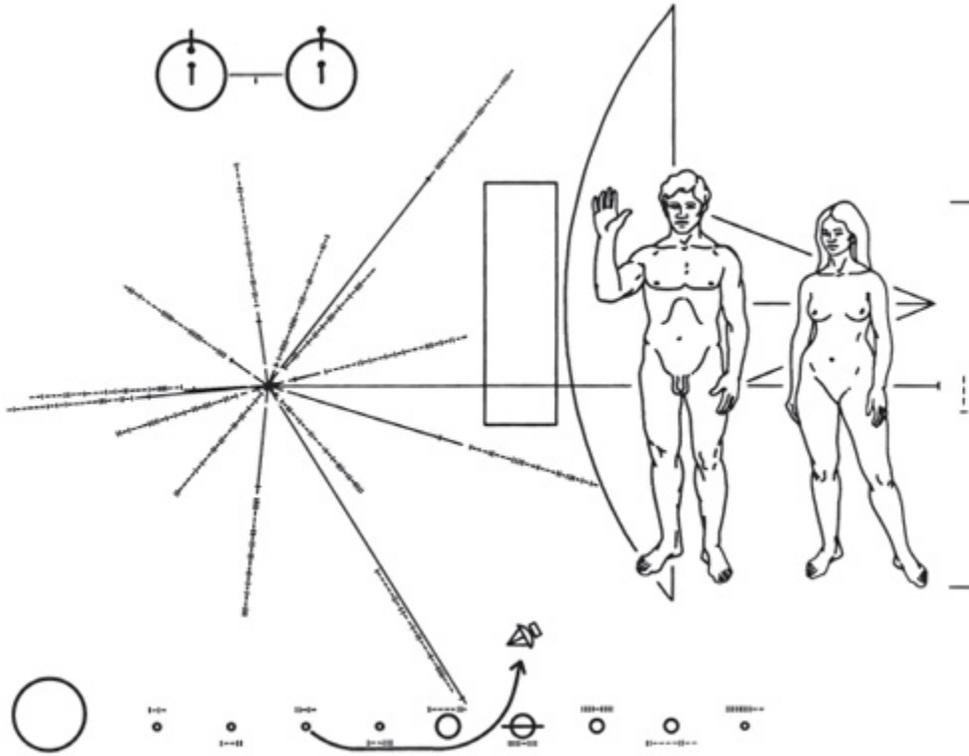


Figure 1.1. The Pioneer 10 space plaque. (Courtesy of NASA)

The space plaque also includes a cryptographic check to reassure the recipient that he has properly interpreted the hydrogen atom key and binary code counting method. This takes the form of two horizontal marks at the far right of the diagram that measure out a vertical distance on the schematic of the spacecraft's antenna dish. The vertical and horizontal dashes engraved between these distance marks record the decimal number 8 using the universal language of binary code. Counting in 21-centimeter units of length, this yields a distance of 1.68 meters (8 times 21 cm). The recipient may then check the validity of this length by measuring it out on the actual spacecraft antenna located near the plaque.

The starlike pattern of radial lines, to the left of the spacecraft is a coded polar coordinate map that attempts to inform the recipients of our location in the Galaxy. The length and direction of the lines denote the galactic plane distances and directions to fourteen of the more than 1500 known radio pulsars as they would be seen by an earth-based observer. Each of these celestial beacons flashes on and off at its own unique rate, their periods ranging from about a tenth of a second to one second. The exact oscillation

period of each pulsar is engraved in binary code. Using the 0.7040241836 billionth of a second time unit provided by the neutral hydrogen key, the recipient would be able to calculate the periods of the pulsars to ten significant figures. Since pulsars are the only astronomical phenomenon having such precise time regularity, the recipient would be reassured that his interpretation of these codes was correct. By knowing these oscillation periods, he would be able to identify the fourteen pulsars and, knowing their positions in space, would be able to triangulate the location of the diagram's central point of convergence, thereby locating our solar system.^{*2} For further reference, the long horizontal line extending to the right indicates the direction and distance of the Galactic center as seen from Earth.

Besides indicating the location of our solar system, the pulsar diagram also provides the recipient civilization with a way of determining the exact time when Pioneer 10 departed from Earth. The decipherer will find that the pulsar pulsation periods given in the diagram are slightly shorter than the periods observed at the time of decoding. This is because these pulsars gradually slow down with the passage of time. By knowing their respective slow-down rates, the recipient could determine the number of years that had passed from the time when the pulsars had those pulsation periods given in the diagram. This would indicate the approximate time when the message was formulated.

The Pioneer 10 space plaque message is indeed quite a brilliant piece of work. But, as we shall see, the cipher concealed in the lore of astrology is far more impressive. Let us now attempt to decode this ancient message which has eluded us for such a very long time.

The Science of Cosmogenesis

To become aware of astrology's Galactic center warning, one must first understand the physics of matter and energy creation that is encoded in its signs. As described in the preceding volume *Genesis of the Cosmos*, each of the twelve zodiac signs portrays a specific metaphysical concept or set of concepts relating to processes occurring in nature.⁴ Moreover, when these signs are properly rearranged from the order they normally present along

the ecliptic, they are found to portray collectively a coherent theory of physical creation. They begin by describing fundamental processes taking place in the ether, the invisible primordial substance that fills all space, and finish by describing how this active ether matrix configures itself into subatomic particles, the building blocks that make up our physical universe. They show how matter and energy first came into being eons ago and how they have since continued to come into being through a process of continuous creation.

A physics of cosmogenesis similar to that described by the zodiac was developed independently by Western science only as recently as the 1970s. This novel physics, called *subquantum kinetics*,^{5, 6, 7} was inspired from advancements made in understanding how ordered patterns spontaneously emerge in open systems—systems whose components maintain a state of directed activity or flux. Extensive studies have led scientists to conclude that natural systems of various types have certain commonalities, one being the idea that they are always born from a preexisting state of flux. Systems theorists have learned that a natural system, whether it be a living organism, a social organization, or an idea-construct, can arise and persist in the face of entropic degradation by continuously regenerating its order through processes fueled by energy imported from the environment.

Honeycomb-like convection patterns that self-organize in a pan of heated oil and chemical concentration patterns that spontaneously emerge in certain kinds of nonlinear chemical-reaction systems are other examples of how ordered forms can emerge and persist in open systems. Figure 1.2a depicts the set of reactions that compose one particularly interesting nonlinear chemical-reaction system known as the Brusselator. This is classified as an open system because it has both inputs (“source” reactants A and B) and outputs (“sink” reactants Z and Ω) that ensure a continuous throughput of reacting and diffusing chemical constituents.

Significant advancements in understanding such systems were made during the 1960s and '70s as a result of the development and widespread use of mainframe computers. The computer simulation results of the Brusselator system were first published in 1968 by thermodynamicists working at the Free University of Brussels under the direction of Nobel

laureate Ilya Prigogine.^{8, 9} These results showed that the Brusselator's X and Y intermediate reaction variables could spontaneously depart from their initially uniform spatial concentrations to form a stationary wave pattern of specific wavelength made up of reciprocal variations in the X and Y concentrations (figure 1.3).

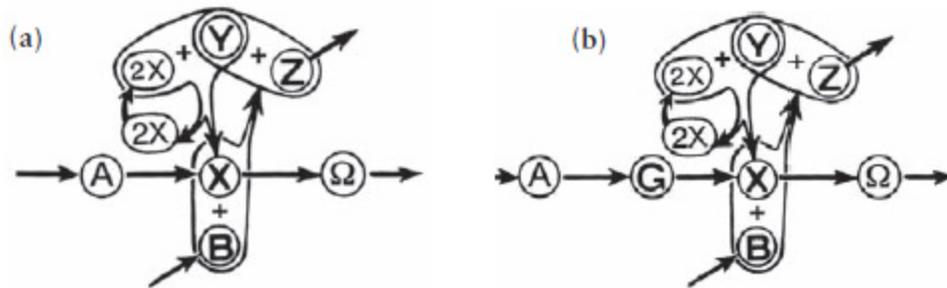


Figure 1.2. Schematic representations of (a) the Brusselator reaction (left) and (b) the Model G reaction (right).

In 1973, I received my first insights for developing subquantum kinetics by reading published work that described the Brusselator and its computer simulation results. I realized that a reaction-diffusion model similar to the Brusselator might prove to be useful in physics for producing a physically realistic model of subatomic particles. By adding a third intermediate reaction variable, G, to the Brusselator, I was able to form the new Model G reaction system shown in figure 1.2b. Model G is able to produce particle-like wave patterns that surround themselves with force-inducing fields mathematically identical to electrostatic and gravitational fields (see figure 1.4).

This new subquantum kinetics approach reconceptualizes physics within an organic, open-system paradigm. It views the physical universe as emerging from an active, life-like ether, whose constituents continually enter and leave our physical plane of existence as they react and irreversibly transform along a *fourth* dimension. One of the advantages of this approach is that it allows order to be spontaneously created and material particles to continuously emerge in “empty” space out of an ever-present zero point energy subquantum noise. Thus it offers a continuous creation alternative to the big bang theory.

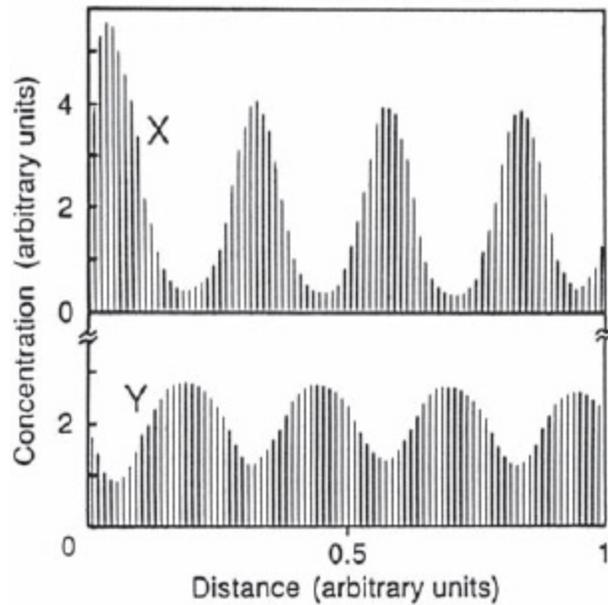


Figure 1.3. Computer simulation of a nonlocalized stationary-wave concentration pattern produced by the Brusselator in a linear reaction volume.

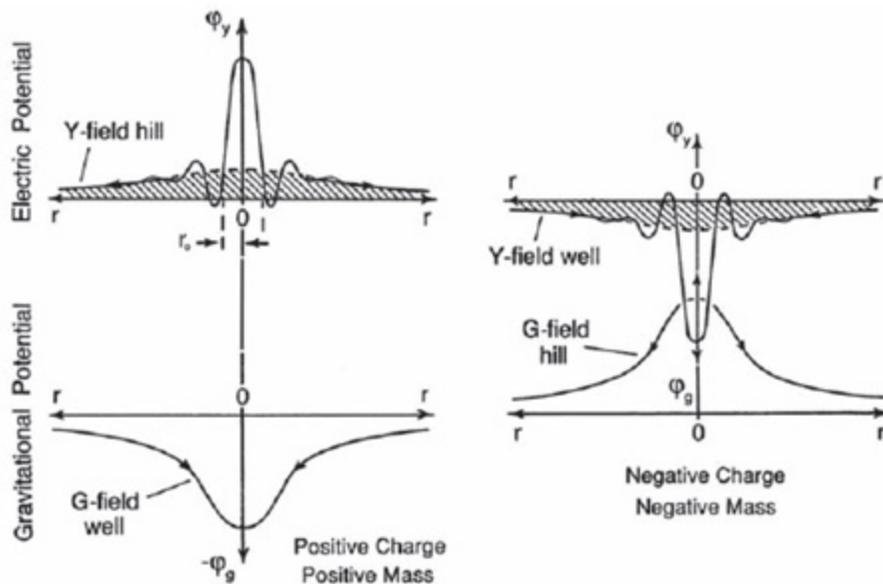


Figure 1.4. Radial cross-sections of ether concentration wave patterns of positive and negative polarity generated by Model G, serving as analogs of subatomic particles of positive charge (left) and negative charge (right).

Research into the tarot in 1975 led me to realize that the first eleven pictograms of the tarot (arcana 0 through 10) metaphorically express a science of physical creation identical to that presented in subquantum kinetics. This indicated not only that there was an ancient predecessor to

subquantum kinetics, but also that whoever designed the tarot must have had a particularly advanced knowledge of both physics and nonlinear system behavior. Following this, I discovered that astrology also shared this scientific advancement in that the twelve signs of the zodiac, when properly rearranged, present this physics as well. Later I found that this physics is also encoded in a number of ancient creation myths, such as the ancient Egyptian myths of Atum and Osiris, the Sumerian story of creation, the Babylonian creation epic, the ancient Greek story of Zeus, and the story of the creation of Atlantis. Certain creation science concepts also have been handed down to us through the Book of Genesis and in ancient teachings conveyed through Buddhism, Hinduism, and Taoism. Considering the large number of cultures that have passed down this science, we are led to conclude that it must have survived from a very early time, predating the beginning of recorded history.

Successful Predictions of Subquantum Kinetics

The subquantum kinetics unified field theory has had ten of its predictions subsequently verified. It correctly anticipated the Hubble Space Telescope findings concerning the early evolution of distant galaxies. It predicted the existence of a new celestial energy source, called *genic energy* and thereby correctly anticipated that the mass and luminosities of newly discovered brown dwarfs as well as the masses and luminosities of the jovian planets (Jupiter, Saturn, Uranus, and Neptune) should lie along the mass-luminosity trend line for red dwarf stars (something not accounted for by standard physics). It also correctly anticipated the unusual frequency blueshifting observed in maser signals transponded to the Pioneer spacecraft. Subquantum kinetics has also explained numerous other physical phenomena such as: stellar pulsation, stellar explosions, Galactic core explosions, the cosmological redshift phenomenon, electro-gravitational field coupling, the generation of subatomic particle charge, spin, and gravitational mass, electron orbital quantization, and the wave structure of matter (eliminating the field-source problem, field-singularity problem, and wave-particle dualism). It also replaces the big bang theory by accounting for primordial creation. Few other unified field theories have offered such a broad range of predictions and explanations. This physics is elaborated in the book *Subquantum Kinetics*.^{[10](#)}

Just as a properly designed time-capsule message conveys its message in a manner easily understandable to a scientist in a technically advanced culture, so too, through its symbolism, astrology expresses its creation physics in a manner clear to one who is familiar with the science of system genesis. Astrology's metaphoric language describes an ether that maintains a state of continuous flux as its diverse constituents, let us call them etherons, endlessly transform from one etheric state to another by engaging in specific reaction and transmutation processes. In many ways their transformations resemble the biochemical reactions that take place in a living organism. More specifically, this symbolism portrays the workings of a nonlinear reaction-diffusion system similar to the Brusselator and Model G.

Using archetypal metaphors, rather than mathematical equations, astrology describes how a localized increase, or "fluctuation," in the spatial concentration of etherons emerges spontaneously out of the ether's ever-present activity. This corresponds in the physical world to a minuscule self-emerging pulse of energy. The zodiac signs then explain how the ether's reaction processes nurture this fluctuation, allowing it to increase in size to the point of disrupting the ether's preexisting state of spatial uniformity. Finally, they tell how this growing fluctuation develops into a tiny wave pattern made up of ether concentrations that vary sinusoidally with distance. Viewed in three dimensions, this wave would appear as a central core concentration surrounded by a series of concentric shells whose wave magnitudes progressively decrease with increasing radial distance as they alternate between a high-X/low-Y concentration polarity and a high-Y/low-X concentration polarity. This core-and-shell wave pattern would physically correspond to a self-created subatomic particle and its surrounding field.

The zodiac's creation physics, which is more fully explained in the book *Genesis of the Cosmos*, is summarized in the text box on pages 13–14. Each sign here portrays a specific open system physics concept. Note that there is a certain logical order in which these concepts are best presented. For example, one must first describe the notion of source (Taurus ♉) before speaking of flux (Aries ♈ and Pisces ♉). Again, one must first describe the process of how tiny energy pulses—ether fluctuations (Gemini ♊)—spontaneously emerge before considering how such fluctuations become

amplified (Cancer ♋) to a critical size (Leo ♌ and Scorpio ♏). Systems theorists and thermodynamicists must abide by this same sequential format when they describe how chemical waves spontaneously emerge in a nonlinear chemical-reaction system or how a cellular convection pattern develops in a pan of heated oil. The phenomenon being described demands this orderly presentation of ideas in much the same way that a cooking recipe requires the proper sequencing of its individual food preparation steps.

Major arcana 0 through 10 of the tarot present these creation science concepts in their proper sequence. However, in the case of astrology, the signs must be sequenced into a new order from the way they appear along the ecliptic. Figure 1.5 compares the arrangement the signs have along the ecliptic with their rearranged sequence, Taurus being chosen as a common starting point.

Of course, this raises the following question. If astrology was originally designed to present a creation physics, why were its constellations not sequenced along the ecliptic to present these creation science concepts in their proper order? Perhaps some of the constellations were placed in their particular positions to illustrate a correspondence between their encoded metaphysical ideas and phenomena found in those parts of the heavens. For example, Virgo, which conveys the notion of matter creation, is placed so that her abdomen is traversed by the Virgo supercluster, the densest concentration of galaxies in our part of the universe. As is mentioned in *Genesis of the Cosmos*, she even indicates the center of the galactic supercluster with one hand and with the other hand scatters wheat (stars) outward along the supergalactic equator, as if seeding galaxies throughout space. Also Gemini, which presents the notion of duality, is appropriately placed in its ecliptic position to include within its boundaries the prominent star Castor (Alpha Geminorum). This double star, which is made up of two mutually bound binary systems, appropriately illustrates Gemini's duality principle. Finally, we find that Scorpio, Sagittarius, Taurus, Leo, and Aquarius are placed in such a way that they indicate important galactic benchmarks, designating cardinal directions toward and away from the Galactic center as well as perpendicular to it. As we shall see, these constellatory references bear important clues to astrology's prophetic

warning about a certain physical location in the heavens—the center of our Galaxy.

A Summary of Astrology's Ether Physics

Part I. Processes in the Ether, the Generative Womb

The first six signs in the sequence describe an ether whose constituent etherons actively combine and react with one another to produce new species. They describe how these processes form an ordered reaction network of intersecting and looping pathways that serves as the generative matrix for the creation of physical form. They explain how an ether concentration fluctuation (energy pulse), spontaneously arising from this underlying activity, is amplified to large size by reaction loops in this matrix.



Taurus (the Bull, 🐂) A source or head of etherons accumulates at a high reaction “potential” to constitute a reserve of etheric energy.



Aries (the Ram, 🐏) Etherons transmute from this high potential state to create a fourth dimensional transmutative flux.



Pisces (the Fish, 🐟) This alchemic flux is multifarious, made up of many kinds of etherons that diffuse and react with one another along crisscrossing pathways to compose an ether reaction network.



Gemini (the Twins, 👯) Due to the statistical nature of etheron reaction and diffusion processes, the concentrations of these ethers continuously and chaotically pulsate. Dualistic fluctuations emerge in the X and Y ethers (either high-X/low-Y or low-X/high-Y), each combating its noisy competitors.



Cancer (the Crab, ) An emerging X/Y fluctuation (Gemini) is protected from this surrounding destructive chaos and amplified by a positive feedback loop in the underlying ether reaction network.



Leo (the Lion, ) The X/Y fluctuation (the emergent energy potential pulse—Gemini) has now grown to a critical size and is ready to disrupt the ether's preexisting uniformly chaotic state.

Part II. Final Phases in the Emergence of Physical Form

The second six signs in the sequence follow the growth of this seed energy fluctuation as it develops into a subatomic particle. This matter-creation process describes not only how the first particle of matter came into being, but also how additional particles continually materialize.



the Scorpion, ) The revolution to overthrow the ether's spatially uniform state has begun.



Sagittarius (the Archer, ) The growing fluctuation of the two ether complements, X and Y, has begun to disrupt the ether's uniform distribution at this site—the concentration of one rising as the other falls; outwardly visible form begins to emerge.



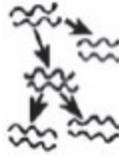
Capricorn (the Goatfish, ) The energy fluctuation grows exponentially as the concentration of the one ether complement increases at the expense of the other.



Libra (the Scales, ) Because the ether complements X and Y are produced by two mutually interlinked reaction processes, the increase in abundance of the one complement being limited by the decrease in abundance of its partner. So, as the initial discrepancy spreads radially outward, the balance begins to swing the other way, allowing the other partner to have the upper hand.



Virgo (the Virgin, ) The X/Y (energy potential) wave pattern is refined and made regular in its nurturing etheric womb; it develops into a mature subatomic particle of precise wavelength.



Aquarius (the Water Bearer, ) The process of matter creation repeats through the interplay of form-generating and form-stabilizing processes; evolution proceeds, and materialized particles are disseminated through space.

												
(a)	Tau	Gem	Can	Leo	Vir	Lib	Sag	Cap	Aqu	Pis	Ari	
	-	+	-	+	-	+	-	+	-	+	-	
	f	m	c	f	m	c	f	m	c	f	m	
	I						II					
(b)												
	Tau	Ari	Pis	Gem	Can	Leo	Sag	Cap	Lib	Vir	Aqu	
	-	+	-	+	-	+	-	+	-	+	-	
	f	c	m	m	c	f	f	m	c	c	m	

Figure 1.5. The astrological signs and their designations of polarity (masculine + and feminine -) and quality (fixed, mutable, and cardinal: f, m, c), arranged (a) as they appear in the zodiac and (b) as they appear when rearranged to depict the science of creation.

Some astrologers maintain that the signs were placed in their current ecliptic locations to catalog how the sky positions of the Sun, Moon, and planets impart certain personality attributes at the time of a person's birth. Others suggest that there is a predetermined pattern to the timing of the

soul's entry into the physical world that elicits the observed conformance between personality and celestial body positions. The contention that there is a correlation between human personality and the positions of the Sun and planets has formed the central theme of a heated debate between astrologers and nonbelievers. Nevertheless, a person's particular viewpoint on this matter should not stop him from appreciating the zodiac's encoded matter-energy creation science nor its warning about the violent explosions that issue from the core of our Galaxy.

The Riddle of the Sphinx

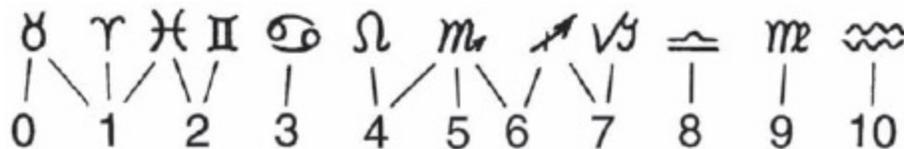
The disarrayed presentation of the zodiac's encoded science forms the basis for a cryptographic puzzle. The traditional ecliptic arrangement familiar to all astrologers and astronomers (figure 1.5a) presents the cryptogram's scrambled or ciphered order while the rearrangement expressing the creation science (figure 1.5b) would be its deciphered sequence, which for millennia has lain waiting to be revealed. Just as any well-designed time-capsule message provides hints to the recipient to facilitate its decoding, so too the zodiac cipher makes use of two anticryptographic keys: the Sphinx and the tarot. In addition, it incorporates a cryptographic check method for signaling the decipherer when its signs have been properly arrayed. In this way, those who successfully rearrange the signs would clearly understand that the cryptogram's creators had intended this new order and had purposely designed the zodiac to convey this important creation science message. Let us first consider the purpose of the Sphinx and tarot keys.

The Sphinx is a mythical animal formed from the hindquarters of a bull, the foreparts of a lion, the wings of an eagle, and the head of a human. Each of these represents one of the four so-called fixed signs of the zodiac: Taurus (the Bull), Leo (the Lion), Scorpio (the Scorpion), and Aquarius (the Water Bearer). Although the eagle form is not explicitly depicted in the Scorpius constellation, astrologers have long made this association, the eagle being said to signify Scorpio's creative aspect. It has been said that the Sphinx is the "key to the occult," that by deciphering its riddle one may gain access to the ancient knowledge.^{[11](#), [12](#)} The ancient practice of placing sphinxes at the gates to cities and temples again underscores its significance

as a device for gaining entrance to a protected place. In fact, the word *gate* in kabbalistic lore signifies a cryptographic key.

The significance of the Sphinx in serving as a key is best understood by referring to figure 1.5b. As seen here, when the twelve signs are placed in their deciphered arrangement, they symmetrically divide into two groups of six, the ends of each sextet being capped off by one of the four signs of the Sphinx. The first set of six describes the preexisting ether and the processes that take place in it, while the second set of six describes the emergence of physical form, the appearance of the primordial subatomic particle. The Sphinx hieroglyph, then, gives us a hint as to which zodiac signs to place at the beginning and end of each of these sextets. In this deciphered arrangement, the order of these four signs of the Sphinx remains unchanged from the order they normally have along the ecliptic. This contrasts markedly with the other zodiac signs, whose sequential order becomes radically changed. Interestingly, astrologers refer to the four signs of the sphinx as the *fixed* signs.

The tarot is the second key to the astrological cryptogram. As mentioned earlier, the first eleven major arcana, numbers 0 through 10, present the cosmogenic processes in their proper order. By matching up each zodiac sign with one or two of these arcana that express a similar metaphysical principle, it is possible to rearrange the zodiac signs into a new sequence that properly conveys this science. The tarot–astrology correspondences are as follows:



Esoteric tradition tells us that there is a definite correspondence between the tarot arcana and the signs of the zodiac, but does not say what this might be. Hence it gives a hint that the tarot was intended to be used as a key for decoding the zodiac. Many tarot scholars have presented their own schemes for matching up the two symbol systems. Yet all have failed to hit upon the pairings presented above, which were arrived at by having a familiarity

with nonlinear chemical kinetics and system theory. The required background may be obtained by reading *Genesis of the Cosmos*.

Ancient Egyptian tradition closely associated astrology and the tarot. For example, according to the ancient Greek philosopher Iamblichus, a series of twenty-two frescoes identical to the tarot major arcana once adorned facing walls of a secret underground gallery accessed through labyrinthine passages. Priests wanting to be indoctrinated into the meanings of these frescoes entered these subterranean passages by passing through a door in the breast of the Great Sphinx (figure 1.6). The novice priest would repeatedly encounter the Sphinx motif within this secret gallery. The frescoes lining each wall were said to be flanked by sphinx-like caryatids, twenty-four in all, and to be lit by eleven crystal oil lamps shaped in the form of sphinxes.¹³ A sphinx was also prominently displayed in Fresco 10 (arcanum 10 of the tarot), the last fresco in the sequence of 0 through 10 that together depicted the science of creation. Also arcanum 21, the final pictogram in the series, depicted the four zodiac signs of the Sphinx distributed symmetrically around a large wreath. Moreover, the initiated priests wore the symbol of the Rose Cross around their necks on a golden chain. This bore the four zodiac signs of the Sphinx, the bull, lion, eagle, and water bearer, distributed symmetrically around the rose between each arm of the cross.

By itself, the Sphinx gives no hint as to which of its four signs should be placed first. The zodiac also gives no clue, for its signs form a circle that seemingly has no beginning or end. Modern astrology has adopted the Ptolemaic system, which arbitrarily assigns Aries as the first sign. This custom was begun by the astronomer and astrologer Claudius Ptolemy, who lived in the second century A.D. at the start of the Age of Aries, when the spring equinox had precessed to the beginning of the constellation of Aries. However, in his book *Astrological Origins*, the astrological historian Cyril Fagan explains that in more ancient times, Taurus was recognized as the first sign of the zodiac, the starting point being set at 0 degrees Taurus. This is the meridian that passes through Beta Taurus, the tip of the Bull's southern horn, which lies almost exactly 15 degrees east from the Bull's eye, Aldebaran (Alpha Taurus).

The widespread association of the bull symbol with the idea of “beginning” also supports the decision to place Taurus at the start of the sequence. For example, *aleph*, the first letter in the Hebrew alphabet, translates as “ox” or “bull” both in Hebrew and Hindu scriptures.



Figure 1.6. The Great Sphinx of Giza. (Photo courtesy of Paul W. Wallace)

A similar sounding name, *alf*, is the word for ox in modern Ethiopian. Moreover, in early Hebrew, the Taurus constellation was similarly designated by the symbol \aleph , the glyph for aleph, which bears a close resemblance to the modern glyph for Taurus, $\♉$. When this symbol is turned on its side, it looks very much like the Greek *alpha*, α , or the Phoenician *a*, again alphabetical starting letters. Furthermore, the Egyptian Sothic calendar sets its zero date at 4240 B.C.E., marking a time when the Age of Taurus was just beginning, with the vernal equinox close to the tip of the Bull’s horns. In summary, no other astrological sign carries a similar connotation of “Start here.”

Hints left here and there in various writings also suggest that Taurus is the intended starting sign. The first four books of the New Testament preserve one clue as to which signs begin and end the Sphinx cryptographic code, the four apostles Matthew, Mark, Luke, and John being traditionally associated with symbols that make up the four signs of the Sphinx: Matthew with the Ox, Mark with the Lion, Luke with the Eagle, and John with the Water Bearer. The four apostles, together with their corresponding astrological symbols, are also pictured as prominent frescoes in St. Peter's Cathedral in the Vatican. Looking upward, they can be seen situated at the four corners of the cathedral's central chamber, adorning the base of its dome just as they did on the Rose Cross of the ancient Magi. Hence, these saints convey the zodiac's proper order: Taurus, Leo, Scorpio, Aquarius.

These same four astrological symbols are mentioned in the Books of Ezekiel (1:10) and Revelation (4:7), in which they take the form of "beasts"; but here their order is given differently. G. H. Mees notes that the correct order of the beasts is found in the second midrash, which states, "When Solomon wished to sit on his throne, the Ox took him gently on his horns and handed him over to the Lion"; finally "the Eagle raised him and placed him on his seat."¹⁴ Solomon on his throne here signifies Aquarius, the sign that represents the regal head of the Sphinx.

It is common in the art of anticryptography to include a cross-check device with the coded message so that the recipient may reassure himself that he has properly deciphered and understood the message. As we have seen, the Pioneer 10 message accomplished this by providing a binary coded distance measurement drawn to scale on the spacecraft schematic. The astrological anticryptogram incorporates a cryptographic check by assigning symbolic attributes to the signs. These are given in the form of masculine and feminine polarities (+ and -) and qualities designated as fixed (f), mutable (m), and cardinal (c).

When the signs are ordered as they appear along the ecliptic, the polarities and qualities repeat through the sign sequence in a regular manner (see figure 1.5a). In the decoded arrangement, the polarities and qualities again exhibit ordered patterns (see figure 1.5b). The polarities alternate between feminine and masculine, as before. The qualities, though, display a new order that divides the twelve signs into two groups of six signs each,

thus paralleling the conceptual bisection of the sequence apparent in the encoded creation science. The qualities are arranged *symmetrically* with respect to the midpoint of each sextet to form two complementary progressions: FCM | MCF and FMC | CMF. The concepts of symmetry and complementarity demonstrated here summarize in essence how the ether generates physical form. Hence, in the deciphered sequence, the qualities express an idea that is very much at the heart of astrology's matter-creation science. Were the signs to be ordered in any other way, this balanced arrangement would be destroyed.

Potentially there are about half a billion ways in which the twelve zodiacal signs could be sequenced. But the number of arrangements that yield ordered patterns for both the polarity and the quality symbols is very small. Moreover, of this small fraction, there are just twelve arrangements that divide the sequence into two sextets and simultaneously illustrate the principles of both symmetry and complementarity, as does the deciphered sequence. By restricting the number of possible ordered combinations to those starting with the sign Taurus, the dozen possible sequences are narrowed down to just one, the sequence given in figure 1.5b.^{*3}

A person wanting to know whether he has properly arranged the zodiac signs need only note that the sequence he has chosen arranges the polarities and qualities in a regular manner. This cryptographic check device reassures him that he has properly understood what the authors of the zodiac were intending to convey and that he has successfully deciphered the age-old riddle of the Sphinx.

The Encryption of the Cosmic Microwave Temperature Gradient

The story of cosmic creation presented in the rearranged sign sequence is just part of astrology's message. The rest is told by the original sequence of the signs and specifically by their constellatory positions along the ecliptic, which, among other things, designate the orientation of a fundamental energy gradient in the heavens. Here, too, the signs of the Sphinx, Leo and Aquarius in particular, provide helpful clues alerting us to this encrypted science.

Leo and Aquarius, which stand opposite one another in the zodiac, appear to be indicating a temperature polarity in space. For example, astrologers traditionally associate Leo with warmth, passion, and generosity; they associate Aquarius with frigidity and being impersonal and intellectual. Astrology specifies that Leo's "ruling planet" is the Sun, the traditional symbol of heat and warmth. For Aquarius, it specifies Saturn, the coldest of the ruling planets and the one farthest from the Sun. Aquarius's coolness is also connoted by the water he pours from his jug.

Looking further into the subject of ruling planets, we find a curious pattern in the way these celestial spheres are appointed to the twelve signs. As seen in figure 1.7a, the five planets—Mercury (♿), Venus (♀), Mars (♂), Jupiter (♃), and Saturn (♄)—are symmetrically disposed around a line bisecting Leo and Cancer on one side of the zodiac and Aquarius and Capricorn on the other. Although the Sun and Moon, which respectively rule Leo and Cancer, are different orbs, astrologers traditionally regard these two celestial bodies as complements of one another, the Sun being masculine and the Moon being its feminine counterpart. So, like the other planet pairs, Leo and Cancer do compose a symmetrical pair of sorts. Furthermore, these six pairs of celestial bodies map out a temperature gradient extending from Leo (the Sun) at the warmest end to Aquarius and Capricorn (Saturn) at the coolest end. In between these two extremes, temperature progressively decreases in either direction around the zodiac. The average surface temperatures that have been determined for the Sun, Moon, and planets are plotted in figure 1.7b for comparison. Although the Moon is cooler than Mercury, it is, by far, much brighter, so this minor exception to the rule may be overlooked.

A similar temperature polarity is suggested by the human body parts traditionally associated with the zodiac sign sequence. These designations are displayed in figure 1.8a. As before, Leo occupies the most central position, this time being identified with the heart, the center of the body's circulatory system. It is flanked by Virgo, which is traditionally associated with the stomach and intestines. Together, these two are regarded as the warmest of the twelve signs. As before, temperature decreases in either direction as we continue around the zodiac, only this time the lowest temperature is reached in Aquarius (the ankles) and Pisces (the feet). The

skin temperatures measured for these various parts of the human body are plotted for comparison in figure 1.8b. The symmetry axis of this body-part thermal gradient bisects Leo and Virgo at the hot end of the zodiac and Aquarius and Pisces at the cool end.

Since the lore of astrology redundantly encodes essentially the same Leo–Aquarius directional temperature bias using entirely unrelated sets of symbols (planets and body parts), we are led to conclude that these symbol systems are being used to call attention to the temperature gradient feature that both share. Although, the symmetry axes of these two thermal ciphers deviate from one another by thirty degrees, both place Leo and Aquarius at their extrema. When averaged together, the two axes yield a symmetry axis that places Leo at the warmest extremum and Aquarius at the coolest extremum, with temperature progressively decreasing in a symmetrical manner between these two zodiacal poles. Scorpio and Taurus, which lie at the halfway point, are left with moderate temperatures between these hot and cold extremes. Thus, through this anticryptographic device, astrology appears to be recording the existence of “hot” and “cold” directions in space and a progressive grading of temperature in directions between these opposite poles.

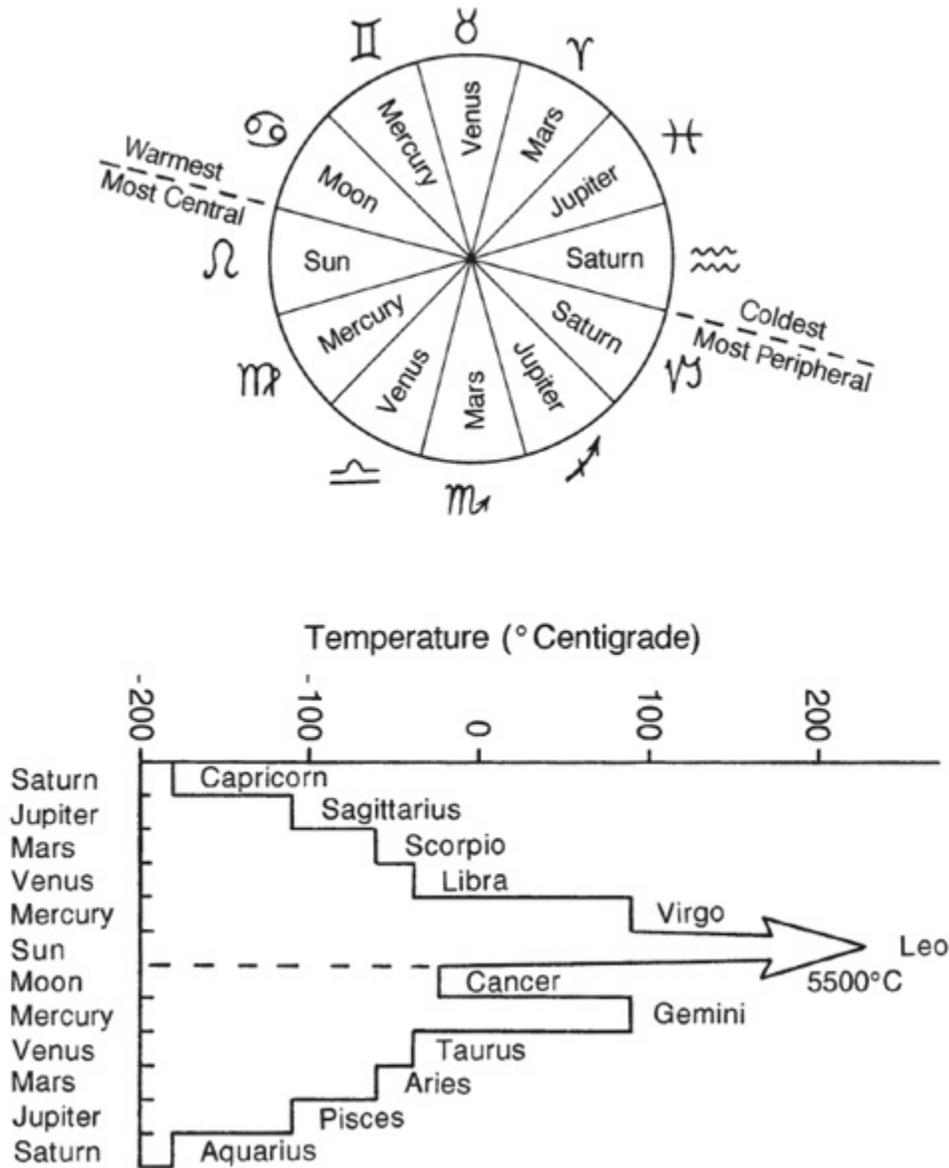


Figure 1.7. (Top) Ruling planets traditionally assigned to each astrological sign. The dashed line denotes the hot-to-cold axis of the implied thermal gradient. (Bottom) Average surface temperatures for the Sun, Moon, and five inner planets plotted to illustrate this encoded gradient. The value plotted for Venus is its cloud-level temperature.

Interestingly, measurements of the intensity of microwave background radiation coming from deep space have revealed precisely this kind of temperature gradient extending uniformly across the heavens, with the hottest microwave temperature located near Leo and the coolest microwave temperature located near Aquarius. This is astounding, for it takes highly sophisticated electronic equipment and a very advanced knowledge of

science to be able to measure this radiation and determine its temperature variation.

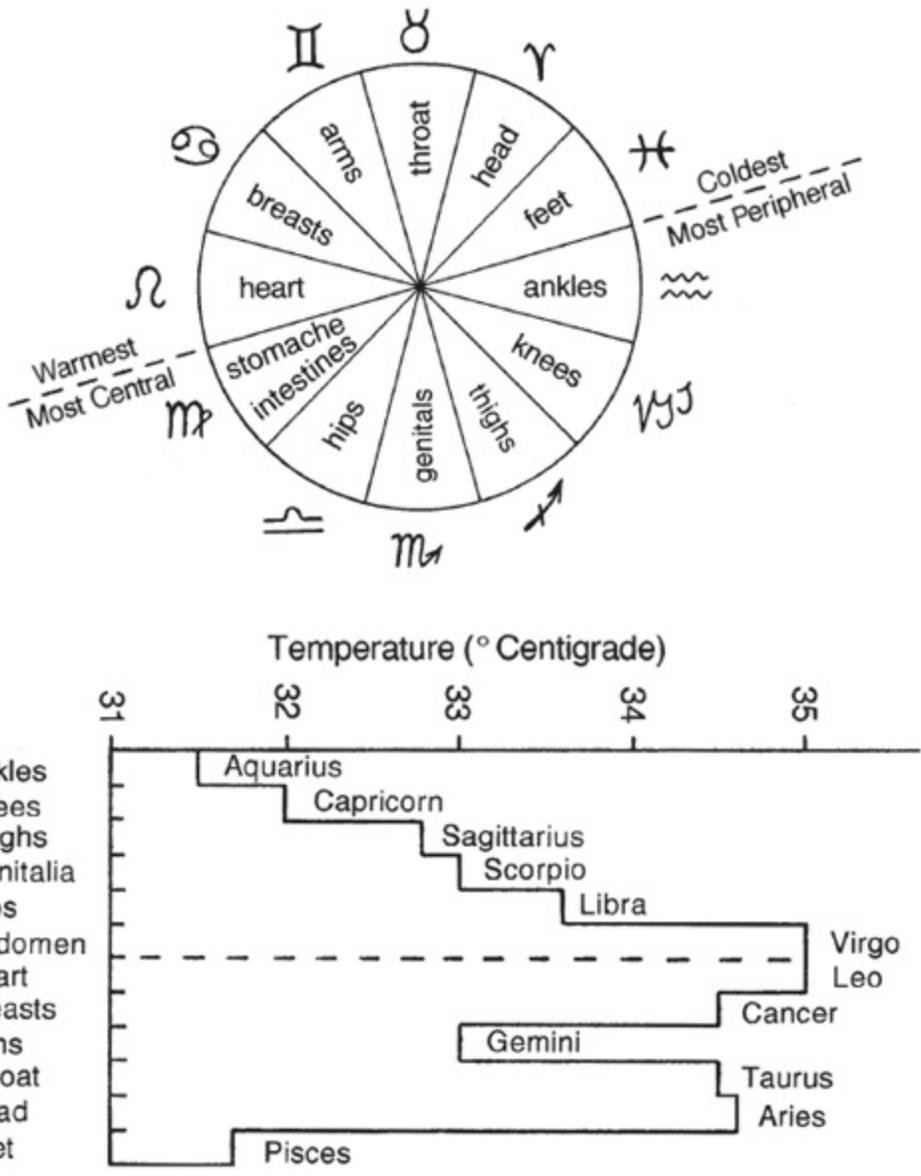


Figure 1.8. (Top) Human body parts traditionally assigned to each astrological sign. The dashed line denotes the orientation of the implied hot-to-cold axis. (Bottom) Skin temperatures for corresponding regions plotted to illustrate this thermal gradient. (From Olesen, *Thermal Physiology*, p. 35.)

The microwave background radiation was first discovered in 1955 by E. Le Roux. For his doctoral work at the École Normale Supérieure in Paris, he scanned the sky using a surplus World War II radar antenna and concluded that space was radiating microwave radiation having a

temperature of 3 ± 2 degrees above absolute zero (3 Kelvin).¹⁵ Unaware of Le Roux's measurements, two Bell Laboratories scientists, Arno Penzias and Robert Wilson, rediscovered the microwave background by accident nine years later. They had been observing the sky with a twenty-foot microwave antenna horn fitted with a liquid helium-cooled radiation detector to search for sources of microwave noise that might interfere with satellite communication. To their surprise, they found that the cosmos was emitting a microwave static hiss having a radiation temperature of 3.5 ± 1 Kelvin. In the following years, other groups made similar measurements using antennae sensitive to microwave wavelengths ranging from fifty centimeters down to half a millimeter. When all of these measurements were combined, it was found that the microwave background had a radiation spectrum similar to that coming from a perfect "blackbody" radiation emitter. Figure 1.9 shows this blackbody spectrum as measured by the Cosmic Background Explorer (COBE) satellite. According to these highly accurate measurements, the microwave background has a temperature of 2.73 ± 0.01 Kelvin.

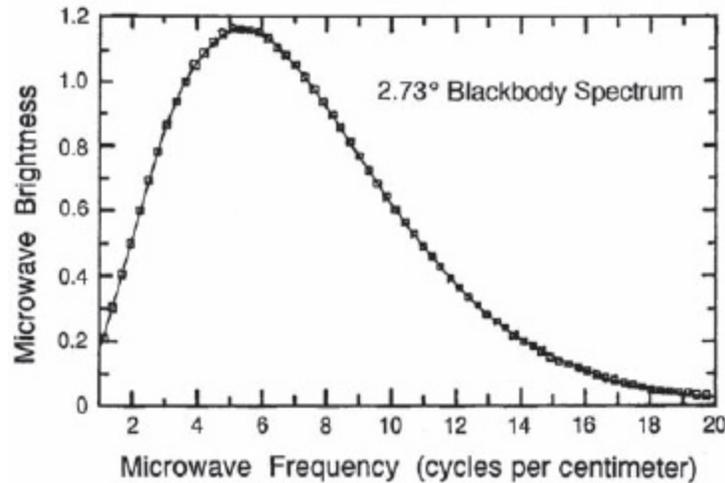


Figure 1.9. The blackbody spectrum of the cosmic microwave background radiation constructed from radiation intensity measurements made at various wavelengths by the COBE satellite. (After Mather et al., *Astrophysical Journal*, p. L39.)

What Is Blackbody Radiation?

Experiments show that a black object not only is an efficient absorber of radiation, but, if heated, also becomes an efficient emitter of radiation. As charged particles in the blackbody vibrate at various rates, they radiate electromagnetic waves having various frequencies. These are spread out over a spectrum that has a characteristic shape called a blackbody spectrum. Interestingly, the Sun, Moon, planets, and parts of the human body, symbols the zodiac uses to encode the microwave temperature variation, all emit radiation that has a blackbody spectrum.

Although big bang theorists initially claimed the cosmic microwave background to be relic radiation left over from the Big Bang, more recently this interpretation has been refuted. In 1990, the cosmologist Eric Lerner demonstrated that the spectrum of such fireball radiation, if it had existed, would have suffered absorption during its ten billion light-year journey through the intergalactic plasma medium,¹⁶ so its spectrum would have been severely distorted from that of an ideal blackbody. He concludes that this radiation must instead arise from a forest of plasma filaments, and that most of the microwave radiation we happen to see originates from plasma residing within about a hundred million light-years of our Galaxy. As explained in the preceding volume *Genesis of the Cosmos*, these filaments emit this radiation because they are being continually energized by an ambient flux of high-energy cosmic ray particles. These arise primarily from the tremendously energetic explosions that periodically take place at the centers of galaxies. Consequently, the ultimate energy source for the 2.7 Kelvin radiation is not a single explosion occurring in the universe's distant past, but rather a series of powerful ongoing explosions that occur in galaxies throughout the universe, *including our own.*^{*4}

The Leo–Aquarius axial temperature variation was too slight to be detected by the Bell Laboratories microwave receiver. In 1964, Penzias and Wilson could establish only to within an accuracy of ± 10 percent that the temperature was approximately the same from one part of the sky to the other. Later, however, as more-sensitive instruments were developed, this evasive temperature nonuniformity was finally detected. In 1977, a Berkeley University research team reported finding a slight temperature variation aligned with the Leo–Aquarius axis, the microwave background

being about 1.2 parts per thousand warmer in the direction of Leo and 1.2 parts per thousand cooler in the direction of Aquarius.¹⁷

More-accurate measurements of this nonuniformity were later made with the COBE satellite. Figure 1.10 presents a microwave temperature map synthesized from this data. Temperature is seen to decrease gradually from the hot to cold poles, just as the zodiac cipher specifies. It is almost as if a microwave “sun” was positioned in Leo and adding its warmth to the surrounding sea of microwave radiation. Thus, astrology’s assignment of the Sun to Leo was appropriate. Figures 1.11a and b show the locations of the hot and cold poles relative to the Leo and Aquarius constellations.

The Berkeley team concluded that this dipole temperature anisotropy (directional nonuniformity) is produced by the solar system’s motion through this microwave radiation field. Just as the pitch of a horn is higher when approaching an observer and lower when moving away, so too the temperature of the microwave field would be higher when viewed toward the “upwind” direction, the solar system’s forward direction of travel, and cooler when viewed from the opposite, downwind direction. Their microwave temperature measurements led them to conclude that the solar system is moving toward the Leo direction at a speed of about 365 kilometers per second (twelve times the speed at which the Earth orbits the Sun). This velocity is attributed both to the Sun’s orbital motion around the Galactic center and to the Galaxy’s bulk motion through space.

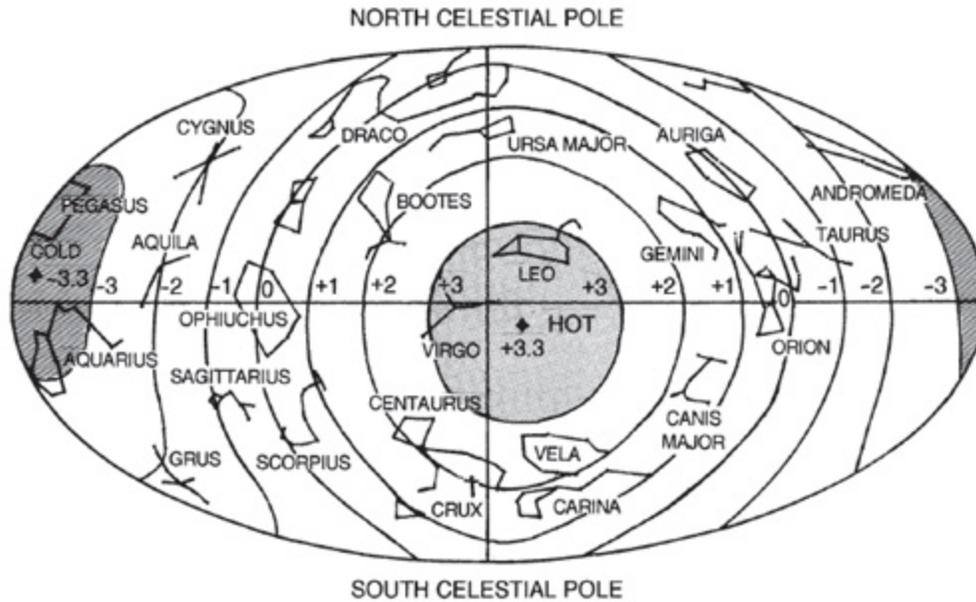


Figure 1.10. A sky map showing how the temperature of the cosmic microwave background varies with direction. Contours of one thousandth of a degree Kelvin are plotted on the celestial sphere. (Based on a map supplied by the COBE project team reproduced courtesy of NASA.)

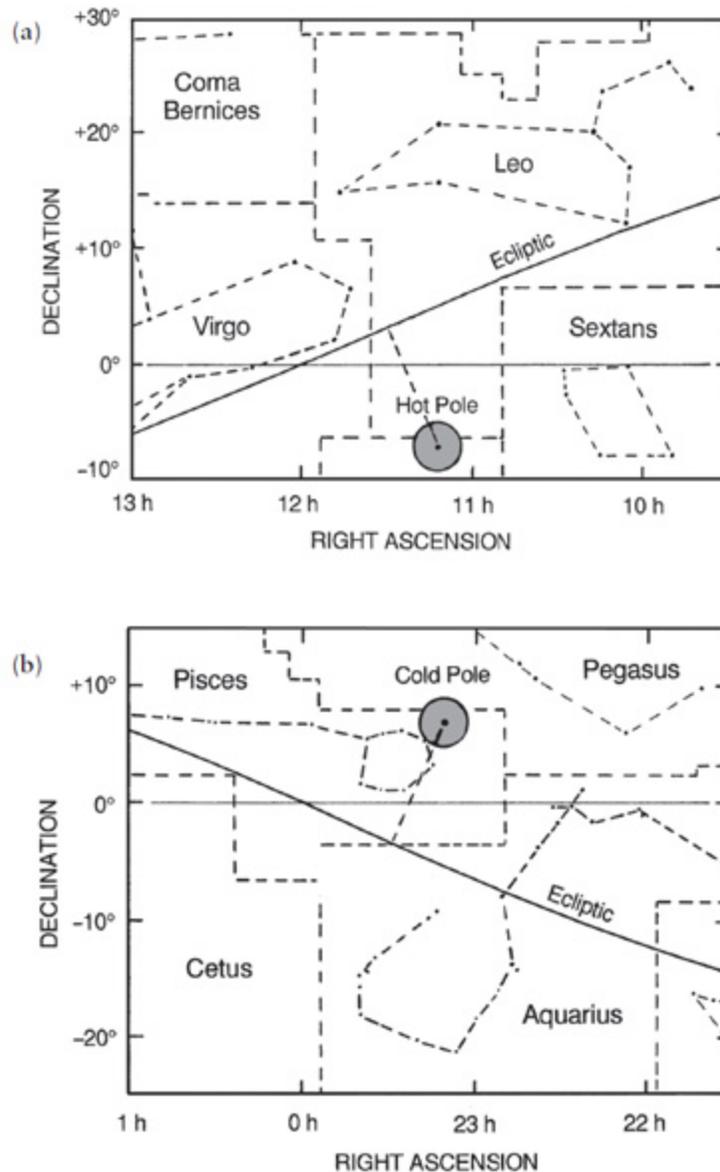


Figure 1.11. (a) A sky map of the Leo–Virgo region; the circle marks the direction in which the 2.7 Kelvin microwave radiation is warmest. (b) A sky map of the Aquarius–Pisces region; the circle marks the direction in which this microwave radiation is coolest.

It is quite astounding to find the zodiac describing this elusive astrophysical phenomenon, for it takes highly sophisticated electronic equipment to detect this microwave radiation and even more advanced technology to sense its ever so slight Leo–Aquarius temperature variation. The Berkeley group made its measurements by building a highly sensitive microwave detector and flying it aboard a U-2 jet aircraft. Apparently these measurements cannot be conducted at ground level, because variations in

the amount of water vapor in the Earth's atmosphere cause fluctuations in the received microwave signals that interfere with the delicate temperature determinations. Even at mountaintop altitudes, fluctuations of twenty thousandths of a degree Kelvin are common, sufficient to completely mask the dipole effect. Scientists have found that these measurements can be made only in the stratosphere over fourteen kilometers above the Earth's surface, where water vapor becomes frozen out of the atmosphere and no longer causes problems. Also, at such high altitudes the amount of oxygen through which the signal must pass is considerably reduced, thus curtailing interference from oxygen microwave emission.

Besides requiring sophisticated microwave detection equipment and a means for observing at high altitudes over extended periods of time, the instrument package that was used had to be carefully designed. Dual horn-shaped microwave antennae had to be used to simultaneously compare the intensity of the microwave radiation coming from two different regions of the sky. To eliminate receiver noise from the data, they had to design their system so that the antennae shared the same microwave receiver. This was accomplished by designing a special alternator that would switch the receiver back and forth between the two antenna horns one hundred times per second. Also, the apparatus had to be designed so that once every minute the antennae horns could be interchanged through a 180-degree rotation. In this way, differences between the abilities of the two horns to collect microwave signals could be minimized. Furthermore, the entire apparatus had to be carefully temperature regulated, shielded against radio-frequency interference, and isolated from aircraft vibration. [18](#)

The COBE satellite, which was launched into space in 1989 to provide us with more accurate data about the dipole anisotropy, is an even more sophisticated piece of measuring apparatus. Clearly, for the authors of the zodiac to have had a knowledge of the Leo–Aquarius temperature dipole, that is, of the millidegree anisotropy in the distribution of cosmic microwave radiation intensity in space, it would have been necessary for them to have achieved a technology at least comparable to that available to us in the mid-1970s. More important, they would have had to have achieved the ability for high-altitude stratospheric flight or possibly even space-based

observation. In consideration of this, one begins to wonder whether the knowledge encoded in astrology really originated on this planet.

Commenting about the possibility of contact between ancient civilizations and a technologically advanced extraterrestrial civilization, the astronomer Carl Sagan writes:

There is only one category of legend that would be convincing: When information is contained in the legend that could not possibly have been generated by the civilization that created the legend—if, for example, a number transmitted from thousands of years ago as holy turns out to be the nuclear fine structure constant. This would be a case worthy of some considerable attention.^{[19](#)}

Applying this criterion to astrology, perhaps the ciphered transmission of the Leo–Aquarius microwave dipole orientation, should give us cause to regard stellar mythology as evidence of such a past contact. This key direction in the heavens certainly would be an ideal benchmark for conversation, one that could be easily designated with zodiac constellations. However, as we shall discover in the next chapter, there may be another reason why this microwave radiation field was singled out as a topic for discussion: It seems that the authors of the zodiac, whoever they were, were trying to call our attention to a deadly cosmic ray phenomenon.

TWO

THE GALACTIC CONNECTION



The Galactic Center Indicators

Of the hundreds of billions of stars that make up our Galaxy, those orbiting closest to its center congregate into a dense spherical mass called the nuclear bulge. Farther out, stars orbiting the Galactic center congregate into a number of gaseous, star-studded spiral arms that extend tens of thousands of light-years outward from the nuclear bulge along its equatorial plane. From a great distance, our galactic homeland would look like an immense glittering pinwheel, not unlike the other spiral galaxies that are scattered through the heavens.

Our solar system is situated about 23,000 light-years from the Galactic center at the fringe of a spiral arm.^{*5} On a clear night the stars forming the Galaxy's spiral disk may be discerned stretching across the heavens as a faintly luminous band of light known as the Milky Way. The Milky Way cuts across the plane of the ecliptic at an angle of 62 degrees, the ecliptic being the plane that defines the orbit of the Earth and planets around the Sun (see figure 2.1). Although the outline of the Galaxy's spiral arms is visible to the naked eye, the Galactic center itself is hidden from view. Even with the aid of optical telescopes, it cannot be seen directly due to the dense clouds of cosmic dust that concentrate along the Galaxy's equatorial plane. Nevertheless, this central location was apparently known to the authors of the zodiac. Of the twelve astrological sign glyphs (♈ ♉ ♊ ♋ ♌ ♍ ♎ ♏ ♐ ♑ ♒ ♓), the glyphs for Scorpio and Sagittarius (♏ and ♐) are the only ones that incorporate arrows, and they are adjacent in

the sequence. When rearranged to reflect the way these constellations actually appear in the sky, $\rightarrow \text{♏}$, the two pointers, Sagittarius's arrow and Scorpio's stinger, are seen to face one another as if indicating a subecliptic sky position in between (see figures 2.2 and 2.3). In fact, they appear to intentionally point out the location of the Galactic center!

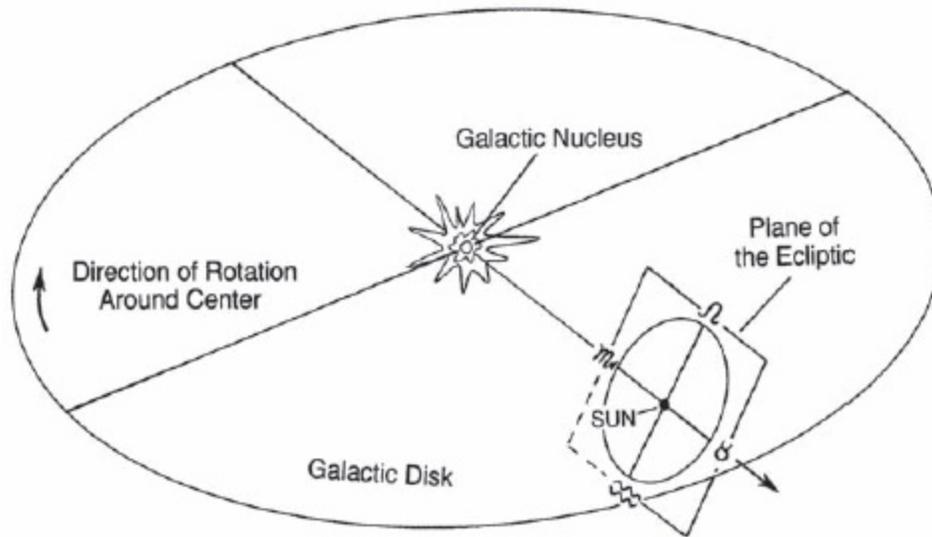


Figure 2.1. The solar system's orientation relative to the Galactic center. It takes us about two hundred million years to make one complete circuit of the Galaxy. The symbols indicate the directions of the zodiac's fixed signs: Taurus (♈), Leo (♌), Scorpio (♏), and Aquarius (♒).

The orange-colored star Gamma Sagittarii (γ Sgr) is unique in that of all the constellation stars, it comes closest to the Galactic center location. It is situated just 4.6 degrees to the east. Quite appropriately, the ancient artisans of the constellation chose this star to represent the tip of the Archer's arrow. It was known to the Arabs as Al Nasal, "the point" or "the head of the arrow." The shaft of Sagittarius's arrow extends back to Delta Sagittarii (δ Sgr), while Mu, Lambda, Delta, and Epsilon Sagittarii (μ , λ , δ , and ϵ) outline his bow.

The star representing the foot of Ophiuchus, the Serpent Bearer, to the west of the Galactic center, appears as the next closest star to the Galactic center. This is followed in proximity by G-Scorpii, Lambda Scorpii (λ Sco), and Upsilon Scorpii (υ Sco), which trace out the very end of Scorpio's tail 7 to 8 degrees to the south. On Arabian star charts, Lambda Scorpii and Upsilon Scorpii are named Shaula and Lesath, both of which mean "the

Sting.” When lines are added to connect these three tail stars with the Galactic center, Scorpius takes on the shape of an upward arching arrow, similar to that depicted in Scorpio’s glyph.^{*6} Viewed in this manner, the Galactic center now appears as Scorpio’s true stinger. Since the Galactic center can at times release lethal outbursts of cosmic ray particles, such deadly symbolism is quite appropriate.

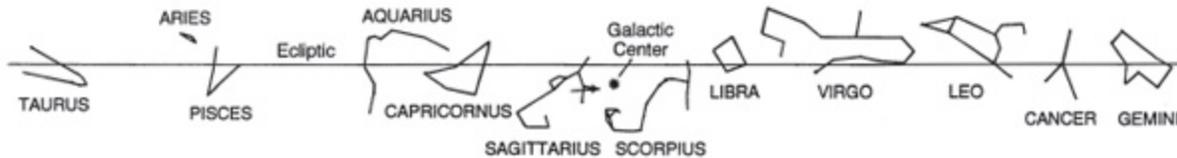


Figure 2.2. The positions of the zodiac signs relative to the ecliptic.

To fully appreciate the significance of these arrow indicators we must consider them in the context of astrology’s encoded creation physics. When the zodiac signs are arranged into their decoded order to convey their metaphysics of matter-energy creation, the signs of Scorpio and Sagittarius are found to fall midway through this sequence (see figure 1.5b). In particular, they fall at a point in this series where the initially tiny energy pulse has grown to the point that it has surpassed a critical threshold and is irrevocably on its way to spawn a mature subatomic particle (see the box in chapter 1 on pages 13 and 14). Consequently, Scorpio and Sagittarius fall exactly at the point where this sequence describes the first emergence of matter into physical manifestation. Because Sagittarius expresses a polemic theme, we are led to conclude that this matter-creation event occurs in an energetic manner. Moreover, since both of these signs display pointers directed at the Galactic center, we may conclude that the zodiac is intentionally designating this central location as the principal region of matter-energy creation in the Galaxy. In fact, this is what modern astronomers have discovered after many years of arduous research and observation using highly sophisticated telescope equipment.

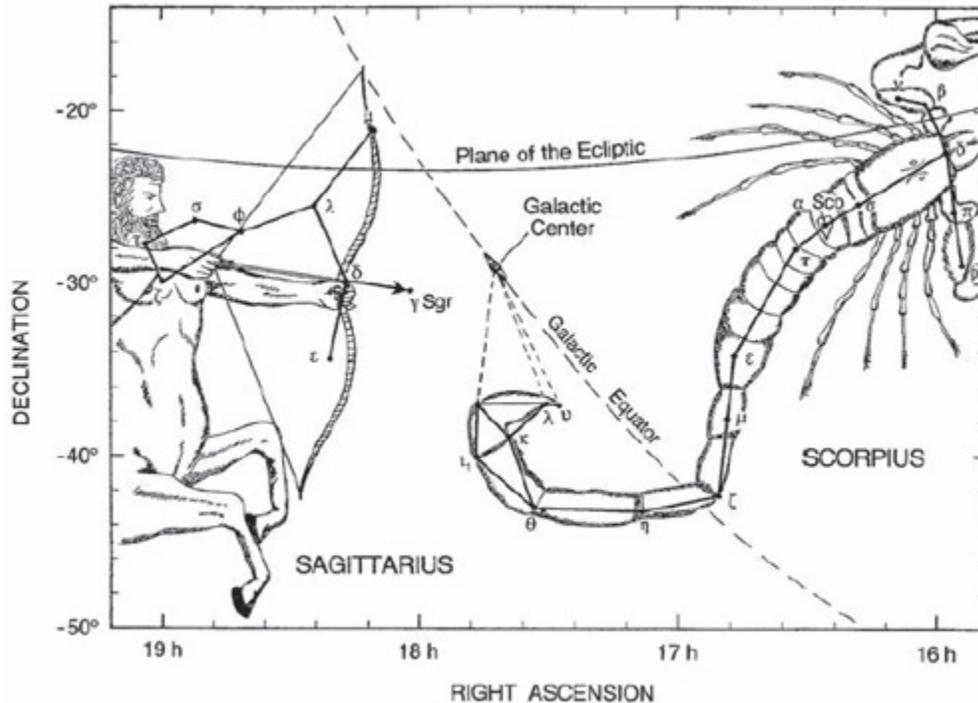


Figure 2.3. The constellations Scorpius and Sagittarius plotted in celestial coordinates.

As the constellations are displayed in the sky, Sagittarius appears to be shooting his arrow toward Scorpius. Indeed, ancient Greek mythology tells us he is taking aim at the Heart of the Scorpion, Alpha Scorpius (α Sco), also named Antares. However, if we project a trajectory in the direction that Sagittarius is presently aiming his arrow, by drawing a line from Delta Sagittarii to Gamma Sagittarii, we find that the arrow's path misses the Scorpion's Heart by about 5 degrees of galactic longitude and the Galactic center by 2.5 degrees of longitude (see figure 2.4).^{[*7](#)}

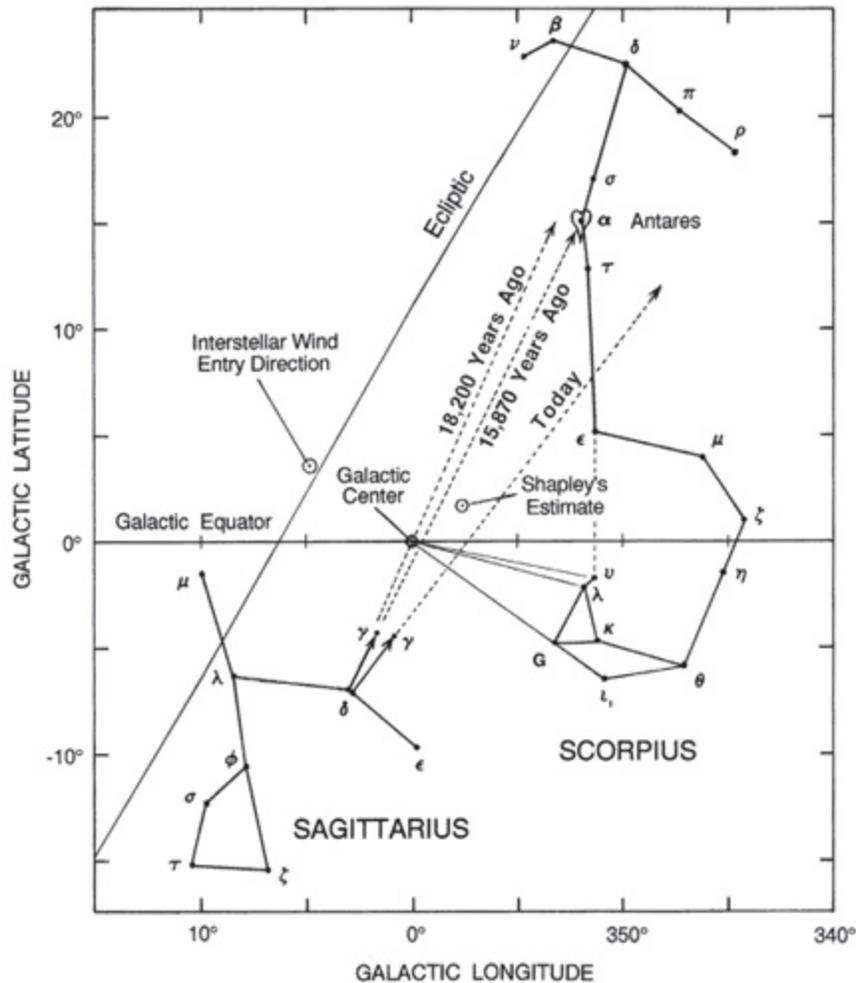


Figure 2.4. A map showing the constellations of Scorpius and Sagittarius as they would have appeared 15,870 years ago. Sightings are plotted for the Archer's arrow for various dates. Shapley's Galactic center position estimate is shown for comparison. Note that this map is plotted in galactic coordinates rather than celestial coordinates to represent the constellations with the least amount of cartographic distortion.

Nevertheless, there was a time in the past when Sagittarius aimed this shaft exactly on target. The pointer star Gamma Sagittarii happens to have one of the highest proper motions of all the stars in the Sagittarius constellation. Over the millennia, its sky position has been moving to the right toward lower galactic longitudes. The arrow's tail moves in a similar direction, but more slowly. As a result, the arrow has been gradually tipping away from its target. Projecting the arrow's position back in time, we find the Archer gradually raising his aim and firing dead center on the Scorpion's Heart around 15,870±150 years ago (or about 13,865 B.C.E.).

When following this flight path, the arrow deviates from the Galactic center by just 0.35° galactic longitude, an angular distance spanning about 70 percent of a full moon diameter! Sagittarius' arrow indicator would have pointed directly at the Galactic center at an earlier time around 18,200 years ago. However, then the trajectory would have passed about one degree of arc to the north of Scorpio's Heart. So, to be true to the myth, we must adopt the flight path of 15,870 years ago as the intended sighting.

References may be found to the Scorpius constellation dating back to as early as 5000 B.C.E., and Sagittarius, which in India was represented in the form of a horse, was mentioned as early as 3000 B.C.E. However, the arrow trajectory discussed above suggests an even earlier origin for the zodiac, one that predates recorded history to a time before the end of the last ice age!

Such a precise indication of the Galactic center's location is quite astounding. It is certainly not what we would usually attribute to the abilities of Stone Age man, for, as we noted earlier, the Galactic center region is heavily obscured by interstellar dust and therefore is not directly visible with optical telescopes. The first modern estimate of the Galactic center's position was made in 1917 by Harlow Shapley. Working with the giant sixty-inch telescope at Mount Wilson Observatory, he determined the distances to ninety-three globular star clusters, dense ball-like clusters of stars scattered uniformly around our Galaxy. Knowing the position and distance of each cluster, he was able to make a three-dimensional map of their distribution, and from this he was able to determine the distribution's center point. He then assumed that this central point lay close to the Galaxy's center. Using this indirect method, he was off the mark by 3.3 degrees of arc. However, the ancient Sagittarius constellation indicates the Galactic center location with an accuracy eight times better than Shapley's estimate. A determination of the Galactic center position more accurate than this had to await the construction of sophisticated radio telescopes!

Ancient Knowledge of the Galactic Plane's Location

The design of Scorpius also suggests that these ancient constellation artisans knew the precise orientation of the galactic plane. The Scorpion's thorax, formed by the stars Sigma, Alpha, Tau, and Epsilon Scorpii (σ , α , τ , and ϵ Sco), 15,870 years ago was oriented almost exactly perpendicular to the galactic plane. At that time, a sighting line drawn from Epsilon Scorpii (ϵ Sco) to the tip of the stinger, Upsilon Scorpii (υ Sco), would have been off normal by just four thousandths of a degree! Epsilon Scorpii has the highest proper motion of all stars in the Scorpius and Sagittarius constellations, so it could very well have been intended as a sighting star, with Upsilon Scorpii as its marker point.

The zodiac's moving-arrow pointer in Sagittarius is quite a clever device. Not only does it indicate the approximate location of the Galactic center, but it also serves as a chronometer that designates an important date in the past. Unlike the Pioneer 10 space plaque message, which incorporates a pulsar chronometer solely for the purpose of indicating the date when its message was sent out from Earth, the zodiac cipher indicates a date of far greater significance. As we shall discover shortly, the 13,865 B.C.E. trajectory indicates the date of a Galactic center energy-creation event, one that had a catastrophic effect on our planet. Moreover, studies of Antarctic ice indicate that around the time of this date, unusually large quantities of acid-bearing dust were injected into the Earth's atmosphere, resulting in an abrupt change in global climate; see "Discovery of the 15,800-years-B.P. Cosmic Event" in chapter 4.

Was the Galactic Center Visible in Ancient Times?

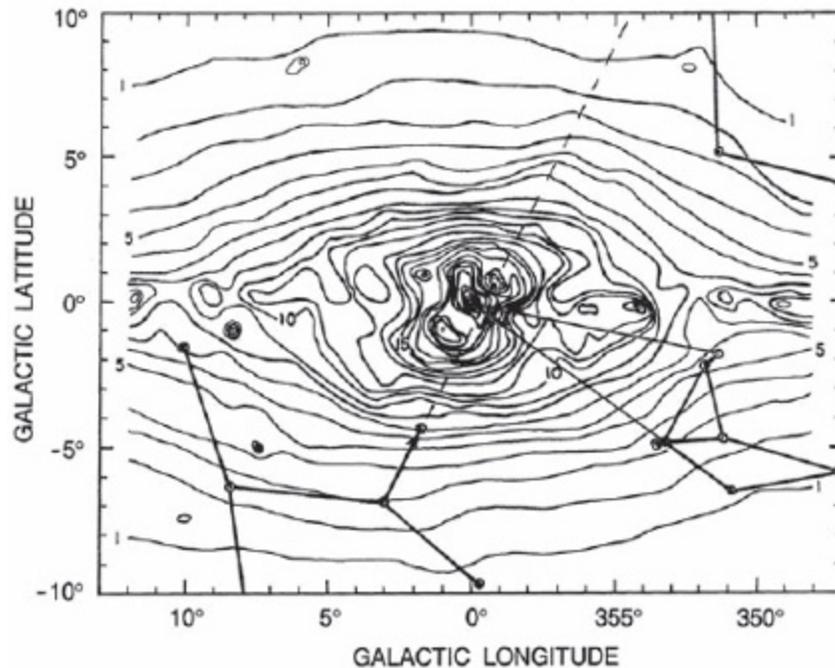
An observer gazing at the Milky Way in the general direction of the Galactic center would not discern any particularly bright object that might lead him to think he was viewing the center of the Galaxy, since the intervening dust attenuates light from the distant center by a billion-fold. Instead, all that is visible is a diffuse band of starlight that appears particularly bright over a stretch of 80 degrees of galactic longitude.



Figure 2.5. A 50° by 50° view of the Sagittarius–Scorpius region of the sky showing the galactic bulge of the Milky Way with the galactic plane oriented diagonally. The Galactic center location is marked by a circle. The dashed line indicates the flight of the arrow in 13,865 B.C.E.

By making a long exposure camera photograph of the Scorpius–Sagittarius region, such as that shown in figure 2.5, one can begin to see that there is something special about this part of the sky. Such a photograph offers a tremendous improvement over what would be seen with the naked eye, for even without the aid of a telescope, a camera can record stars a thousand times fainter than the faintest stars visible to the human eye. As seen here, the Galaxy’s 12,000-light-year-diameter central bulge appears as a roughly elliptical region of illumination. Still, the Galactic center evades detection in such photographs. It lurks in a relatively dark region of the sky, heavily obscured by galactic plane dust and particularly by the nearby dust lane called the Great Rift. As recently as 1963, the astronomer Walter Baade attempted to photograph the Galactic center using the two-hundred-inch Mount Palomar reflector telescope. Although he used red sensitive photographic plates and allowed exposure times of up to seven hours, the center remained hidden. How appropriate that this location should be

marked by a scorpion, a creature that normally eludes detection by hiding under the cover of darkness.



*Figure 2.6. A contour map of the Galaxy's nuclear bulge, synthesized from observations made in the near infrared at a wavelength of 2.4 microns (after Matsumoto et al., *The Galactic Center*, p. 49). The positions of the constellations are shown as they would have appeared 15,870 years ago.*

Using advanced modern equipment, such as radio and infrared telescopes, astronomers eventually succeeded in locating the Galactic center. Yet our ancient predecessors also knew its location by some means. Were they sufficiently advanced to construct detection devices like those used by modern astronomers? Or was the core of our Galaxy much brighter then because it was actively erupting?

The accuracy with which Sagittarius targets the Galactic center may be appreciated by viewing the infrared brightness contour map shown in figure 2.6. Because infrared radiation is able to penetrate interstellar dust relatively easily, the region of peak brightness marking the position of the Galactic center is clearly visible. It is evident to the left of the arrow trajectory. However, making such a map requires the most advanced technology, a special telescope, a semiconductor-type infrared detector cooled in liquid nitrogen, sophisticated signal processing electronics, and a

vehicle to loft the entire assembly into the upper stratosphere, where atmospheric infrared absorption is minimal.

The history of astronomy shows that science has progressed through a long struggle to reach its present understanding that we live in a galaxy of stars whose center lies far from our solar system. This realization makes us appreciate all the more the zodiac's depiction of the Galactic center location. The notion that the Milky Way is made up of a mass of stars was suggested for the first time around 400 B.C.E. by the ancient Greek philosopher Democritus. However, his theory was not confirmed by observation until 1610, when Galileo made observations with the aid of his famous one-inch telescope. At that time, the Earth was believed to lie at the center of the universe and the universe was identified with the surrounding stars, so there was no incentive to search for a "center" as a distinct location in the sky. Although Copernicus showed in 1543 that the Sun, not the Earth, lay at the center of the solar system, the remaining misconception that the Sun lay at the center of the universe was not discarded until 1917, when Harlow Shapley discovered that our Sun is just one of many stars orbiting a central location lying thousands of light-years away. As mentioned earlier, this "modern Copernicus" succeeded in estimating the location of the Galaxy's center to within several degrees of its actual position by observing the locations of globular star clusters. Seven years later, the American astronomer Edwin Hubble delivered the final blow to the old Earth-centered cosmology when he showed that spiral nebulae, normally visible only through a telescope, are not members of our galaxy as previously thought, but are entire galaxies of stars located millions of light-years away. Astronomers then realized that the Milky Way was just one of many galaxies scattered throughout a vast universe.

The Galactic center is best detected by observing in the radio region of the electromagnetic spectrum. It is an intense emitter of radio waves, and this emission, like infrared emission, is able to penetrate the intervening interstellar dust without suffering much. Thus, with the proper radio telescope apparatus, its location may be easily determined. Bell Laboratories engineer Karl Jansky was the first to discover its radio emission. He detected it in 1931 while using a shortwave radio to search the sky for sources of radio static. He found that the Galactic center is the

brightest radio source in the sky. However, because his antenna was relatively small, his image of it was not able to show much detail.

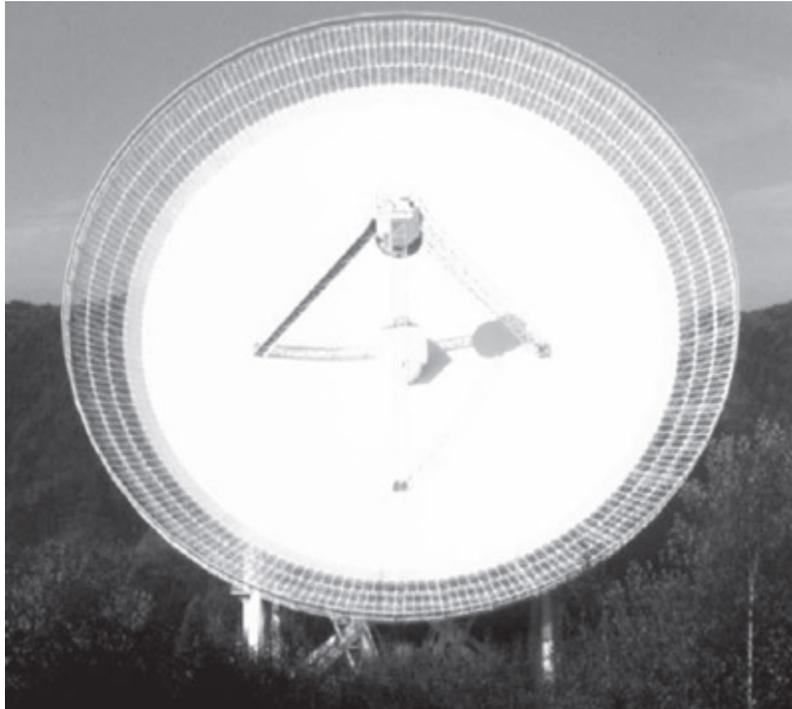


Figure 2.7. The 100-meter radio telescope at Effelsburg, West Germany. (Photo by the author)

Eventually, as radio astronomy techniques improved and larger radio telescope dish antennae were built, such as the one shown in figure 2.7, more-accurate radio maps of the Galactic center became available. Figure 2.8 shows one such radio intensity contour map made in 1966 using a 120-foot-diameter dish antenna. The high-intensity peak, designated on the map as Sagittarius A (Sgr A), marks the location of the Galactic center to within 0.04 degrees of arc. Thus, the zodiac's accuracy in locating the Galactic center's sky position was surpassed only as recently as the mid-1960s following the development of highly sophisticated electronic equipment.

To make a more detailed radio image, one must observe with an antenna dish of much greater size. Since it is impractical to construct very large dishes, astronomers have solved the problem by using a technique called *radio interferometry*. This involves observing a given radio source simultaneously with an array of adjacent antennae and using a computer to combine the signals from each antenna to produce a single radio map of very high resolution. The Very Large Array (VLA) radio telescope

interferometer located in Socorro, New Mexico (figure 2.9), was specially designed for this purpose. It consists of 27 steer-able dish antennae, each about 10 stories high, arranged in three lines to form a Y-shaped array. When the antennae are at their maximum spacing, the array has an image-resolving power equivalent to a radio dish 27 kilometers in diameter. Scientists have used the VLA to produce the radio maps shown in figure 2.10, which present a considerably magnified view of Sagittarius A. The very compact, highly luminous unresolved radio source designated as Sagittarius A-star (Sgr A*) lies at the Galaxy's exact center. The spiral arms of radio-emitting gas seen to converge near this spot are believed to be material that Sgr A* ejected some time in the last ten thousand to twenty thousand years.¹

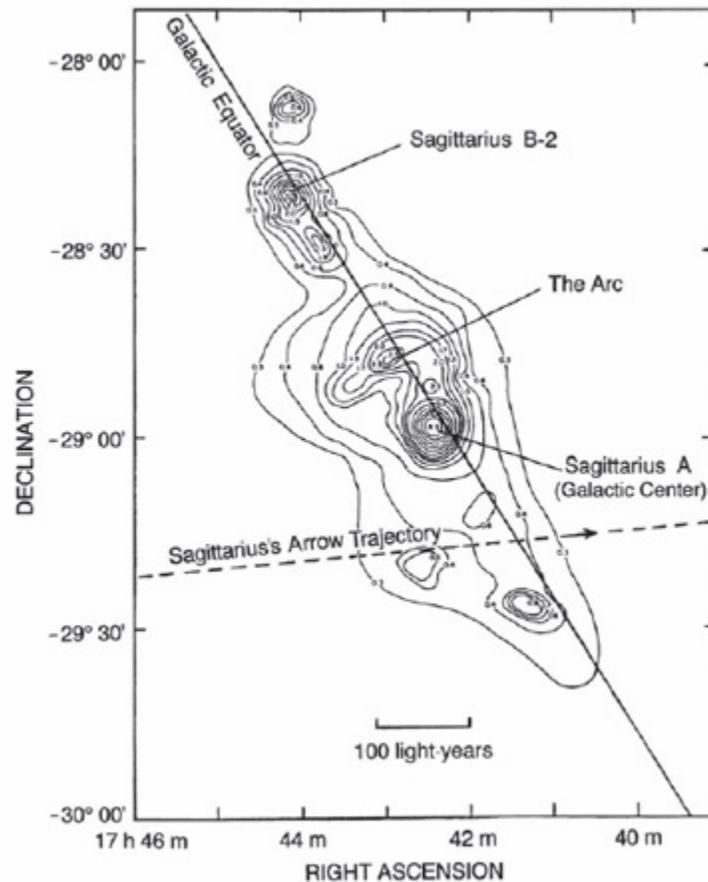


Figure 2.8. A radio map of the Galactic center region. The contours denote radio intensity at a radio wavelength of 3.75 centimeters. (After Downes and Maxwell, *Astrophysical Journal*, p. 657.)



Figure 2.9. The Very Large Array (VLA) radio telescope at Socorro, New Mexico. (Photo by the author)

Astronomers are convinced that Sgr A* is a single body. It is estimated to be about a million times as massive as the Sun, making it the most massive celestial object in the Galaxy. By comparison, the most massive known gaseous stars rarely exceed 80 solar masses. The diameter of Sgr A* is presently unknown, although, as an upper limit, it has been determined to be smaller than the diameter of Jupiter's orbit.² This relatively tiny region generates a fierce wind of cosmic ray electrons and protons rushing outward at very close to the speed of light. On their way, these particles emit electromagnetic radiation ranging from low-frequency radio emission to high-energy gamma ray emission. Nearby gas clouds warmed by this energetic blast emit infrared radiation at a rate equivalent to ten million to thirty million of our Suns.

Some astronomers have suggested that Sgr A* is a black hole, a gravitational singularity that voraciously gobbles up surrounding gas. This gas, they say, would radiate profuse quantities of electromagnetic radiation just before irrevocably disappearing past the black hole's dark event horizon, the boundary past which even light cannot escape. However, there are problems with this view. First, all evidence to date suggests that gas is not being drawn toward the Galactic center but is being pushed away. Not only are outlying gas clouds moving away from this center, but also the

inner one light-year region is relatively devoid of gas and dust, presumably because the Galactic center's ferocious particle wind continually clears it away. Furthermore, if a black hole was gobbling up such large quantities of material over the billions of years of our Galaxy's existence, why then has the Milky Way not been entirely consumed?

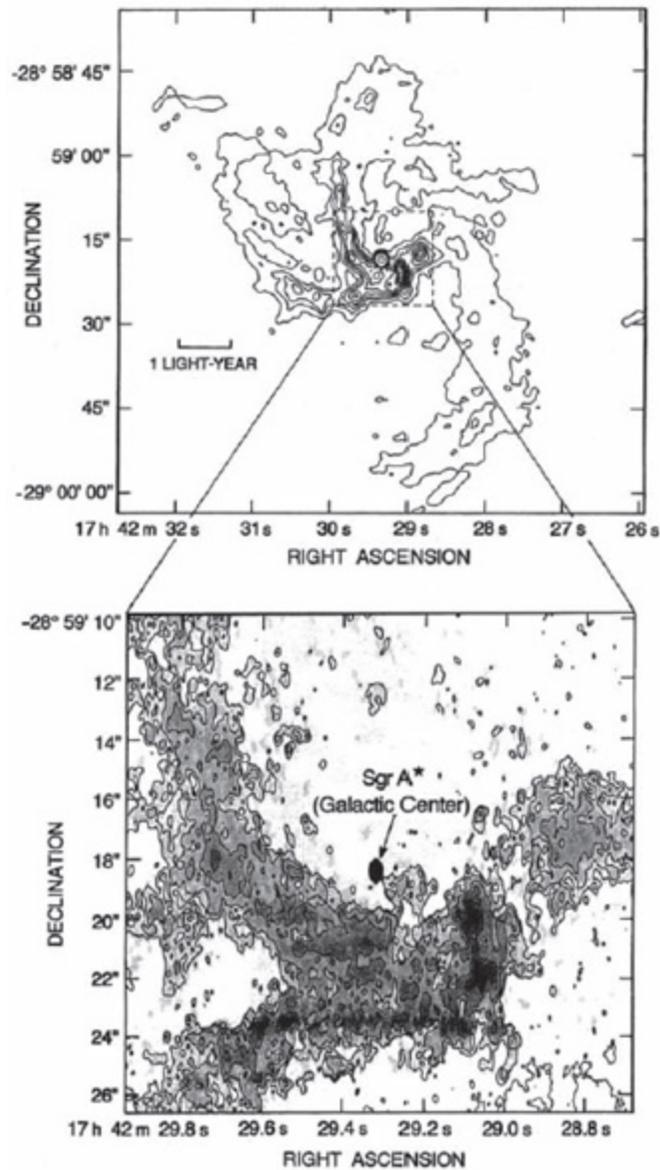


Figure 2.10. The central part of Sagittarius A mapped at a radio wavelength of 6 centimeters (top) and 2 centimeters (bottom). The peak marked as Sgr A* denotes the compact Galactic center radio source. (Reproduced courtesy of NRAO and Kwok-Yung Lo [Lo and Claussen, *Nature*, p. 648; Zhao et al., *Nature*, p. 48].)

The originators of the zodiac constellations viewed the Galactic center in a manner quite different from the way modern black hole enthusiasts view it. They did not portray the Heart of the Galaxy as a region of matter annihilation, but as one of matter and energy creation, a cosmic wellspring giving birth to all the matter in the Galaxy. However, such creation centers can at times erupt with such force as to affect worlds even at a galaxy's most distant perimeter. The zodiac cryptogram appears to tell of one such deadly outburst that issued from our own Galactic center. Let us proceed to decipher this portion of its message.

Cosmic Procreation

To unmask this part of the zodiac's message, we must look away from the Galactic center to an area far north of the ecliptic marked out by the constellations of Aquila (the Eagle) and Sagitta (the Arrow); see figure 2.11. Although Aquila and Sagitta are not members of the traditional twelve astrological constellations, they are nevertheless intimately related to astrology's message of cosmic procreation.

According to ancient Greek mythology, Sagitta represents Cupid's Arrow. As in the Valentine tradition, Cupid is known for inducing his victims into highly amorous, procreative moods by shooting arrows through their hearts. Here, we are reminded of Sagittarius shooting his arrow through the heart of the Scorpion. Like Cupid's victims, Scorpio is traditionally characterized as being procreative. It is the one sign of the zodiac associated with the generative organs and with sex.

As noted earlier, astrologers sometimes depict Scorpio as an eagle, the symbol by which it is represented in the Sphinx cryptographic key. The eagle form traditionally represents Scorpio's higher constructive creative aspect, whereas the scorpion form traditionally represents the sign's destructive side. Consequently, the constellations of Scorpius and Aquila may be seen as having a close relation. Moreover, the story about Cupid and Sagitta suggests that the constellations of Sagittarius and Sagitta also have a close connection. Just as Cupid shoots the arrow through his victim and transforms him or her into a procreative mood, so too Sagittarius shoots his arrow through the heart of the Scorpion transforming Scorpio into her creative eagle form, represented as Aquila. Aquila is pictured in the sky

clutching Sagitta in an upraised claw, either being dragged forward by Sagitta or gliding with the arrow. Aquila's inverted posture is reminiscent of the position assumed by female eagles during mating, again bringing up the theme of cosmic procreation.

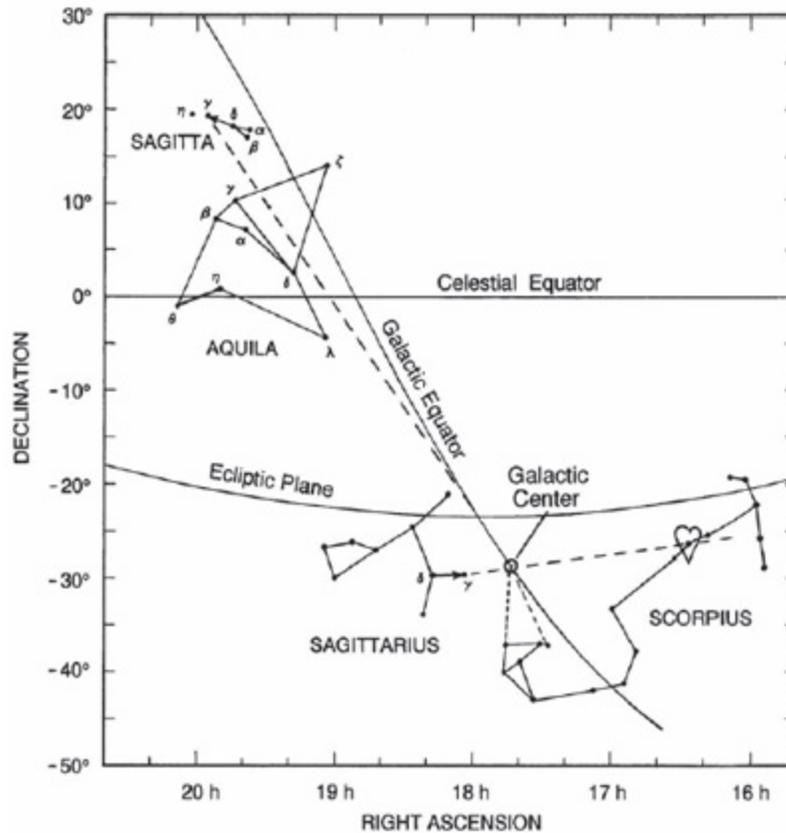


Figure 2.11. A map showing the locations of Sagitta and Aquila.

The arrow clutched by Aquila (γ - δ Sagittae) may be assumed to be the same arrow shot from the Archer's bow (γ - δ Sagittarii). The two arrows have approximately the same apparent length; one spans 2.9 degrees in the sky and the other 2.6 degrees. Also, since ancient times the point and tail stars in either constellation are similarly designated by the Greek letters gamma (γ) and delta (δ). It also happens that these two constellations are the only ones in the heavens that specifically depict arrows.

When these various constellation symbols are viewed in the context of astrology's encoded creation physics, the drama they depict begins to make sense. As mentioned earlier, Scorpio and Sagittarius in the zodiac cryptogram depict the energetic creation of matter at the Galactic center,

this creation center being represented by the Scorpius constellation and, in particular, by Scorpio's Heart toward which Sagittarius directs his arrow indicator. Consequently, the transformation of the Scorpion into the soaring eagle, Aquila, mediated by the Archer's shot through the Galactic center, suggests that creative energy stored up in the Galactic center is suddenly released and outwardly expressed.

The tarot symbolism provides additional support for the interpretation that the shooting of the Scorpion depicts cosmogenic matter creation. As explained in *Genesis of the Cosmos*, the first eleven tarot arcana present a physics of creation identical to that found in astrology. In particular, arcanum 6 (figure 2.12), which occurs midway through this series, conveys a cosmology principle analogous to that presented by Sagittarius. In this arcanum, a young man tries to decide between one or the other of two alternative paths of marital partnership. In the context of the deciphered physics, the young man signifies the initial uniform state of the ether that existed before the emergence of matter, and the two matrimonial paths before him signify the imminent emergence of one or the other of two possible matter polarity states.³ The hovering Cupid-like spirit with bow and arrow, together with the procreative context of this arcanum, suggests a close relation to the pageant of spontaneous emergence of matter (ordered form) depicted by Scorpius and Sagittarius.

The Babylonian creation epic specifically associates the Scorpio and Sagittarius constellations with the theme of cosmic creation. In that story, the warrior hero Marduk ultimately brings about the creation of the universe by waging a vicious battle against Tiamat, the destructive mother goddess who portrays the chaotic ether. According to the mythologist L. W. King,⁴ the Babylonians identified the ecliptic constellations of Scorpio and Capricorn with this brood of monsters. Moreover, the Fourth Tablet of this creation epic describes the translation of Marduk's bow to heaven, where it was given the name Long-wood and Bow-star,⁵ possibly a reference to the constellation Sagittarius (the Archer).



Figure 2.12. Arcanum 6 of the tarot: “The Two Paths” or “The Lovers.”

The final battle between Marduk and Tiamat portrays yet another connection to Sagittarius and Scorpio. The myth holds that at the battle’s climax, Marduk calls up an evil wind that blows so fiercely that Tiamat is unable to close her gaping jaws. As the raging winds distend her body, he shoots an arrow through her open mouth. It penetrates her belly and strikes her heart, killing her. Immediately thereafter, Marduk brings the stars and planets into being. Marduk’s arrow shot through Tiamat’s heart parallels the ancient Greek myth which states that Sagittarius is taking aim at the Heart of the Scorpion. So, like Scorpio, Tiamat would represent the Galactic center, which, through a cosmic battle, brings matter into being.

Aquila plays a key role in the ancient Greek story about how Zeus created the universe.⁶ When Zeus was but a child, his mother, Rhea, hid him in a mountain cave in Crete to escape destruction at the hands of his father, Cronus, the tyrant who ruled the universe. Aquila is said to be the eagle that carried nectar to Zeus while he lay hidden in this cave. Later, when Zeus was fully grown and leading his brothers and sisters in a rebellion against the destructive giants, Aquila provided Zeus with

weapons. Ultimately, Zeus won this battle against the forces of chaos and established a kingdom of order—the physical universe. Thus, Aquila played an important role in facilitating the battle of physical creation.

Esoteric tradition ascribes a polemic, matter-creation connotation to the eagle metaphor. For example, the warrior hero Horus, the ancient Egyptian god of light and creator of order, sometimes took the form of an eagle, although he was usually represented as a falcon. The Osirian creation myth relates the story of how Horus defeats Set, god of disorder, and subsequently brings physical form into being. One ancient fresco even portrays him as a warrior holding a scorpion in his left hand. The Tarot also employs the eagle metaphor in a polemically creative capacity. It is used to symbolize the mature warrior-emperor (arcanum 4), who symbolizes the growing seminal energy fluctuation that vanquishes the uniform status quo of space to spawn matter.⁷

The transformation of the Scorpion into the soaring eagle—Aquila, mediated by the Archer's shot through the Galactic center—suggests that creative energy stored up in the Galactic center is released suddenly and thrown violently outward. The lethal connotations of the scorpion and the warrior eagle, the astrological designation of Scorpio as the zodiac's sign of death, the image of the arrow piercing the Scorpion's heart, all of these metaphors suggest that the act of matter and energy creation at the Galactic center can be extremely violent.

Astronomers have found that other galaxies also have massive energetic sources at their center, similar in many ways to the Sagittarius A* source in the Milky Way. It is known that at periodic intervals such galactic cores can become “active” and radiate energy many orders of magnitude more intense than during their intervening quiescent phase. This energy is emitted as highly energetic cosmic ray particles and as an intense outpouring of electromagnetic emissions of all kinds (radio waves, infrared rays, light, ultraviolet rays, X rays, and gamma rays). Just as Sagitta flies through the heavens from its Galactic “Heart” origin, so too in an exploding galaxy a barrage of particles and radiation flies outward from the galaxy's core. This energy wind, in turn, propels surrounding gas and dust radially outward at thousands of kilometers per second. Observational evidence suggests that such explosive eruptions are recurrent. Some astronomers believe that these

outbursts are part of an ongoing process in which matter and energy come into physical manifestation at galactic centers.

If astrology was intentionally created in prehistoric times to record the occurrence of a Galactic core explosion, this is indeed quite impressive. The notion that galactic cores periodically expel vast quantities of matter and energy entered modern astronomy for the first time during the twentieth century. Astronomers began to speculate on this subject following Edwin Hubble's demonstration that spiral nebulae are actually distant galaxies like our own, each made up of billions of stars. As early as 1928, the British astronomer Sir James Jeans wrote:

Each failure to explain the spiral arms makes it more and more difficult to resist a suspicion that the spiral nebulae are the seat of types of forces entirely unknown to us, forces which may possibly express novel and unsuspected metric properties of space. The type of conjecture which presents itself, somewhat insistently, is that the centers of the nebulae are of the nature of 'singular points' at which matter is poured into our universe from some other, and entirely extraneous spatial dimension, so that, to a denizen of our universe, they appear as points at which matter is being continually created.⁸

The idea that the centers of galaxies are periodically the site of unusual activity was put forth again thirty years later by the Soviet astrophysicist V. Ambartsumian.⁹ At the 1958 Solvay conference in Brussels, he presented the idea that galactic nuclei periodically eject large masses of matter that orbit the parent galaxy as embryonic satellite galaxies. He suggested that these birth events are quite violent, involving giant cosmic ray-producing explosions. Several years later the astrophysicist William McCrea¹⁰ and the cosmologists Fred Hoyle and J. Narlikar¹¹ proposed theories suggesting that the centers of galaxies serve as "embryos" or "pockets of creation" where matter is continuously produced and periodically spat out.

These galaxy core matter-energy creation theories present a cosmology quite different from the more publicized big bang theory, which suggests that all the matter in the universe arose all at once from a single explosion

in the past. Moreover, it is interesting that a large number of renowned twentieth-century cosmologists would independently reach conclusions about galactic center creation events similar to those proposed thousands of years ago.

During the 1960s astronomers began to accumulate a considerable amount of observational evidence pointing to the occurrence of explosive activity in active galactic nuclei.^{12, 13} They found that the core of an active galaxy can shine as bright as the galaxy itself, thereby masking the inner spiral arm features on telescope images. Such masking is seen in active spirals called Seyfert galaxies, named after their discoverer, Carl Seyfert. The core of Seyfert galaxy NGC 4051, for example, is about 100,000 times more luminous than our own Galactic core, as judged from radio intensity measurements. Astronomical surveys show that about one spiral galaxy out of every five to seven presently exhibits Seyfert-like characteristics.

Galaxies whose cores are undergoing even more energetic outbursts, resulting in the masking of all but the very outer fringes of their spiral arms, have been categorized as N-galaxies. When the core outburst is so intense that the spiral arms are entirely masked, the galaxy takes on a starlike appearance and is called a quasar or blazar. The cores of such quasi-stellar objects can become more than 100 to 1000 times as luminous as our entire Galaxy of 100 billion stars. In the case of quasar 3C 273 (figure 2.13), the core radiation is about 100 times brighter than the galaxy itself! Only when special image-processing techniques are used to mask the quasar's bright emission does the underlying galaxy become visible.¹⁴ However, with the superior optical resolution of the Hubble Space Telescope, it has become possible in some cases to resolve the surrounding galaxy, which is not seen in photos taken with ground-based telescopes. One example is the Sb-type spiral galaxy PG 0052+251, whose arms are clearly visible in figure 2.14. Its quasarlike core, which is seven times brighter than its surrounding arms, radiates 100 billion times as much energy as our Sun.

Astronomers have come to realize that galactic core explosions occur in all spiral galaxies, even in our own, and that the majority of galaxies that have a normal appearance with no sign of core activity are simply galaxies whose cores happen to be in their quiescent phase. The statistics suggest

that a galaxy core resides in this quiescent phase 80 to 85 percent of the time. It spends the other 15 to 20 percent of the time in an active state, with eruptive episodes lasting from hundreds to several *thousands* of years.

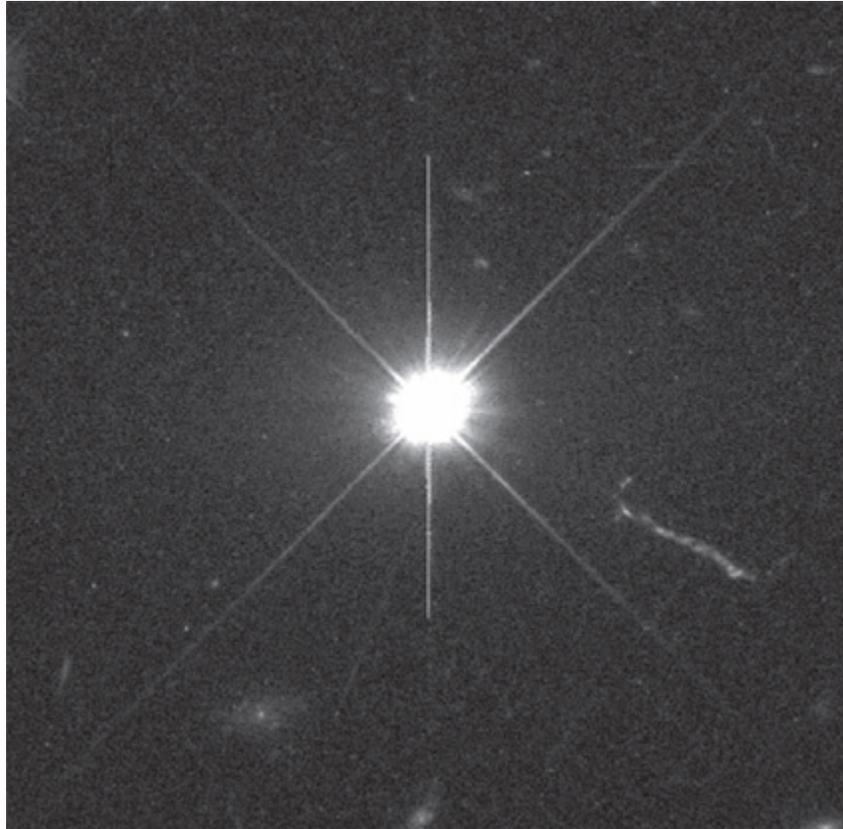


Figure 2.13. *Quasar 3C 273. This intensely bright galactic core is surrounded by a faint galactic disk. (Courtesy of J. Bahcall and NASA.)*

It has become fashionable for astronomers to speculate that these core objects are massive *black holes*, space-time singularities that spit out energy as they gobble up surrounding gas and dust. However, black hole models have difficulty accounting for highly luminous cores such as those in the quasar classification. Black holes simply would not be able to draw in matter fast enough to supply their vast outpouring of energy through matter-to-energy conversion. In addition, black hole theories have run into increasing difficulty as observations have begun to come in from the Hubble Space Telescope. For example, such theories fail to account for quasar images such as that shown in figure 2.14, where the surrounding galaxy has a relatively normal appearance and shows no indication that its

stars are supposedly being gravitationally disrupted and swallowed up.¹⁵ Moreover, the general relativity equations, which form the basis for considering the existence of black holes, have themselves run into problems. For example, computer simulations of these field equations have shown that they contain a fatal flaw in which collapsing masses can produce absurdly infinite solutions that lead to a massive breakdown of the geometrical space-time hypothesis.¹⁶



Figure 2.14. An Sb spiral galaxy with an active core designated as quasar PG 0052 +251. (Photo courtesy of J. Bahcall, S. Kirhakos, D. Schneider, and NASA, Astrophysical Journal, pp. 557–64.)

The physics of subquantum kinetics, the modern counterpart of the ancient physics encoded in the zodiac, avoids these difficulties, as it proposes that the energy outputs from galactic cores are being fueled by matter and energy *creation*, rather than matter annihilation.¹⁷, ¹⁸ It suggests that a galaxy's core is not a gravitational singularity, but rather a super massive, highly dense star. It might have a mass several hundred– to a millionfold that of the Sun and a density about a million times that of the

Sun, about like that of a white dwarf star. Subquantum kinetics also suggests that this “mother star” creates matter as well as energy at prodigious rates, in accordance with the continuous creation ideas of Jeans and McCrea. Although this galactic core star would have enormous gravitational forces pulling its mass inward, its gravitational collapse would be prevented by the tremendous outpouring of energy created spontaneously in its interior. The existence of this so-called genic energy is predicted by subquantum kinetics and supported by astronomical observation.^{19, 20} This new physics also predicts that this energy output could at times become unstable and cause this core star to explode.

It seems quite likely that the zodiac cryptogram was devised in an attempt to communicate to future generations that the core of our Galaxy underwent a major explosion, comparable to the ones we observe taking place in the nuclei of Seyfert galaxies. Could it be, then, that the 13,865 B.C.E. date indicated by the zodiac’s Galactic center pointers marks the time when one such outburst began to bombard the solar system? If so, an ancient civilization probably would not have needed sophisticated radio telescopes to secure a precise fix on the Galactic center’s location. The light radiation generated by the intense flux of cosmic ray particles emitted from the Galaxy’s exploding core may simply have been sufficiently bright to be seen through the intervening interstellar dust.

Activity in the Core of Our Galaxy

Is there any evidence that the Galactic center has exploded in the last ten thousand to twenty thousand years? The answer, quite emphatically, is yes. Astronomers have found that gas is moving radially outward from the Galaxy’s nucleus, as if recently propelled by a blast of energy from the Galaxy’s center. These motions may be detected from as close as a fraction of a light-year from the center to as far out as 10,000 light-years. For example, the spiral-shaped gas arms visible in figure 2.10 appear to have been ejected from the Galactic center sometime within the past 7,500 to 22,000 years.^{21, *8}

About 5 light-years farther out, radio astronomers have found that the Galactic center is surrounded by a clumpy, irregular disk of molecular gas

that, in places, has temperatures as high as 2000° centigrade. Studies of the gas motions in this disk again indicate that this central region has been the scene of a violent and relatively recent disturbance. The region within 5 light-years of the Galactic center has been swept clear of gas due to an outburst that must have occurred some 10,000 to 100,000 years ago.²² The clumpy, disturbed molecular gas surrounding it, then, would be carrying the memory of this violent explosion.

Farther out, at 10 to 20 light-years from the center, astronomers find a ring of oxygen-enriched gas that is in rotation around the Galactic center and is also moving radially away from it as if having been propelled outward recently by a central explosion. Estimates of the ring's age suggest that this explosion took place less than 50,000 years ago.²³ Still farther away, from 30 light-years out to 600 light-years, astronomers find a wind of molecular gas moving radially outward from the Galactic center. Also, at a radial distance of around 500 light-years, they have found a ring of molecular gas clouds that is expanding outward at around 150 kilometers per second. The astronomer Jan Oort reports that an enormous quantity of energy was needed to propel this material outward from the central region of the Galaxy, an amount equal to about 100,000 highly energetic supernova explosions.^{24, †9} Consequently, he concludes that this gas was very likely expelled by an outburst of radiation and cosmic ray particles issuing from an explosion of the Galaxy's core. Even farther out, at a distance of 10,000 light-years from the center, astronomers find that the Galaxy's massive inner spiral arms are themselves moving outward as they orbit the Galactic nucleus.

All of these gas motions and concentric expanding rings lie predominantly in the plane of the Galaxy's spiral arm disk. However, there is also evidence of features extending out at steep angles to the galactic plane. One particularly interesting example is the bow-shaped band of radio-emitting filaments known as the Arc. This structure, which is only partially discernible in figure 2.8, is seen more clearly in the high-resolution radio map presented in figure 2.15. It is hundreds of light-years in length and is positioned about 100 light-years from the Galactic center. A large-scale structure such as this could not persist indefinitely, since stars and

interstellar gas revolving rapidly about the Galactic center would eventually disperse it. Because of its arcing shape and close proximity to the Galactic core, astronomers have suggested that the Arc was formed by an energetic expulsion from the Galactic center.²⁵ For example, the Arc may consist of gas that has been impacted and compressed from time to time by cosmic ray volleys emitted from the Galactic center. This is quite plausible, as the Arc and the Sagittarius A region are both seen to be radiating synchrotron radio emissions, a type of polarized electromagnetic radiation that is produced when cosmic ray particles spiral around magnetic fields. The radial orientation of the radio-emitting filaments that emanate from the Galactic center and the much larger arcing filaments that extend northward to the Arc could have been formed by the same series of Galactic core explosions that seem to have shaped the Arc. The knotlike radio-emitting structure that crosses the Arc at the point where the Arc intersects the galactic equator may have arisen in the same way. This feature, nicknamed the Sickle, is shown magnified in figure 2.16.

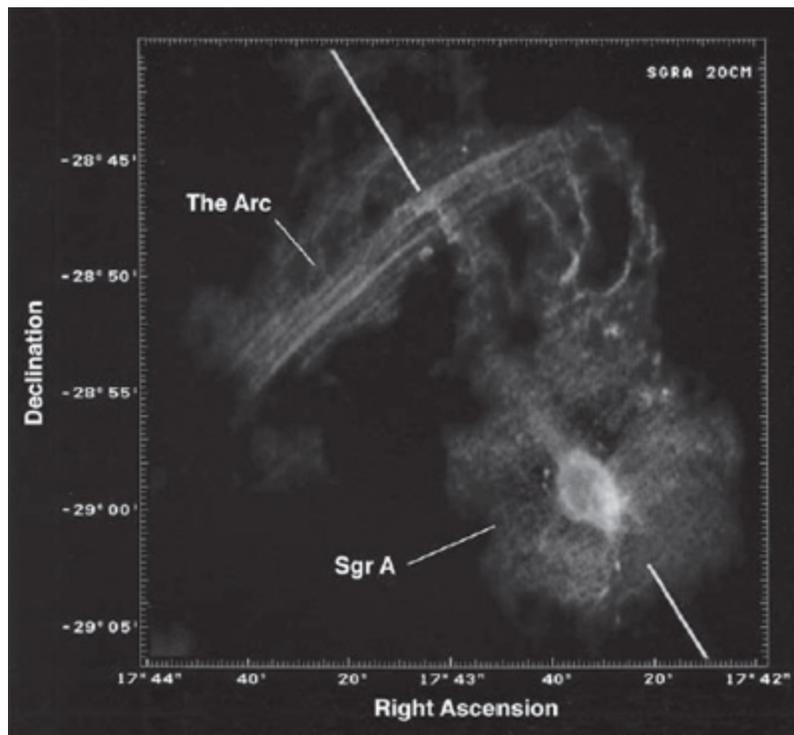


Figure 2.15. The Galactic nucleus (lower right) and Arc (upper left) seen on a map made with the VLA radio telescope. The line indicates the location of the galactic equator. (Photo courtesy of NRAO/AVI and Farhad Yusef-Zadeh [Yusef-Zadeh, Morris, and Chance, *Nature*, p. 558].)

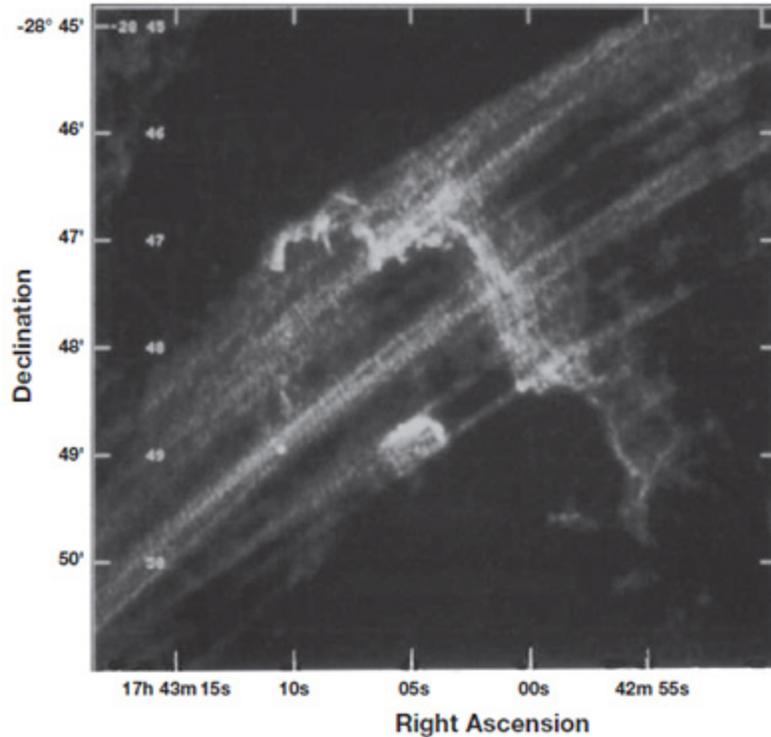


Figure 2.16. A radio telescope image of the Sickle, a knot of radio emission that runs crosswise to the Arc. (Photo courtesy of Yusef-Zadeh; Yusef-Zadeh and Morris, *Astronomical Journal*, plate 97.)

The Sickle and the Arc are reminiscent of an arrow being drawn on a longbow and aimed out along the galactic equator. The curved end of the Sickle resembles the finger grip of a bow and the long filaments arcing between the Galactic center and the Arc suggest bowstrings. Was it just a coincidence that, in designing the figure of Sagittarius, the ancients chose this same bow and arrow metaphor to point out the location of the Galactic center? Was it also just a coincidence that Sagitta, the arrow shot out from the Galactic center, was placed along the galactic plane in the same direction that the Arc's sickle appears to be aiming? Because the Arc's details have been discerned only recently using the sophisticated twenty-seven-antenna VLA radio telescope interferometer, we are left to wonder whether this is just a coincidence, or could our predecessors have known about the shape of these radio-emitting features? If they did know about them, how did they find out? Even if the explosion at the Galactic center was visible to them, this optically invisible arc would still have remained hidden.

Cosmic Benchmarks

We have seen earlier that the Sphinx is a key that aids the process of decoding astrology's creation physics cipher. However, in addition, the four astrological signs that compose it (Taurus, Leo, Scorpio, and Aquarius) provide clues to important information about the Galaxy. They call attention to four cardinal directions in space. Scorpius designates the direction of the Galactic center; Taurus indicates the opposite direction, known as the Galactic anticenter. Together they mark the line along which the plane of the ecliptic intersects the galactic plane (see figure 2.2). Leo and Aquarius, on the other hand, mark the direction of the solar system's motion through the 2.7 Kelvin cosmic microwave background radiation. As mentioned in the last chapter, this radiation field appears to be energized by the cosmic ray particle background radiation. Interestingly, by some strange coincidence, the solar system is traveling through this intergalactic microwave background toward Leo in a direction that deviates by just 3 degrees from being exactly perpendicular to the Galactic center direction and just 10 degrees from being aligned with the plane of the ecliptic (recall figure 1.11). This Galactic center connection is further emphasized by Leo and Aquarius being combined with Scorpio and Taurus to form the astrological Sphinx, thereby indirectly linking the cosmic ray symbolism of the Leo–Aquarius axis with the Galactic center symbolism of the Scorpio–Taurus axis. The zodiac appears, then, to be suggesting that the Galactic center had explosively ejected a blast of high-energy cosmic ray particles.

These key orthogonal directions in the heavens appear to have been purposely designated by these four constellation benchmarks. Astrology specifies these signs as being of *fixed* quality, signifying stability. The ancient Persians gave special recognition to these four ecliptic directions as early as 3000 B.C.E. They marked them with four “Royal Stars” spaced about 90 degrees from one another. These Four Guardians of Heaven, as they were called, were Aldebaran (Alpha Taurus), representing the eye of the Bull; Regulus (Alpha Leonis) representing the heart of the Lion; Antares (Alpha Scorpius), representing the heart of the Scorpion; and Fomalhaut (Alpha Pisces Austrinus), representing the heart of the Southern Fish. All four are first magnitude stars.^{[*10](#)} Aldebaran, Regulus, and Antares are the brightest stars in their respective constellations, and are

among the six brightest stars in the zodiac. All three lie within 5 degrees of arc of the ecliptic. Fomalhaut, however, is not a member of the zodiac. It lies about 25 degrees south of the ecliptic, directly under the stream of water falling from Aquarius's urn. This leaves Aquarius "out in the cold" with among the dimmest stars in the zodiac, none being brighter than third magnitude.

Besides the sphinx axial markers, the constellations of Sagitta and Crucis, the Southern Cross, also indicate key directions. They point out the location of the Galactic center using the radian system of angular measure. The radian is a universal standard of measure, understandable to people (or beings) of all cultures having a familiarity with geometry. It is the angle subtended when the radius of a circle is measured off along its circumference. Doing so designates an angle equal to $360^\circ / 2\pi$, or about 57.296 degrees. No matter what size circle is picked, or what units are chosen for angular measurement, one radian will always be the same fraction of the circle's circumference.

This same geometrical concept may be charted on a map of the Galaxy. Looking down onto the Milky Way, with the galactic plane lying flat before us, we may imagine an immense circle having the Earth at its center and the Galactic center (GC) positioned along its circumference at galactic longitude $\ell = -0.056^\circ$ (figure 2.17). Taking the circle's 23,000 light-year radius, and measuring off this distance along its circumference gives an angle of 57.296° . Going counterclockwise and clockwise from the GC reference point ($\ell = -0.056^\circ$), two one-radian marker points are produced, one at $\ell = 57.240^\circ$ and another at $\ell = 302.648^\circ$.

Sagitta references the Galactic center by designating its northern one-radian marker. On 13,865 B.C.E., the star Gamma Sagittae, representing the tip of the Celestial Arrow, was positioned at galactic longitude $\ell = 57.73^\circ$, or about 57.78° from the exact center of the Galaxy. So the projection of this arrow tip onto the galactic plane comes just 0.5 degrees from the Galaxy's northern one-radian mark (figure 2.18). No other visible star comes closer to this unique galactic marker. Furthermore, the Southern Cross constellation designates the Galactic center's southern one-radian marker point. On 13,865 B.C.E., Beta Crucis, the Southern Cross star that faces the Galactic center, was positioned at $\ell = 302.67^\circ$, just 0.02 degrees

from this one-radian marker. No other constellation star comes closer. Moreover if a line is drawn from Beta Crucis to Gamma Sagittae, the midpoint of this line comes quite close to the Galactic center, being positioned at galactic coordinate ($l = 0.2^\circ$, $b = -0.9^\circ$). Thus with the Sagitta and Crucis one-radian markers, it is possible to determine the approximate location of the Galactic center.

The placement of Sagitta and Crucis, with their arrow tip and cross tip symbols each positioned one radian from the Galactic center, is a very clever way of directly referring to the Galactic center from a distant vantage point. Their positions suggest that the creators of these constellations knew the exact sky location of the Galactic center. Furthermore it suggests that, like the zodiac lore, this star lore predates ancient Greek and Babylonian times by many thousands of years. This implied Galactic center association weighs strongly in favor of our earlier suggestion that Sagitta is the arrow shot by the Archer through the Galactic center. It cannot be just a matter of coincidence that the only two arrows represented in the sky happen to measure unique points in the Galaxy, one marking the Galactic center location, and the other marking a position one-radian away.

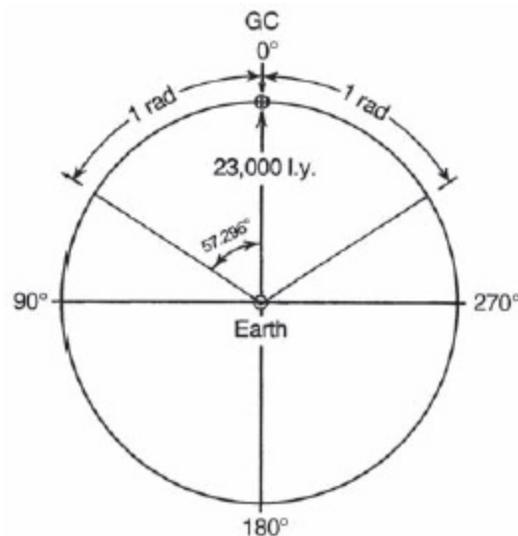


Figure 2.17. The relation of the Earth and Galactic center to the one-radian marker positions along the galactic equator.

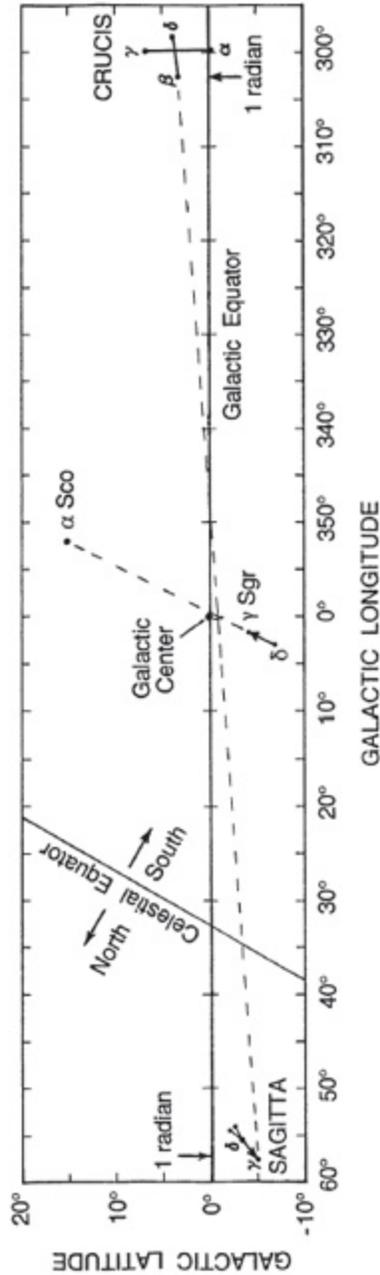


Figure 2.18. The positions of Sagitta and Crucis relative to the one radian positions measured from the Galactic center. Star positions are as they were ca. 15,800 years B.P. The celestial equator, shown as it appears today, would then have been positioned to the right beyond Sagittarius. Whereas figure 2.17 maps the Milky Way from a vantage point looking down onto the plane, here the observer views the Milky Way from an Earth-based vantage point lying in the galactic plane at the circle's center, the circle's circumference now being stretched out as the horizontal 0° latitude line that designates the galactic equator. Ordinate values in this plot chart elevation above or below the galactic equator.

Since this same one-radian arc distance reaches all the way from the Galactic center to the Earth, Sagitta's flight outward from the Galaxy's

center, uses geometrical metaphor to indicate the Galactic center's radial distance from the observer, one measured from the arc's Galactic center origin in Sagittarius towards the Earth. This symbolism implies that the explosively generated Sagittarian arrows—high-energy X rays, gamma rays, and cosmic ray electrons, positrons, and protons—fly outward from the Galactic core, traverse the intervening 23,000 light-years of space, and ultimately reach our planet. Thus Sagitta seems to be telling us quite clearly “Earth is in danger.”

By duplicating the Sagittarian arrow symbol one radian away in the form of the constellation of Sagitta, ancient astrologers sought to relate the Sagittarius-Scorpius trajectory through the Galactic center to the Galaxy's northern one-radian marker in order to emphasize the symbolism of their cosmic-ray-volley message. This same symbol duplication correspondence technique was used to symbolically link the Galactic center with Crucis, the “Centaur's Cross,” lying one radian to the south, for Sagittarius and Centaurus are the only two centaurs in the heavens. Originally, the Cross was considered part of the Centaurus constellation, but modern astrocartographers chose to separate it, designating it as Crucis or the Southern Cross. Due to polar precession, Centaurus/Crucis would have been visible from the northern hemisphere during the latter part of the ice age, 11,000 to 15,000 years ago. As far north as 40° north latitude, it would have been seen just above the southern horizon. As in the case of Sagittarius and Sagitta, the duplicate Centaur symbols may have been used as a device for calling attention to these two marker constellations containing Sagittarius' arrow and Centaurus' cross.

Curiously, the Quiché Mayan Indians of South America also interrelated the Sagittarius and Crucis constellations. They gave each of them the same name: *ripib'al elaq'omab'*, “the thieves' cross.” The Sagittarian thieves' cross was formed by the stars Sigma-Phi-Delta-Gamma and Lambda-Epsilon-Eta. Its counterpart was formed by the four stars in Crucis and appeared identical to the modern Crucis constellation. It is interesting that cultures existing on two widely separated continents would both evolve constellatory systems that in each case interlink these two particular constellations, one pointing out the Galactic center and the other indicating a sky position lying one radian away from the Galactic center. This

commonalty not only underscores the importance of these particular sky locations, but also suggests a common origin for the science behind their stellar lores.

The cross symbol, like the arrow, is commonly used as a location marker. In fact, one Australian aboriginal myth about the Southern Cross refers to its three brightest stars (Alpha Crucis, Beta Crucis and Gamma Crucis) as being “the Pointers.” The myth relates that these are the three camp fires which *Goorda*, the fire spirit, keeps brightly lit. The myth relates that Goorda, having become lonely in his celestial camp, one day caught a passing comet and set out on a journey to Earth to make friends with its inhabitants. The story, which is presented more fully in chapter 6, describes how he unintentionally sets the Earth on fire, before finally departing to his home in the sky. Taken in the context of the one-radian reference to the Galactic center, we may conclude that the myth may be describing, in allegorical form, an actual catastrophe experienced long ago, one that was triggered by the arrival of fire (cosmic ray particles) from the Galactic center.

Several things are noticeable about the stars of the Southern Cross. The vertical arm of the Cross, marked by the stars Alpha and Gamma Crucis happens to be very nearly perpendicular to the galactic plane. This line segment currently deviates by about a quarter of a degree from making an exact right angle; 15,870 years ago it would have deviated by slightly more than 2 degrees. Moreover the brightest of the four stars, Alpha Crucis, happens to lie just 0.3 degrees of arc from the galactic plane. So the civilization that laid out this constellation seems to have had a detailed knowledge of the exact location of the galactic plane.

Sagitta and Centaurus, lying at opposite ends of the sky, symbolically lie together at our doorstep. That is, this geometrical metaphor compels us to regard the Galactic center as a kind of fulcrum and to swing these two one-radian markers together so that both symbolically coincide at our Galactic location (the point marked Earth in figure 2.17). Displayed in this fashion, these three constellations—Sagittarius, Sagitta and Crucis—collectively portray the cosmic tragedy that befell our planet in antediluvian times. Sagittarius, the Archer, symbolizes the Galactic center, the orb that unleashes a swarm of cosmic ray arrows, the “heart” that “stings” when it

“beats.” The cosmic ray particles he launches, symbolized by Sagitta, have flown radially outward through the Galactic disk and on this date 15,870 years before the present, have begun to reach the Earth. Centaurus, who is pictured holding a raised shield, stands in defense attempting to fend off this arrow attack (see figure 5.3, p. 140). What an ingenious and artistic rendering, displayed so masterfully upon the night sky’s canvas, telling a story that hopefully will not be forgotten for many generations to come.

THREE

THE CHARGE OF THE BULL

“Except this supernova does seem unusually bright,” interjected Tom Cook.

“Has brightened up still more,” announced Bill Gaynor, who had just come in. “Didn’t go to bed. I stayed up till it rose— in the east, about an hour ago.”

“What is it now?”

“I’d say about minus eight.” [25 times brighter than Venus]

There was a whistle around the common room.

“More like a bloody quasar than a supernova,” muttered someone.

A long silence followed this remark. It was broken by Almond.

“Which would explain something that’s been worrying the hell out of me.”

“What’s that, Dr. Almond?” Gaynor asked, his eyes red with lack of sleep.

“Why the position of the thing is so precisely the same as the Galactic center. It’s obvious really, isn’t it? The center of the Galaxy has blown up.” Almond’s deep voice was grave as he made this pronouncement.

THE INFERNO, FRED HOYLE AND GEOFFREY HOYLE

Galactic Superwaves

Up through the first half of the twentieth century, scientists had no idea that explosions of our Galaxy's core might pose a threat to the Earth. Only in the late 1950s and early 1960s did observational reports begin to surface of highly energetic explosions taking place in the cores of certain galaxies. Shortly thereafter, astronomers began speculating that such explosive activity may be a relatively common phenomenon, one that periodically recurs in the cores of all galaxies, including our own.

Nevertheless, they were not alarmed at the thought that the center of our Galaxy might explode periodically, for they believed that the outgoing cosmic ray particles would not survive the journey to Earth. It was their speculation that interstellar magnetic fields present in the Galaxy's nucleus would serve as a kind of safety net, preventing the electrically charged cosmic rays from traveling more than a few hundred light-years. For example, they thought the Galaxy's magnetic field lines were aligned perpendicular to the direction the cosmic rays would be traveling. In such an orientation, the fields would have exerted forces that would deflect the particles and cause them to orbit in tight spirals, thus capturing them and impeding their outward advance. One study, published in 1964, predicted that the outward flight of the cosmic rays would be retarded to such an extent that they would take millions of years to diffuse to the solar system, by which time the energy of the explosion would be so spent that background radiation levels in Earth's vicinity would be increased by only a few percent. As will be shown shortly, this theory is incorrect, as the Galaxy's magnetic field lines would be mostly oriented parallel to the outward flight paths of these particles, not crosswise to them.

Astronomers have also greatly overestimated the time between explosions, thinking that they must recur as infrequently as once every 10 million to 100 million years. These large time estimates first came about as a result of certain erroneous interpretations that were made concerning double-lobed radio galaxies. These are galaxies with active cosmic ray-emitting cores that are flanked by two large regions called radio lobes in which the outward-flying cosmic rays emit copious amounts of radio waves. Although these lobes extend outward for millions of light-years, their emission can be easily explained by a galactic core explosion lasting

about one thousand to ten thousand years (see appendix B). However, radio astronomers instead erroneously concluded that these cosmic rays were being supplied by core explosions that lasted millions of years and which would be followed by quiescent periods lasting as long as a hundred million years. Noting that the core of our Galaxy is comparatively inactive at present, astronomers concluded that the present quiescent period should similarly continue for many tens of millions of years. Although evidence to the contrary began emerging in 1977, indicating that relatively intense explosions have taken place at the Galactic center within the past 10,000 to 100,000 years,¹ ² astronomers were predisposed to believe that these were minor outbursts that happened to occur during an interval when the core was generally quiescent.

The zodiac cipher brings forth a very different picture. It indicates that explosions of our Galaxy's core can very seriously affect Earth and its inhabitants and, in particular, that one such outburst arrived close to the end of the last ice age. If true, this would imply that Seyfert-like galactic core explosions recur much more frequently than modern astronomers have supposed, perhaps every ten to twenty thousand years instead of every 10 to 100 million years. This impels us to set forth a very different hypothesis concerning galactic core explosions, one that may be summarized as follows:³

1. The core of our Galaxy periodically enters an explosive phase, during which it generates an intense wind of cosmic ray particles (electrons, positrons, and protons). The total energy generated over the duration of the event is equivalent to that released from five to ten million highly energetic supernova explosions.
2. These outbursts recur about every ten thousand years and can last anywhere from several hundred to several thousand years.
3. Cosmic ray electrons and positrons generated in a core explosion travel radially outward from the Galactic center at very close to the speed of light and pass through the entire galactic disk with minimal attenuation. The cosmic ray *proton* component, however, is more readily impeded. Being two thousand times heavier than electrons,

protons travel much slower and lag behind the cosmic ray electron front, whereupon they disperse, rapidly decelerate, and are captured by magnetic fields in the galactic nucleus.

4. One such cosmic ray volley passed through the solar system toward the end of the last ice age and for several thousand years injected large amounts of cosmic dust. This dust, in turn, substantially altered Earth's climate through its effect on the Sun and sunlight transmission through space.

The third proposition listed above suggests that the cosmic ray electron component propagates radially outward from the center of the Galaxy in the form of an expanding spherical shell that has a thickness of several hundred to several thousand light-years (figure 3.1). This high-velocity cosmic ray volley is termed a galactic superwave.⁴

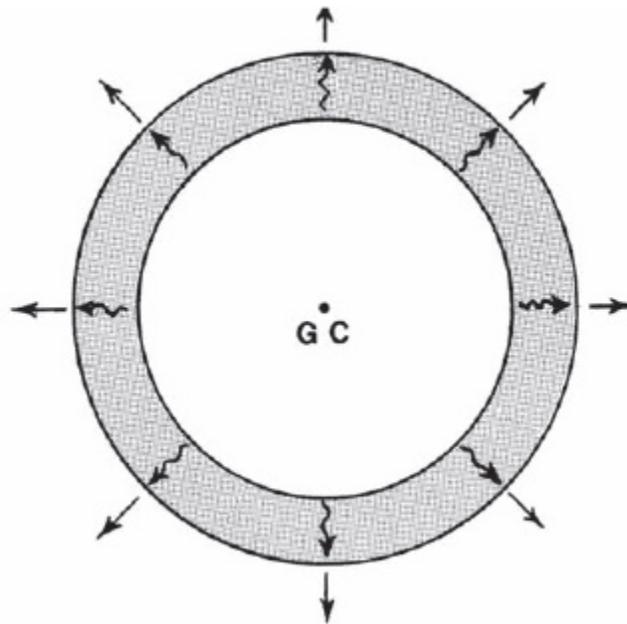


Figure 3.1. A schematic representation of a galactic superwave. The superwave shell (shaded region) contains cosmic ray electrons and electromagnetic radiation that move radially outward from the Galaxy's center.

According to this scenario, the electrically charged superwave cosmic ray electrons would stream freely away from the Galaxy's nucleus, they would travel outward along field lines aligned with their radial direction of

travel. As the particles sped outward along these field lines, they would exert forces on them that would tend to comb them out like strands of hair. This would keep the fields aligned radially with respect to the Galactic center and ensure that they offered minimal resistance. Because superwaves would be released from the Galactic center quite frequently, these combed-out fields would not have a chance to drift far from their radial orientation. Although interstellar magnetic field lines would also be present in a crosswise orientation, they would not obstruct the forward progress of the superwave particles, as the radial magnetic field component would tunnel through and around them.

As the superwave electrons moved outward through the Galaxy, following the radial magnetic pathways, they would jostle back and forth, and as they did, they would emit a forward-directed conical beam of synchrotron electromagnetic radiation. This forward-beaming effect would arise because the electrons are traveling nearly as fast as the radiation they emit. This radiation facilitates the superwave's progress because it heats up the interstellar medium immediately ahead of the advancing cosmic rays, and this, in turn, suppresses the buildup of hydromagnetic waves called plasma waves, which might otherwise slow them down.

Early Development of the Galactic Explosion Hypothesis

I discovered the zodiac's amazing message while working toward a doctorate in systems science at Portland State University. Over a period of three years, I gradually uncovered details of how the zodiac signs spell out their physics of cosmic creation and how they designate the hot and cold directions in the cosmic microwave background radiation. Subsequently, in 1979, I discovered that the Scorpio and Sagittarius "arrows" were intentionally pointing to the Galactic center. After a few other pieces of the puzzle fell into place, I suddenly realized that the zodiac's cosmogenic creation science was actually describing an immense explosion that occurred at the center of our Galaxy thousands of years ago. Stunned by what it said, I undertook a four-year doctoral study to determine if there was any evidence that a cosmic ray event of this sort had occurred. I began the inquiry by advancing a set of testable assumptions similar to those set forth above, which I collectively named the Galactic Explosion Hypothesis.

The ability of a heated gas to facilitate the propagation of cosmic ray particles was demonstrated in the mid-1980s in tests conducted on “Star Wars” particle beam weapons. Researchers were having trouble getting the emitted beam of particles to follow a straight path to its target. They solved the problem by firing a high-powered laser just a split second before firing their particle beam. The laser beam created a tunnel of hot ionized gas through which the particle beam could follow unhampered. The researchers found, to their amazement, that once the beam got started, it just kept on going as straight as an arrow. Apparently, once the particle volley was in transit along a straight path, its forward-beamed synchrotron radiation acted as a kind of “laser” that ionized the gas immediately ahead.

In 1985 additional evidence came to light which indicated that cosmic rays can propagate over long distances unimpeded by galactic magnetic fields and plasma wave interactions. A group of high-energy physicists had found that Cygnus X-3, a pulsating cosmic ray source lying 25,000 to 30,000 light-years away, is showering Earth with bursts of high-energy cosmic ray particles.⁵ They found that, despite the presence of intervening magnetic fields, these particles are able to reach Earth at close to the speed of light following straight-line trajectories. A few years later, another group of physicists found that another source, the X-ray pulsar Hercules X-1, is presently bombarding Earth with bursts of particles every 1.2357 seconds.⁶ ⁷ Even though this star lies 12,000 light-years away, the intervening interstellar medium has so little effect on its cosmic rays that the period between successive particle bursts is constant to within 300 millionths of a second! Had these particles been slowed down significantly by the interstellar medium, their pulses would have been smoothed out to a nearly steady stream. Thus, these findings strongly support the zodiac’s prediction that cosmic rays from the Galactic center can travel all the way to Earth at nearly the speed of light.^{*11}

The Blue Star

According to a legend told by the Hopi Indians, the present world civilization is not the first to populate Earth. Before this one, there were three other “worlds,” each terminated by a global catastrophe. They call the

present world cycle the “Fourth World,” and claim that it too, like the others before it, will one day come to an end. They say that this ending will be heralded by the appearance of Saquasohuh, the Blue Star spirit.

As the cores of distant exploding galaxies are observed to have a bright blue, starlike appearance, it is reasonable to expect that the core of our own Galaxy would have a similar appearance during its explosive phase, so the legendary appearance of the Blue Star could be referring to an explosion of our Galaxy’s core. Supernova explosions may be ruled out as frequently recurring causes of terrestrial cataclysms. Although nearby supernovae might appear as bright blue stars, those occurring close enough to seriously affect Earth and our solar system take place very rarely, only about once in several hundred million years. They certainly could not account for three Hopi world cycles occurring during the past several hundred thousand years or so.

Since optical radiation from the Galactic core is heavily obscured by the large amounts of intervening interstellar dust, most of the blue light that ancient viewers would have seen from a Galactic core explosion event would have come from the superwave cosmic ray electrons emitted from the core, rather than from the core itself. During their 23,000light-year journey to us, this advancing army of torchbearers would have been continuously generating and beaming forward a bluish light, a color characteristic of their synchrotron electromagnetic emission. Most of the light reaching us would have come from electrons that had emerged from the Galaxy’s dust-obscured inner regions.

Because the synchrotron radiation from such high-velocity electrons shines forward in a very narrow cone, this light would have appeared to ancient observers like a bright blue-white star about a thousand times brighter than the brightest star in the night sky. About 80 percent of this light would have come from a region less than a third of an arc minute in diameter—in other words, from a region smaller than the apparent diameter of the planet Mars. An additional 17 percent of the light would have come from a region three times larger, approximately equivalent in size to the apparent diameter of Venus. This Galactic center synchrotron source would have been visible even during the day, radiating from the vicinity of Sagittarius A*. It would have appeared suddenly, without warning, and

would have remained in the sky for several hundred to several thousand years, marking the duration of the superwave's passage. During the time it ruled the heavens, its intensity would have varied from hour to hour, sometimes from minute to minute, due to variations in the concentration of cosmic rays along the depth of the advancing superwave shell.

During this ancient superwave passage, the star-studded sky that we are used to seeing on a clear night would have been transformed into a ghostly scene of variously shaped, amorphous nebulae and dust clouds overlying one another. Bluish light from the superwave's cosmic rays would have back-illuminated and silhouetted dark forms residing in the general direction of the galactic nucleus, with the back-illumination increasing in brightness toward the Blue Star. The entire Scorpio-Sagittarius-Lupus-Ophiucus region would have taken on an ominous appearance. The cloud of gas and dust that currently surrounds the solar system would become illuminated and grotesquely visible. Nearby clouds lying in the anticenter direction—that is, on the Taurus-Orion-Capella side of the heavens—would instead have been front-illuminated, the beamed synchrotron radiation there being directed away from Earth. On this leeward side, viewers would have seen visual effects produced by superwave cosmic rays that were now receding from Earth.

Other lighting effects would have been seen in the immediate vicinity of the solar system. Within minutes after the appearance of the Blue Star, superwave cosmic rays would have begun impacting the solar system's heliopause magnetic field sheath as well as the bow-shaped shock front that surrounds and shields it on the upwind side facing the Galactic center. The approaching cosmic rays would have been captured by the turbulent magnetic fields residing behind the shock front as well as within the heliopause sheath. There, they would have formed a network of faintly luminous cobweblike filaments stretching outward across the sky from the vicinity of the Blue Star.

Perhaps the most frightening phenomenon to occur in this early stage would be the prompt arrival of the electromagnetic pulse and, some days later, the onslaught of the gravity wave, with its ensuing crustal torque, which would have caused earthquakes and volcanic eruptions. These terrifying aspects are discussed more fully in chapter 12.

The Eye of Re

Several hundred years after the first appearance of the Blue Star, Earth observers would have become aware of lighting effects resulting from the superwave's passage through the Galaxy's central bulge. Synchrotron radiation emitted by the superwave's cosmic rays would have illuminated the dense gas clouds in the Galaxy's nucleus to create an oval luminous form around the Blue Star. Light from this inner region would have come to us from a direction away from our direct line of sight to the Galactic center. Since it would have made a much longer journey before reaching us, it would have become visible many years after the advent of the Blue Star.

This apparition would have been shaped somewhat like the infrared map image shown in figure 2.6. Dense clouds of dust obscure visible light coming from this region, so that the core is normally invisible to the human eye. However, during its bright active phase, some light would have penetrated. This frightening spectacle may have appeared to ancient inhabitants as a gigantic punishing "Eye" in the sky, the entire form occupying about a 16-degree field of view, or about 32 solar diameters. Its "iris" would have had a diameter of about 4 degrees with a brilliant light emanating from its central pupil—the Blue Star.

A superwave event accompanied by a galactic nucleus illumination of this sort may have spawned ancient myths about mankind being punished by a giant cosmic eye. For example, one ancient Egyptian myth tells how Atum-Re, the Creator, sent his "Eye" to inflict punishment upon an earlier race of man. A version of this myth from the Herakleopolitan Period (circa 2250 B.C.E.) has been translated as follows:

Re, the god who created himself, was originally king over gods and men together, but mankind schemed against his sovereignty, for he began to grow old, his bones became silver, his flesh gold and his hair [as] real lapis lazuli. When he realized that mankind was plotting against him he said to his suite:

"Go, summon me hither my Eye, together with Shu, Tefnut, Geb, Nut and all the fathers and mothers who were with me in the Primeval Waters, as well as the god Nun himself and let him bring his court with him. You must gather them together secretly, do not let mankind see. . .

. You shall bring them to the Great Palace that they may give their advice from the time I emerged from the waters, up to the place where I now appear.”⁸

Before proceeding further in this story, it is worth taking a moment to appreciate the significance of the secret gathering of these gods. All of these gods are the key figures in the Heliopolitan creation myth, where Re was called Atum—“the Complete One.” Atum-Re is the Prime Mover god who at the beginning of Time arose from the Primeval Waters, called Nun. Nun personifies the primordial ether medium from which all matter and energy in the universe comes into being, this emergence being brought about by the actions of Atum’s progeny, the gods Shu, Tefnut, Geb, and Nut. Atum is the being who animates this generative ether and makes all this possible. As is more fully explained in *Genesis of the Cosmos*, this story of creation metaphorically encodes a brilliant science that presents a realistic description of how matter and energy may have come into being.⁹

In the Herakleopolitan myth, Atum-Re speaks from his residence, the Great Palace. This may be identical to the Primeval Place, described as the “city” at the center of the universe—possibly an allusion to the Galaxy’s massive core. He summons these gods and his Eye to the Great Palace to hear their advice pertaining to the creation events that took place from the time he first emerged from Nun until the time when the Great Palace (Galactic center) was formed. That is, he invokes the process of matter-energy creation at the Galactic center. The myth then continues:

So the gods were brought together . . . Re addressed Nun: “. . . Behold mankind, who came from my Eye, have been scheming against me. Tell me what you would do about it, for I seek [a solution]. I would not kill them until I had heard what you have to say.”

Then Nun said: “O Re . . . If your Eye were turned against those who are plotting against you, how greatly would they fear you?”

. . . Then the others who were about him said: “Let your Eye be sent out to seize those who are plotting evil against you. Of itself the Eye is not strong enough to destroy them. Let it descend upon them as Hathor.”

So that goddess [Hathor] came and slew mankind in the desert . . . Hathor said: *“As truly as you live for me I have prevailed over mankind and it is pleasant to my heart.”*

Then Re said: *“Now that I am in control of them, do not reduce them any more . . .”*

According to one form of this myth, this destruction is carried out by Sekmet, the lion-headed goddess of fire. In this myth, the destruction of mankind was carried out by Hathor, the cow-headed goddess of inundation, whom the Egyptians associated with the Scorpius constellation. Hathor symbolized the heavenly ocean imagined as a “great flood.” She was worshipped in some places as a cow whose star-speckled belly formed the sky—the Milky Way. The “Eye,” her terrible aspect, would have symbolized the Milky Way’s erupting core. Hathor’s departure from this central heavenly palace on her mission to slay mankind would represent the superwave’s ominous journey from the Galactic center to wreak havoc upon the Earth. As is pointed out further on, this advancing superwave was memorialized in the heavens by the constellation of Taurus, which portrays a bull charging toward the Galactic anticenter, the sky direction opposite to the Galactic center toward which the superwave would have been traveling.

As the myth continues, Re attempts to spare mankind’s last survivors from Hathor’s wrath. He instructs his servants to grind up red ochre, mix it with crushed barley for beer, and carry it to where the last remnant of mankind is to be slaughtered. There the brew is poured out over the fields to a depth of about one foot. When Hathor arrives at dawn, she finds everything flooded and takes to drinking the liquid, whereupon she becomes drunk. Taking no notice of mankind, she finally returns home.

This myth bears some strong parallels to the biblical flood story as well as to similar flood stories found in various cultures around the world. As we shall see, the legendary flood was an actual event directly related to this ancient Galactic core explosion catastrophe.

Spell 316 of the Coffin Texts contains another story about humanity being punished by an Eye. In this case the Eye is that of Horus, the left one, which Set had plucked out during their ferocious battle. This spell states:

*I am the all-seeing Eye of Horus,
whose appearance strikes terror,
Lady of Slaughter, Mighty One of Frightfulness,
who takes the form of blazing light,
whose appearance Re ordained, whose birth Atum established when
Re said to her:
“Great will be your power and mighty your majesty over the bodies of
your enemies.
They will fall howling on their faces, all mankind will cringe beneath
you and your might,
they will respect you when they behold you in that vigorous form which
the Master of the Primeval Gods gave you . . .”
Look . . . O Primeval Ancestors!
upon this spirit who comes today, taking the form of a beam of light,
coming from the Isle of Fire . . .
“I have to raise my hand to shade myself, for fear of the fire of her
mouth,” says one of the elder gods.
“Behold it (the Eye) will be stronger than all the gods,
It has mastered the dwellers at the ends of the Earth,
it is sovereign over every god.”
. . . No one will come who can withstand me, except Atum,
for it was he who originally moved and put me before him so that I
could wield power and throw out my heat.[10](#)*

Here we find the Eye described as a “blazing light” in the heavens, a “beam of light, coming from the Isle of Fire,” which “throw[s] out [its] heat,” a light so bright that even the gods shade themselves in fear. The Isle of Fire is the mythical land of origin claimed by the ancient Egyptians to lie at the center of creation. Hence, this myth, too, appears to be describing an explosion of the Galaxy’s core.

The Temple of Dendera

The temple of Dendera, consecrated to Hathor, was built by the Ptolemys in the first century B.C.E. Its hieroglyphics declare that it was constructed according to the plan laid down in the time of the Shemsu-Hor, which translates as the “Followers of Horus.”¹¹ The Royal Papyrus of Turin states that the Shemsu-Hor ruled Egypt for a period of 13,420 years, up to the time when Egypt was unified under Menes. Schwaller de Lubicz dates this unification at 4240 B.C.E., implying that the Followers of Horus began their rule of Egypt in 17,660 B.C.E. Interestingly, this date memorializes the time when the autumnal equinox coincided with the galactic-equator-ecliptic crossing point near the Galactic center. The winter solstice today coincides with this galactic equator crossing point, an alignment the ancient Maya considered to be highly significant as marking the end of the present world cycle.

The circular constellation map displayed on the roof of the temple of Dendera is of particular interest, since it calls attention to the 13,865 B.C.E. date marking the time when Sagittarius’s arrow was aimed precisely at the Heart of the Scorpion. Let us take a minute to analyze how the temple encodes this date, for it helps to confirm our earlier conclusions about the zodiac anticryptogram.

The Dendera ceiling frieze presents the Egyptian constellations in a polar projection format (see figure 3.2). The constellation symbols are oriented symmetrically around the celestial polar axis, except for the zodiac constellations, which are arranged in a circle around the ecliptic pole. The celestial pole is shown positioned at the foot of the jackal (Ursa Minor), whereas the fixed ecliptic pole is shown centered on the nipple of the female hippopotamus (Draco). Because Earth’s equatorial plane was then tilted by about 23.8 degrees relative to the ecliptic, a polar projection map of the heavens should show the celestial pole and ecliptic pole deviating by 13 percent of the ecliptic circle diameter, just as the Dendera fresco shows them. The map shows the summer solstice (direction of the ecliptic’s maximum displacement toward the north celestial pole) appropriately oriented toward true north at the temple site. It also shows the spring and autumnal equinoxes (the nodes where the ecliptic and celestial equators intersect) appropriately oriented due east and due west. The proper depiction of the polar displacement and its appropriate orientation relative

to true north suggest that the designers of this map intended to use polar precession as a way of indicating key dates in the past.

In this astronomical timepiece, the vernal equinox would serve as the pointing hand, marking the Sun's position against the background constellations on the first day of spring, when day and night are of equal length. Due to the precession of the Earth's poles, the vernal equinox slowly shifts backward through the signs of the zodiac with the forward advancement of time. It takes about 25,700 years to make a complete circuit of the ecliptic, an interval that in ancient times was termed a Great Cycle.

In viewing the Dendera zodiac, one is immediately struck by the fact that the equinoxes are not positioned as they should be for the date the temple was constructed. Instead, they memorialize a date occurring almost six centuries earlier, displaying the ecliptic with its summer solstice at the Cancer–Gemini boundary, a position it would have had in 650 B.C.E. This summer solstice is designated by the transect that just grazes the Cancer constellation on its western side facing Gemini (the Twins). In particular, Cancer is shown displaced poleward by about 23° from its true position on the ecliptic, as if to call special attention to itself.

The Dendera zodiac designates this key date by placing a special hieroglyphic marker positioned on the celestial equator close to the summer solstice transect. This marker is pictured as the cow of Isis adorned with a star, symbolic of Isis's commemorative star Sirius (Sothis). The ancient Egyptians used the heliacal rising of Sirius to set their Sothic calendar, whose year measured 365.25 days and that deviated slightly from the vague year of their civil calendar, which measured 365 days. The beginning dates of the two calendars came into coincidence once every 1,460 years, an event that the ancient Egyptians celebrated as their New Year with festivities held at Dendera. Records of double dates given in ancient Egyptian manuscripts allow us to determine that the Egyptian New Year would have fallen successively on 140 A.D., 1320 B.C.E., 2780 B.C.E., 4240 B.C.E., 5700 B.C.E., 7160 B.C.E., and so on back in time. It is reasonable to infer that temple architects intended Dendera's Sothic star marker to designate one of these past Sothic New Year dates as a vernal equinox time marker. In particular, on the Egyptian New Year date of 7160 B.C.E., the vernal equinox would have been positioned at ecliptic longitude

125.05°, which just grazes the Cancer constellation on the side of Gemini. Since this Sothic star marker is positioned one degree east of the north-south transect, we may surmise that this transect designates an ecliptic longitude of $126.0 \pm 0.2^\circ$. Although the vernal equinox would have been positioned at this longitude in 7230 B.C.E., the temple zodiac instead depicts the summer solstice at this longitude, a position it would have had in 650 ± 20 B.C.E. The map depicts the vernal equinox 90° from this direction at ecliptic longitude 36° .

What was so special about this particular date that would warrant its commemoration? The Dendera zodiac offers a clue by presenting its constellation map oriented 180 degrees from true north. That is, a vector drawn along the summer solstice transect from the map's celestial equator toward its north pole center is directed instead toward true south at the temple site. Cancer would have been displaced in such a fashion, southward relative to the celestial equator, one-half precessional cycle earlier when the winter solstice would have been at this position. Also, the true west transect, which grazes the edge of the Virgo constellation and which designates the autumnal equinox on the constellation map, would at that time have designated the position of the vernal equinox ($180^\circ + 36^\circ = 216^\circ$). The map appears, then, to be commemorating the date $13,807 \pm 20$ B.C.E., half a precessional Great Cycle prior to 650 B.C.E., when the vernal equinox was situated at this particular 216° ecliptic position. This essentially coincides with the date $13,865 \pm 150$ B.C.E., which is designated by Sagittarius's arrow indicator. As we shall see, this date marks the initial onset of the climatic warming that ended the ice age. Thus, the Dendera zodiac appears to be commemorating a geologically significant date.



Figure 3.2. Detail of the Dendera temple ceiling showing some of its many constellations (after Schwaller de Lubicz, Sacred Science, figure 36). The upper central circle designates the ecliptic; the lower central circle designates the celestial equator.

About Equinoctial Precession

The equinoxes do not precess linearly with time. Instead, their rate of precession increases to a maximum and then decreases to a minimum over a period of 38,830 years as the inclination or “obliquity” of the Earth’s axis relative to the ecliptic oscillates between a minimum of 22.2 degrees and a maximum of 24.2 degrees. In 7135 B.C.E., the equinoxes were precessing at their minimum rate of 73.75 years per degree, while in 26,550 B.C.E. they were precessing at their maximum rate of 68.8 years per

degree. On the average, they take 71.28 years to move one degree, not 72 years as is often quoted. Thus, one precessional Great Cycle actually spans an average of 25,660 years. More recently, however, this cycle has been lasting longer than this average. Measuring back from 650 B.C.E., computer simulations indicate that the preceding precessional half cycle took 13,160 years to complete, about 330 years longer than the time for an average half cycle.

Taking into consideration inscriptions indicating that the temple of Dendera was built according to a plan set down in prehistoric times, when Egypt was ruled by the Followers of Horus, the idea that the zodiac was designed to reference such an ancient date becomes quite plausible. Moreover, the patroness of the Dendera temple was Hathor, the cow goddess whom the ancient Egyptians associated with the constellation of Scorpius. As mentioned earlier, Atum sent out Hathor from the center of the universe (the Galactic center) to cause a mass destruction of mankind, a catastrophe that was terminated by a global flood, so it seems quite fitting that the Dendera zodiac refers to this same prehistoric cosmic event.

This zodiac encodes several other significant dates. As noted in figure 3.2, the axis of the temple is shifted counterclockwise by 17 degrees in relation to the zodiac's cardinal points. With this shift to 199° , the autumnal equinox would indicate a polar precession date of 12,550 B.C.E. This coincides with the beginning of the Bölling interstadial, the major global warming that occurred at the end of the last ice age. Also, two hieroglyphs at the periphery of the zodiac, which denote "east" and "west," mark out an alternate east-west axis oriented 47 degrees clockwise from the true east-west axis. This indicates an ecliptic longitude of 83° ($36^\circ + 47^\circ$), hence a vernal equinox date of 4040 B.C.E., which does not appear to have any particular geologic significance. It does fall very close to the date 4240 B.C.E., however, which designates the beginning of the Egyptian Sothic calendar. About that time, the vernal equinox would have been positioned between the tips of the horns of Taurus, the constellation that serves both as an indicator of the galactic anticenter and as the beginning sign for the zodiac's encoded matter-energy creation metaphysics.

Distant Thunder

After passing the solar system, the superwave cosmic rays would have headed directly toward the Galactic anticenter. The ancient artisans of the constellations symbolized this by picturing an angry bull charging toward this very spot (see figure 3.3). The tip of Taurus's upper horn, which is marked by the whitish star Beta Tauri (β Tauri), is a key indicator of this important galactic benchmark. Of all constellatory stars, this one lies closest to the Galactic anti-center position. A line projected eastward from this pointer star, in the direction of the Bull's charge parallel to the ecliptic, passes just half a degree from the anticenter location. To further emphasize this forward charge idea, Beta Tauri has also been included as a principal star making up the constellation of Auriga, the Charioteer. This constellation, which is not shown in figure 3.3, pictures a chariot charging across the heavens.

There are no myths that directly connect Taurus or Auriga to the passage of a destructive superwave. However, catastrophic events are associated with the Pleiades, a cluster of stars located in Taurus just above the Bull's head (figure 3.4). Legends preserved by many cultures around the world, from pre-Columbian Mexico to ancient Persia, link the Pleiades with a widespread cataclysmic event that caused a great loss of life in the distant past. The Pleiades are associated with festivals such as the Druids' All Hallows' Eve (Halloween), All Saints' Day, the Feast of the Lamps among the Hindus, and the Feast of Lanterns among the Japanese. These holidays, generally observed close to the last day of October, honor the people who died in a catastrophe that occurred in ancient times and which is described in the biblical story of the Deluge.^{[12](#), [13](#)} Perhaps the witches and ghosts said to fly through the sky on Halloween night are surviving tales of frightening apparitions that appeared in the heavens during the passage of the galactic superwave.

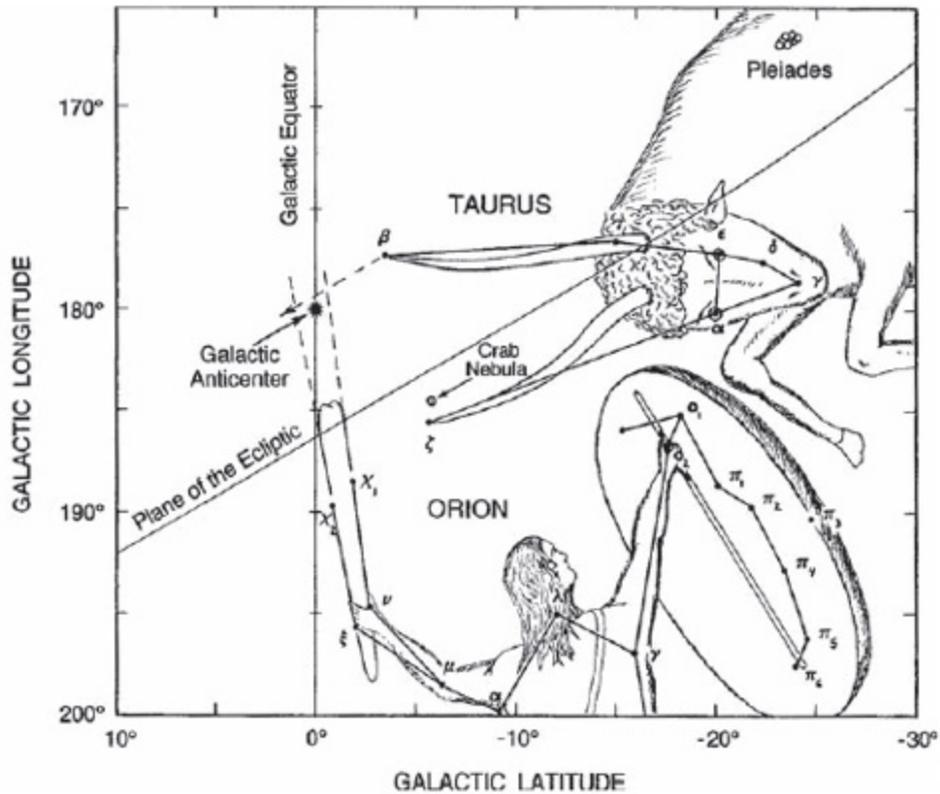


Figure 3.3. A map showing the constellations of Taurus and Orion as they appeared 15,870 years ago. The projection parallel to the ecliptic of Taurus's upper horn and the upward projection of Orion's club appear to indicate the Galactic anticenter.

The time when the Pleiades reached the midnight zenith was universally observed in memorial services throughout the world. The ancient Aztecs regarded the midnight culmination of the Pleiades as an event of great and ominous significance, particularly on dates when the sacred and secular calendars came into coincidence, every 52 years.¹⁴ They believed that on one such date the present world civilization, their "Fifth World," would come to an end, four previous Worlds having already met their destruction.

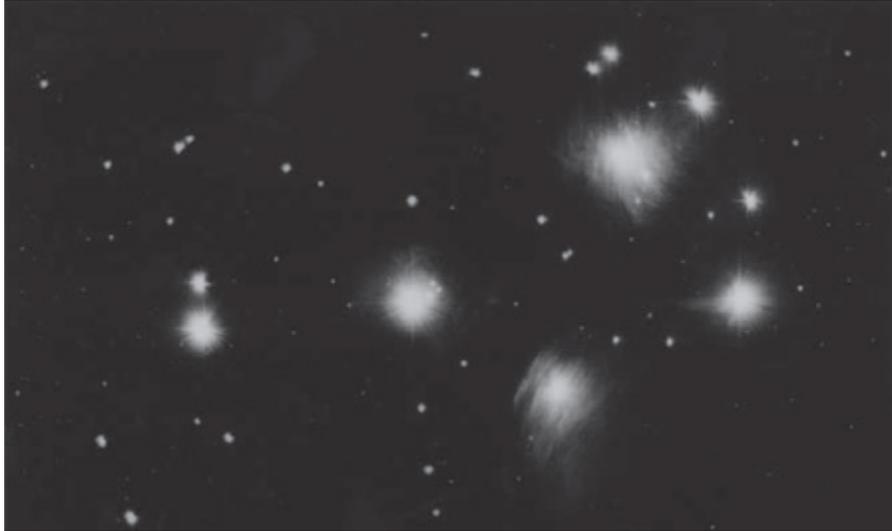


Figure 3.4. The Pleiades, also called the Seven Sisters, is a star cluster found in the Taurus constellation. (Lick Observatory photograph)

Orion, the Celestial Warrior, is another constellation that appears to have been purposely positioned to designate the Galactic anticenter. Orion is pointing to this location with his upraised wooden club. Adopting the coordinates that the stars had 15,870 years ago, we find that when the end of the club is extended northward by projecting trajectories from the stars Xi (ξ) and Nu (ν) Orion to Chi-2 (χ 2) and Chi-1 (χ 1) Orion, the center line comes within 0.2 degree of the anticenter location (figure 3.3).

Like Sagittarius and Scorpio, Taurus and Orion are paired in what appears to be a combatant role. Robert Burnham comments as follows about the relation of these two signs:

Orion, like Hercules, is usually depicted with a lion-skin shield held high on one arm as Orion faces the thundering charge of Taurus, the Bull, whose baleful red eye, Aldebaran, glares down from the V-shaped Hyades group, the Bull's head. The significance of the Orion-Taurus combat does not appear to be made clear in any ancient legend; the purely symbolic interpretation is the obvious one, that the two constellations represent the eternal conflict of good and evil. But this interpretation, aside from its triteness, does not seem supported by any of the ancient myths; the Bull was never regarded as a symbol of evil anywhere in the classical world; on the contrary it was venerated as

the embodiment of strength, power, and virility, and was an object of worship in more than one ancient cult.¹⁵

Although there are no myths that directly explain the significance of the conflict between Orion and Taurus, their struggle probably memorializes mankind's attempt to survive the superwave. Orion would represent the people who fought valiantly to survive the encounter with the forward-charging Galactic superwave, symbolized by Taurus. According to one legend, Orion represents Gilgamesh, the Babylonian Hercules who was attacked and mortally wounded by Scorpion-men as the Sun rose in Scorpio.¹⁶ The archer carved on the twelfth-century-B.C.E. Babylonian boundary stone shown in figure 3.5 could be depicting one of these Galactic center attackers. Note that the figure incorporates features of both Sagittarius and Scorpio. A similar story found in ancient Greek myth relates that Orion was stung to death when he stepped on the Scorpion. Afterward, he was honored by being elevated to the heavens, and the fatal scorpion was placed in an opposite part of the sky so that it could never threaten him again. Thus, the Orion constellation may have been created as a memorial, a celestial monument to all the men, women, and children who died in the last superwave cataclysm.

To the ancient Egyptians, the Orion constellation was known as Sahu, the stellar form of the resurrected god Osiris. Osiris was the divine king who according to myth ruled over Egypt during an early Golden Age but was murdered by his evil brother, Set. Set, who was identified with natural disasters, was sometimes represented in the form of a scorpion. However, Osiris's son Horus eventually defeated Set and brought order back to the world. So, like Orion, Sahu could have been meant to memorialize mankind's survival of a prehistoric Galactic core explosion catastrophe.

The ancient Egyptian myth about Hathor and Ihy also provides some insights about the significance of Taurus. The myth holds that Hathor gave birth to a son named Ihy, who emerged from his mother every day at dawn in the form of the new sun. The rosy hue of the dawn sky was identified with the blood that Hathor would emit at the time of Ihy's morning birth. One myth about the creation of Ihy states:

*. . . Ihy, son of Hathor.
I am the male of masculinity,
I slid forth from the outflow between her thighs in this name of Jackal
of the Light.
I broke forth from the egg, I oozed out of her essence,
I escaped in her blood. I am the master of the redness.
I am the Bull of the Confusion, my mother Isis generated me.*¹⁷

Hathor was often identified with Isis in her role of giving birth to Ihy. However, Ihy is quite different from Isis's son Horus, the creator of the physical universe. Whereas Horus established order in the universe, Ihy seems more aligned with the principle of chaos, being referred to as "the Bull of the Confusion" who emerged on the "day of confusion." The chaotic birth of Ihy could be a reference to a Galactic core explosion event. Since the Egyptians considered the jackal to be a wind spirit, Ihy's title of Jackal of Light, connotes "wind of light," an appropriate description for the superwave's intense radiation wind.



Figure 3.5. A sketch of a scorpion-man archer (12 cm tall) displayed on a twelfth-century-B.C.E. Babylonian boundary stone from the reign of Nebuchadnezzar I, Assyro-Kassite Period (British Museum, London).

The bull could have played a similar symbolic role in ancient Minoan rituals. The Minoan civilization, which flourished in the second millennium B.C.E., had its center at Knossos on the island of Crete. The unearthing in 1900 of the Minoan palace at Knossos brought to light some interesting archaeological findings. Its excavator, Sir Arthur Evans, discovered on the wall of the palace's north portico a huge stucco relief of a charging bull. He found frescoes and reliefs of the bull in other places as well, even on seals. Evans's most unusual finding was a fresco showing young acrobats somersaulting over a charging bull (figure 3.6). Leonard Cottrell describes Evans's discovery as follows:

Later came the most remarkable of all the discoveries made at Knossos: the remains of a spirited fresco depicting—without a shadow of doubt—a young man in the act of somersaulting over the back of a charging bull, while a young girl, similarly dressed in “toreador’s” costume, waited behind the animal’s flank to catch him. Soon other examples of the same scene came to light, proving that among these ancient people there had undoubtedly existed a form of sport in which the bull played a prominent part. In none of these scenes was any contestant shown carrying a weapon, nor was the bull killed. But again and again—in wall-paintings, on seals, in a delicate ivory statuette—the same incredible scene was repeated: the slim agile figure of the youthful bull-leaper in the act of somersaulting over the horns of the charging beast. Had there been, after all, some kind of ritual sacrifice? Were these young men and girls the Athenian hostages who, according to tradition, were sent each year as tribute to the Minotaur?[18](#)



Figure 3.6. A plate painting showing the Minoan bull-leaping sport, as depicted in a fresco found in the Palace of Knossos on Crete.

Some authorities doubted that it was even possible to execute such bull-leaping acrobatics. One veteran steer wrestler, who was shown a picture of the fresco, refused to believe that the feat was possible. He is quoted as saying:

You couldn't catch hold of the bull's horns for the start of the somersault, for there's no chance of a human person being able to obtain a balance when the bull is charging full against him. The bull is three times as strong as a steer, and when running, raises his head sideways and gores anyone in front of him.¹⁹

No one volunteered to duplicate the stunt, so the question of whether this sport could be safely undertaken went unanswered. Most likely it would have had a high casualty rate. Considered in the context of the significance of Taurus and Orion, we might surmise that the sport was part of a religious ceremony or festival performed in remembrance of the many souls who, over ten thousand years ago, endured the arrival of a galactic superwave. The charging bull, like Taurus of the zodiac, may have signified the cosmic ray barrage that charged through the Galaxy toward Earth. The young acrobats would have signified our brave ancestors who confronted the superwave and the hardships that it brought. Perhaps the expression "taking the bull by the horns" dates back further than we think. Just as many died in this ancient catastrophe, so too many acrobats probably sacrificed their lives in performing this dangerous sport. Those who survived would have had the honor of representing the small remnant of humanity that survived the superwave.

Ice Core Evidence of Prehistoric Cosmic Ray Volleys

Beginning in the late 1970s, scientists developed a useful technique for determining Earth's past levels of exposure to cosmic ray particle radiation. This involved measuring a rare radioactive isotope known as beryllium-10 (Be-10).^{*12}

Minute quantities of this isotope are continuously produced in Earth's stratosphere when high-energy cosmic ray particles collide with nitrogen and oxygen atomic nuclei present there and split them into lighter elements. The intensity of cosmic ray radiation striking the atmosphere is directly correlated with the rate of stratospheric Be-10 production and hence with the rate at which Be-10 falls onto Earth's surface. Because Earth's polar ice caps preserve a record of this past fallout in their successive annual ice layers, by coring the polar cap and measuring its Be-10 concentration at various depths, scientists are able to assess Earth's past level of exposure to cosmic ray radiation.

Results of such measurements performed on a 2.1-kilometer-long ice core drilled at Vostok, East Antarctica (figure 3.7), corroborate the zodiac's encoded message. They show that a volley of cosmic ray radiation apparently did pass through the solar system near the end of the last ice age and on several earlier occasions as well. The lower profile in figure 3.8 shows how cosmic ray intensity impacting the solar system has varied during the past 150,000 years, as determined from changes in the rate of atmospheric beryllium-10 production. Cosmic ray (Be-10) peaks are seen to be centered at around 14,150 and 12,600 years before present (B.P.), an increase that began shortly after the 15,815-years-B.P. date recorded in the zodiac cryptogram.^{*13} By 10,500 years B.P., cosmic ray intensity had returned to background levels. Except for a minor peak centered at around 5200 years B.P., from that time up to the present the Earth did not experience a period of cosmic ray intensity as high as this. If this beryllium-10 increase was produced by a superwave composed primarily of cosmic ray electrons and positrons, rather than protons, as seems most likely to be the case, then this beryllium-10 production rate peak would greatly underestimate the superwave's true intensity. The 40 percent increase of beryllium-10 production rate displayed here could translate into a 30,000-to 100,000-fold increase in electron intensity compared with the present cosmic ray background electron intensity (see box below). What appears to be a modest beryllium-10 peak could record the passage of a moderately strong galactic superwave.

In addition, several cosmic ray peaks are evident at earlier times centered around 36,800 years B.P., 60,500 years B.P., 89,500 years B.P.,

103,500 years B.P., 110,000 years B.P., and 131,500 years B.P. Interestingly, an analysis of this record indicates that these cosmic ray events recur about every $26,000 \pm 3000$ years, approximating the duration of a precessional Great Cycle. On occasion, a 13,000-year half-cycle recurrence interval is also evident. The 14,150-years-B.P. cosmic ray superwave could have been as intense as these earlier events but not produce a peak of comparable height, since there is an indication that the solar wind was particularly strong at the end of the ice age and would have tended to more effectively screen out any impacting cosmic rays.

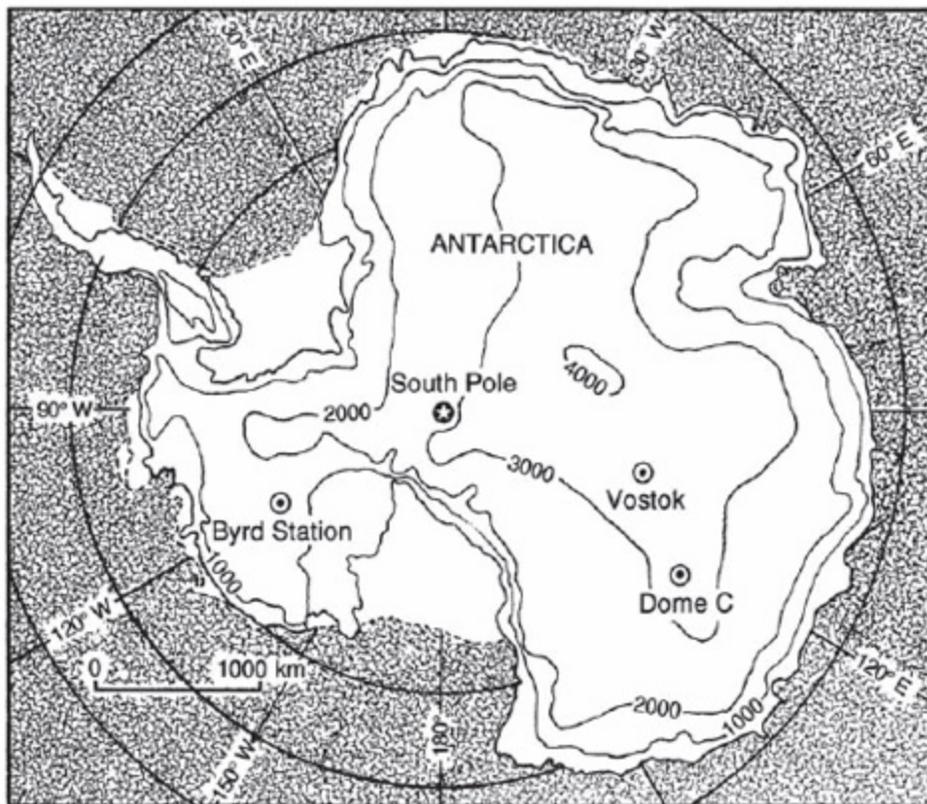


Figure 3.7. Map of Antarctica showing sites where deep ice cores have been drilled.

The upper profile in figure 3.8 presents a record of the Earth's climate during the past 150,000 years. It charts the air temperature history of this Antarctic location by plotting colder temperatures (and hence more ice accumulation) toward the top of the graph. Numbers above this profile designate major climatic stages. The most recent subdivision (Stage 1) marks the warm interglacial period that has presided during the past 11,600 years and which is termed the Holocene. This was preceded by the last ice

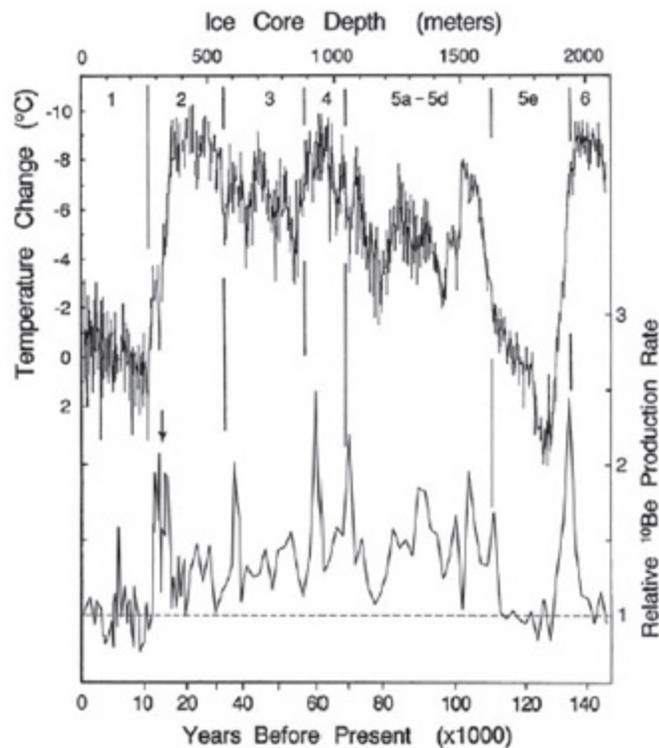
age, a 60,000-year-long glacial period that North American geologists call the Wisconsin, and which subdivides into late, middle, and early glacial phases (Stages 2, 3, and 4). This, in turn, was preceded by the Sangamon (Stages 5a through 5d), which was a 40,000-year-long semiglaciaded interval, and was preceded by the Eemian (Stage 5e), an 18,000-year-long interglacial similar to our own. One is tempted to identify this preceding warm interglacial period with the “Eden” or “Golden Age” described in ancient writings. Finally, the record ends in the middle of another fully glaciaded interval termed the Illinoian glaciaded (Stage 6).

Estimating the Superwave’s Intensity

Cosmic ray electrons currently make up only about 1 percent of the total cosmic ray background flux, the other 99 percent being cosmic ray protons, mostly coming from outside our Galaxy. The current beryllium-10 background level is chiefly produced by this extragalactic proton component. Because the superwave would be almost entirely composed of cosmic ray electrons, its flux must increase by a hundredfold above the present cosmic ray electron background for its intensity to equal that of the proton background. Since electrons are comparatively inefficient producers of the Be-10 isotope, the cosmic ray electron flux might need to increase a hundredfold to double the Be-10 production rate. In addition, the solar system’s heliopause magnetic field sheath screens out much of the incident cosmic ray flux, so superwave cosmic ray fluxes outside the solar system would be several fold higher still. Thus, the cosmic ray electron intensity outside the solar system could easily have increased 30,000-fold with the arrival of this recent superwave. Moreover, between 16,000 and 11,000 years ago, the solar wind was much stronger than it is today, since flaring activity was up to fifty times higher. An additional increase, then, should be included to account for the solar wind’s increased tendency to shield cosmic rays from the Earth. In all, cosmic ray electron intensities may have increased by over 105-fold.

Figure 3.8 shows that cosmic ray intensities were on the average higher during the glaciaded and semiglaciaded intervals (Stages 2–5d and 6) and comparably lower during both the current and previous interglacials (Stages 1 and 5e). The previous interglacial is flanked by peaks of high cosmic ray intensity, the earlier peak coinciding with the termination of the Illinoian ice age and the more recent peak coinciding with the onset of the Sangamon semiglaciaded interval. More recent cosmic ray peaks appear to correlate

with other climatic transitions. Even with this relatively sparse amount of ice core data, it is apparent that episodes of high cosmic ray intensity tend to occur at times of rapid climatic change. In particular, the most recent peak centered at 14,150 years B.P. coincides with a period of unusually warm climate. As we shall discover in chapter 5, superwaves can trigger climatic warming by pushing large quantities of cosmic dust into the solar system. Although the cosmic ray lull during the previous interglacial lasted about 16,000 years, there is no guarantee that our present interglacial will enjoy a similarly long period of quiescence.



*Figure 3.8. Lower profile: Cosmic ray intensity impacting the solar system during the past 145,000 years as indicated by beryllium-10 production rate over Vostok, East Antarctica, determined from ice core ^{10}Be concentration data (Raisbeck et al., *The Last Deglaciation*, p. 130). The plotted data has been adjusted by the author for changes in ice accumulation rate and has been normalized to present-day values. Values between 11 and 16 kyrs B.P. have been boosted up to 40 percent of peak values to compensate for the enhancement in solar wind screening during this period, which was reducing the intensity of cosmic ray radiation reaching the Earth. Upper profile: A plot of ambient air temperature during this period, as indicated by the ice core's deuterium (heavy hydrogen) content. (From Jouzel, *Nature*, p. 403.)*

In 1979, when I had decoded the astrological cryptogram and first developed the superwave theory, beryllium-10 data for the ice age period

had not yet been published. The first such profile was not forthcoming until 1981, and data used to construct the more detailed profile shown in figure 3.8 was not published until 1985. As we have seen, this data confirms the zodiac's a priori cosmic ray prediction. However, there is a large amount of other evidence, both astronomical and geological, that also supports the superwave theory. This is discussed in subsequent chapters.

FOUR

COSMIC DUST INVASIONS



Arrival

Legends from various cultures around the world describe the occurrence of terrible natural disasters affecting the entire globe. Although each of these is unique in its own way, they all share certain themes. One such theme concerns a period of darkness that lasts for many generations and during which the Sun, Moon, and stars become dim or disappear from view behind dark clouds in the heavens. Some legends associate this sunless period with a long interval of cold weather and glaciation; others connect it with a period of unbearable warmth in which the surface of the Earth becomes consumed in fire. Legends usually attribute this conflagration to intense radiation received from an unusually hot and active sun. Many legends also describe how great floods swept across the Earth, often noting that this flooding quenched the burning hot climate.

Some folklore suggests that these tragic events were associated with the arrival of “stinging” projectiles from the Galactic center constellation of Scorpio. Since this and various other zodiac constellations are connected with catastrophe legends and because the zodiac itself constitutes a time-capsule message that indicates the time and nature of a superwave-like event, we are led to conclude that these fabled disasters were brought about by a galactic superwave. However, cosmic rays alone cannot account for the diverse climatic effects that these legends report. Even at full intensity, the cosmic ray component of the 14,200-years-B.P. superwave would have imparted an energy flux of less than one thousandth of a percent of what

Earth receives from the Sun. To account for these catastrophes, a second culprit must have been involved—*cosmic dust*.

Astronomical observations indicate that our solar system is surrounded by a cloud of dust and frozen cometary debris that most probably is of interstellar origin. Normally, the solar wind keeps the solar system free of much of this dust. This outward breeze of ionized hydrogen and helium, continually emitted by the Sun, exerts a pressure on these outlying dust particles keeping them at bay. However, upon its arrival, a superwave cosmic ray volley would have countered the solar wind's expelling action and would have begun to push this cosmic dust back into the solar system.

Cosmic dust particles in the submicron size range (10^{-5} to 10^{-4} centimeters) would be particularly harmful from a climatic standpoint, as they efficiently scatter and absorb visible and ultraviolet light. Sufficiently large amounts of this dust in the interplanetary medium could have reduced or entirely blocked light coming from the Sun, Moon, and stars, thus accounting for the legendary references to the darkening of the luminaries. The dust would have altered the intensity and spectrum of solar radiation reaching Earth, with effects being most pronounced in Earth's polar regions. This could explain the strange climatic effects described in various ancient myths. For example, a simultaneous warming of the atmosphere and cooling of the ground could have created conditions favorable to glacial growth.

The invading particles of dust could also have energized the Sun. As these large amounts of material fell into the Sun, they would have increased the Sun's energy output and flaring activity to such an extent that Earth's climate would have grown unusually hot, drying forests and grasslands to the point that they could easily catch fire, hence the legends of the searing heat and great conflagration. Since Earth was glaciated at that time, this sudden climatic heating would have caused these continental ice sheets to melt rapidly and periodically to release immense quantities of glacial meltwater, thus accounting for stories of vast destructive floods sweeping the land. Figure 4.1 sketches out how a superwave-induced cosmic dust incursion could produce the variety of natural hazards described in the ancient legends.

Let us take a moment to consider how a superwave would have pushed this dust into the terrestrial environment. When superwave cosmic rays began arriving thousands of years ago, they would have first encountered the heliopause, an envelope of turbulent ionized gas that surrounds our solar system twice as far out as Neptune's orbit. The force of the blast would have compressed ionized gas lying on the upwind side of the heliopause, forming a bow-shaped shock front composed of a turbulent magnetized plasma (see figure 4.2). As these Galactic center cosmic rays passed through this bow shock, they would have become magnetically captured there to repeatedly cycle within it in tight spiral trajectories. As a result, the cosmic ray intensity in that region would have built up far above levels present in the superwave to form an intense "radiation zone" similar to that found in Earth's Van Allen radiation belts. Any comets, meteoric ice bodies, and smaller-sized ice debris drifting through this hot zone would have gradually vaporized, leaving behind dense clouds of water vapor and light-scattering dust particles. Under the constant pressure of the impacting superwave cosmic rays, shock front waves would have developed in this region and would have slowly transported this vaporized material into the solar system against the pressure of the solar wind.

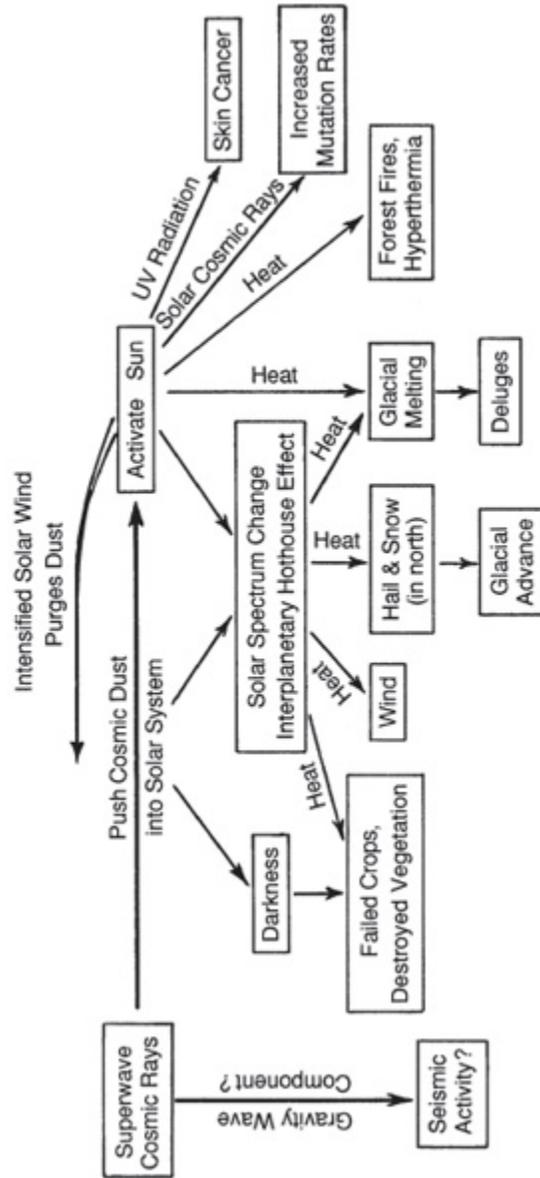


Figure 4.1. Various catastrophic effects resulting from a superwave-induced cosmic dust invasion.

The solar wind normally keeps the interplanetary cavity within the heliopause relatively clean by sweeping out any intruding dust particles. However, during a superwave event, its ability to cleanse the solar system would have been greatly diminished. Under the force of the superwave cosmic ray volley, the upwind side of the heliopause, which usually distends outward far past the orbit of Pluto, could have been pressed inward, possibly as far as the asteroid belt situated between Mars and Jupiter. With the solar wind's domain being restricted in this way, invading dust particles would have been able to accelerate inward under the attractive

influence of the Sun's gravitational field and to acquire sufficient momentum to keep them moving inward even after penetrating the solar wind's domain. Within months of the time the superwave first arrived, this invading dust would have begun to enshroud Earth, the Moon, the inner planets, and even the Sun.

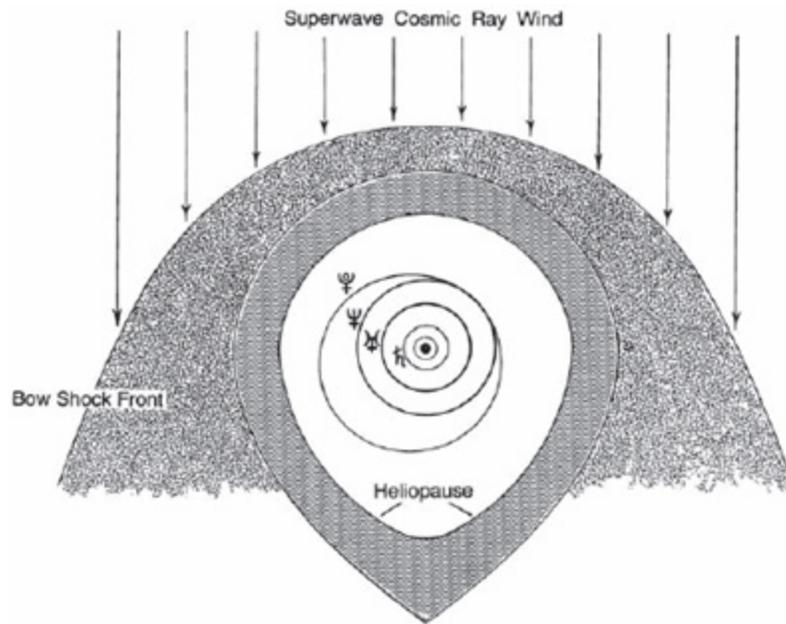


Figure 4.2. The solar system's ecliptic plane viewed from above showing the surrounding heliopause sheath and bow shock front produced by the impact of the superwave cosmic rays (arrows). Large concentrations of cometary debris are now known to reside outside the orbit of Saturn (\tilde{r}).

The Age of Darkness

In several places, the Old Testament refers to a rapidly approaching attack that brings darkness. For example, chapter 4 of the Book of Jeremiah states:

13. Behold, he shall come up as clouds, and his chariots shall be as a whirlwind: his horses are swifter than eagles. Woe unto us! for we are spoiled.



Figure 4.3. Appendages of interstellar hydrogen gas and light absorbing dust extend outward from the Eagle Nebula, located seven thousand light-years away in the constellation Serpens. Small globules of even denser gas are buried within the pillars, the tallest of which (left) measures about a light-year in length from base to tip. Similarly dense shrouds of dust may have invaded our solar system during the last ice age. This picture was taken with the Hubble Space Telescope Wide Field and Planetary Camera 2. (Photo courtesy of J. Hester, P. Scowen, and NASA.)

23.I beheld the earth, and lo, it was without form, and void; and the heavens, and they had no light.

24.I beheld the mountains, and, lo, they trembled, and all the hills moved lightly.

26.I beheld, and, lo, the fruitful place was a wilderness, and all the cities thereof were broken down at the presence of the Lord, and by his fierce anger.

Chapter 2 of the Book of Joel describes a period of darkness and widespread conflagration brought about by attacking forces. In this case, the event is something that is to take place in the near future:

1. Blow ye the trumpet in Zion, and sound an alarm in my holy mountain: let all the inhabitants of the land tremble: for the day of the Lord cometh, for it is nigh at hand;

2. A day of darkness and of gloominess, a day of clouds and of thick darkness, as the morning spread upon the mountains: a great people and a strong; there hath not been ever the like, neither shall be any more after it, even to the years of many generations.

3. A fire devoureth before them; and behind them a flame burneth: the land is as the garden of Eden before them, and behind them a desolate wilderness; yea, and nothing shall escape them.

4. The appearance of them is as the appearance of horses; and as horsemen, so shall they run.

5. Like the noise of chariots on the tops of mountains shall they leap, like the noise of a flame of fire that devoureth the stubble, as a strong people set in battle array.

6. Before their face the people shall be much pained: all faces shall gather blackness.

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

31. The sun shall be turned into darkness, and the moon into blood, before the great and the terrible day of the Lord come.

The appearance of the cosmic invaders, being likened to charging horses or horsemen, brings to mind the combative celestial figure portrayed in the constellation of Sagittarius, whom the Babylonians and Persians named “the Giant King of War.”

Chapter 13 of Isaiah prophesizes that light will be occluded from the celestial luminaries during this “day of the Lord”:

9. Behold, the day of the Lord cometh, cruel both with wrath and fierce anger, to lay the land desolate . . .

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

Perhaps the Old Testament's portrayal of the Lord as an angry father who inflicts cosmic catastrophes to punish mankind's sins originated during the last ice age, when humanity endured what may have been the worst global disaster of its entire history. Being overwhelmed by the magnitude of these events and not having a scientific understanding of what was happening, people naturally turned to supernatural explanations.

The Bundahis, a sacred text from Persia, tells of an evil spirit that appeared in the heavens at the close of a world age and waged a war of darkness against the planets and the Earth:

10. Afterwards the evil spirit [Ahriman], with the confederate demons, went toward the luminaries . . . and he led them up with malicious intentions.

11. He stood upon one-third of the inside of the sky, and he sprang, like a snake, out of the sky down to the earth.

12. . . . the sky was as shattered and frightened by him, as a sheep by a wolf.

14. . . . like a fly, he rushed out upon the whole creation; and he injured the whole world and made it dark at midday as though it were in dark night.

15. And noxious creatures were diffused by him over the earth, biting and venomous, such as the snake, scorpion, frog, and lizard.

16. And blight was diffused by him over the vegetation, and it withered away immediately.

20. . . . he saw the world dark as night, and the earth as though not a needle's point remained free from noxious creatures; the celestial sphere was in revolution, and the sun and moon remained in motion, and the world's struggle owing to the clamor of the Mâzînikân demons, was with the constellations.

24. And, afterwards, he [the evil spirit] came to fire, and he mingled smoke and darkness with it.

25. The planets, with many demons, dashed against the celestial sphere, and they mixed the constellations; and the whole creation was as disfigured as though fire disfigured every place and smoke arose over it.

26. And ninety days and nights the heavenly angels were contending in the world with the confederate demons of the evil spirit, and hurled them confounded to hell; and the rampart of the sky was formed so that the adversary should not be able to mingle with it.¹

The evil spirit that led the demons to attack the luminaries and afterward “came to fire” may be the superwave cosmic rays that were bombarding the solar system. The “noxious creatures” that diffused over the Earth, the “smoke and darkness” and “demons [that] dashed against the celestial sphere” and “mixed the constellations” would be the invading cosmic dust that the bombarding cosmic rays released from outlying cometary debris.

Reference to an ancient celestial catastrophe can also be found in American Indian legends. The Vilela Indians of Argentina have a myth that tells of how an offended spirit caused the Earth to be enveloped in an absolute darkness that lasted for an entire year.² The people starved to the point of eating their dogs. Finally the spirit summoned a strong wind, which blew away not only the darkness but the thatched houses as well. Afterward, the people were so weak that they crawled on all fours.

The neighboring Toba Indian tribe also has a tradition about a great darkness occurring long ago. It tells of how the sun one day disappeared, bringing starvation to the world. As the people ran out of food, they resorted to eating their children to stay alive. The Toba say that the cataclysm was brought about because the world had become overpopulated and needed to be saved.

The Codex Chimalpopoca, one of the sacred ancient manuscripts of the Toltecs of Mexico, relates a time in the distant past when a cosmic catastrophe brought a long period of darkness. In his history of the suns, the

author of the Chimalpopoca relates that the third sun, named the Sun of Rain brought a rain of fire and gravel in which all that existed burned. “The sun itself was on fire, and everything, together with the houses was consumed.”³ This was followed by a great deluge and by frightening celestial phenomena in which Earth was twice plunged into darkness, one episode lasting for 25 years.⁴

The Popul Vuh, the sacred text of the Quiché Mayan Indians of Mexico and Central America, tells of four ages of the world. The first was populated by men made of clay. They had language, but were inept, strengthless, and lacked intelligence. The Creator, the Heart of Heaven, caused them to be consumed by a flood of water. Afterward, a second race came into being that was made of wood. They moved about well, but were wanting in intelligence and had no memory of their maker. Because they forgot the Heart of Heaven, they were destroyed by a thick resin that fell night and day from heaven and darkened the Earth.⁵ This catastrophe was accompanied by fire and tremendous earthquakes, from which only a few escaped:

They were inundated and a thick resin fell from the sky . . . The face of the earth was obscured and a rain of darkness began, raining day and night . . . and there was a great din of fire above their heads . . . Then men were seen running about, pushing themselves, full of despair; they tried to climb on top of their houses but the houses would collapse making them fall to the earth; they tried to climb the trees but the trees would shake them far away; they tried to enter caves but the caves would close before them.⁶

The pitch falling from heaven may be a reference to the ensuing invasion of cosmic dust. The Heart of Heaven may signify the Galactic center, which indeed lies at the heart of the Milky Way. The Maya attributed the demise of the past worlds to their failure to pay homage to this divinity.

The Creator then made a third race of men, whose flesh was composed of yellow and white corn. They saw and understood all and gave thanks to those that had made the world, but because they were perfect, the gods

feared that man might make himself equal to them. The gods thus persuaded the Heart of Heaven to breathe a cloud over the pupil of their eyes, causing their sight to be contracted. During this period all was dark, save the white light of the morning star.

The Popul Vuh then describes the hardships that were endured during this period of darkness and how the people prayed for the return of light:

“Hail! O Creator!” they cried, “O Former! Thou that hearest and understandest us! abandon us not! forsake us not! O God, thou that art in heaven and on earth; O Heart of Heaven! O Heart of Earth! give us descendants, and a posterity as long as the light endure.”

It was thus they spake, living tranquilly, invoking the return of the light; waiting the rising of the sun; watching the star of the morning, precursor of the sun. But no sun came, and the four men and their descendants grew uneasy. *“We have no person to watch over us,”* they said; *“nothing to guard our symbols!”*

Now the Quiches had as yet no fire, and as the climate was much colder . . . they soon began to feel the want of it. The god Tohil in some way supplied them with fire. But shortly after there fell a great rain that extinguished all the fires of the land. . . . Several times their fire failed them, but Tohil always renewed it. Many other trials also they underwent in Tulan, famines and such things, and a general dampness and cold; for the earth was moist, there being yet no sun.⁷

The Popul Vuh goes on to explain that while waiting for the return of the light, the language of the families became confused, so that one tribe could no longer understand the speech of the others. We are led to conclude, then, that this Age of Darkness and cold lasted for many generations, with separate tribes living in relative isolation from one another. The legend describes how the people migrated in search of food during this desolate period:

They continued on their way amid the most extreme hardships for the want of food; sustaining themselves at one time upon the mere smell of their staves, and by imagining they were eating, when in verity and

truth they ate nothing. Their heart, indeed, it is again and again said was almost broken by affliction. Poor wanderers!⁸

Gradually they emerge from this period of continual twilight, the clouds grow brighter, and finally the sun appears, heralding the coming of the fourth world age:

At last they came to a mountain, that they named Hacavitz, after one of their gods, and here they rested—for here they were by some means given to understand that they should see the sun . . . It seemed to them that even the face of the morning star caught a new and more resplendent brightness. They shook their incense-pans and danced for very gladness: sweet were their tears in dancing, very hot their incense—their precious incense. At last the sun commenced to advance; the animals small and great were full of delight; they raised themselves to the surface of the water; they fluttered in the ravines; they gathered at the edge of the mountains, turning their heads together toward that part from which the sun came. And the lion and the tiger roared. And the first bird that sang was that called the Queletzu. All the animals were beside themselves at the sight. . . . The men prostrated themselves on the ground, for their hearts were full to the brim. And the sun and the moon and the stars were now all established [had become visible]. Yet was not the sun then in the beginning the same as now; his heat wanted force, and he was but as a reflection in a mirror; verily, say the histories, not at all the same sun as that of today. Nevertheless, he dried up and warmed the surface of the earth, and answered many good ends.⁹

Both in Mexico and in Central America the descendants of the Maya commemorate the successive renewals of the human race in the “fasting of four,” conducted during the month Izcalli. Humbling themselves, they implore the divinity to spare them from the return of these terrible calamities. These prayers are followed by dances and feasts that celebrate the restoration of the world and the triumph of humanity that three times had the good fortune to escape total destruction.¹⁰

Historians have established that the date August 13, 3114 B.C.E., marks the beginning of the Mayan Long Count calendar as well as the beginning of the Maya's present fourth world age. Interestingly, a significant spike in galactic cosmic ray intensity occurred close to this time, 3250 ± 200 B.C.E. (see figure 3.8), as did an abrupt climatic cooling, circa 3200 B.C.E. Consequently, the Mayan calendar appears to be marking the approximate date when our solar system was impacted by a superwave. Although the ice core cosmic ray record indicates that this was a relatively minor event compared with the one that occurred at the end of the last ice age, it was nevertheless the most significant such event to have occurred during our present interglacial period. The climatic cooling associated with this event was so sudden that live plants growing in the Peruvian Andes were flash frozen and buried in ice in a matter of hours. The same event may explain the fate of the "ice man" whose mummified remains were discovered in the Italian Alps in 1991. The relatively well-preserved body has been dated to be 5,300 years old. Studies suggest that he died of hypothermia. His body was apparently buried in a thick snowfall much like that which covered the plant found in the Peruvian ice cap. This event must have had a major global impact on human civilization, for with its end came the ending of the Neolithic period and the rise of the Nile Delta civilization and the founding of Old Kingdom Egypt around 3100 B.C.E.

The Mayan calendar makes explicit reference to the Galactic center by designating the solstice date A.D. December 22, 2012 as its calendric end date. That is, close to this date, the winter solstice, precessing along the ecliptic one degree every 72 years, coincides with the galactic plane–ecliptic crossing point, which lies just 6° northeast of the Galactic center (see figure 2.4). In other words, on this calendric end date the Earth's polar axis will be maximally pointed away from this galactic plane crossing point. Mayan lore associates this galactic plane crossing point with a violent cosmic birth process evoked by the cosmic Mother, the Heart of Heaven. Sacred Mayan writings teach that on 2012—5,126 years after the previous cataclysm—the present world age will come to a catastrophic end.

The Aztecs, like the Maya, remember a period of darkness. Their legend of the Return of the Sun speaks of a time when there had been no sun in existence for many years. Finally, an old man named Nanahuatzin sacrificed

himself by leaping into a fire, thereby transforming himself into a sun and bringing an end to the gloom.¹¹ The Aztecs, who remembered four rather than three destructions of mankind, also feared the return of these events. They believed that the planets and constellations could be transformed into fierce star demons of darkness, called the *tzitzimime*, who would attack the Sun and descend from the heavens to destroy the world (cosmic dust?).¹² These ominous events were believed to occur most likely during eclipses and on the last night of each of their 52-year calendrical cycles. To prevent their return, the Aztecs performed a night vigil and fire ceremony, about which D. Brinton writes:

On the last night of each cycle of fifty-two years, the Aztecs extinguished every fire, and proceeded, in solemn procession, to some sacred spot. Then the priests, with awe and trembling, sought to kindle a new fire by friction. Momentous was the endeavor, for did it fail, their fathers had taught them on the morrow no sun would rise, and darkness, death, and the waters would descend forever on this beautiful world. Quetzalcoatl, he who had made it, would destroy it.¹³

The Battle of Horus and Set

As explained earlier, astrology encodes two physics and astronomy themes: a scientifically advanced metaphysics describing how matter and energy become spontaneously created and a specific reference to the release of an energetic radiation volley from the Galactic center. The ancient Egyptian myth of the death and resurrection of the god Osiris is found to encode a similar dual message. On the one hand, it metaphorically presents an advanced science of how physical form (matter and energy) emerges out of the ether.¹⁴ On the other hand, it also expresses a related theme about how matter and energy explosively emerged from the Galactic center (as a superwave) and brought a period of darkness and chaos to the world. Let us consider how the Osiris myth develops this second theme.

The myth begins by describing the tranquil state that originally prevailed on our planet before the arrival of this cosmic onslaught. It tells of a period in which Egypt lived happily in an idyllic Golden Age governed by

the god Osiris, whom the ancient Egyptians equated with the metaphysical principle of orderly creation in nature. During this peaceful period he is said to have journeyed around the globe teaching all of humanity the arts of civilization. However, this pleasant era eventually came to an end when Osiris was murdered by his evil and jealous brother, Set. Set, who was regarded as the god of chaos and destruction, symbolized the dangerous aspect that emerges when the process of cosmic creation gets out of hand and turns destructive. Although he was usually depicted in the form of a wolflike beast, occasionally he also appeared in the form of a scorpion, and hence was associated with Scorpius, one of the two constellations that mark the location of the Galactic center.

According to Plutarch's version of the myth, Set carried out his evil deed with the aid of 72 confederates. He and his cohorts managed to trick Osiris into lying downed in a coffin, whereupon they slammed the lid shut and drowned him by dumping the coffin into the Nile. This was done "on the seventeenth day of Hathor, when the sun passes through the Scorpion."¹⁵ With Set's takeover, the world became plunged into darkness, chaos, and climatic upheaval. The Egyptians traditionally associated Osiris with the setting sun. His death through enclosure in a coffin would parallel the omission of life-giving light when the Sun became enclosed by an invading shroud of cosmic dust.

During this period of darkness and upheaval, Horus, the son of Isis and Osiris, sought to regain control of his father's kingdom. He and Set fought two vicious battles and became involved in an extended legal controversy over which of them should have the right to rulership. During this time, Horus presided over Upper Egypt, the Nile Delta and delta apex region, which included the sites of Heliopolis, Memphis, and Giza. Set presided over Lower Egypt, the southern Nile River Valley. This dark age eventually ended following a third battle, in which Horus finally defeated Set. With his victory, Horus gained control of the entire empire and brought order into the world once again. Whereas the demise of Osiris at the hands of Set was associated with the setting sun and with darkness, the subsequent victory of Horus was associated with the rising sun and the return of light.

The date of Horus's mythical victory was traditionally identified with the unification of Upper and Lower Egypt into a single kingdom, which

became the dynastic Egyptian empire of historical times. This unification of the “Two Lands” was marked by the zero date of the Egyptian Sothic calendar, which Schwaller de Lubicz and other Egyptologists have determined to be 4240 B.C.E. Curiously, on 4266 B.C.E., 26 years before this key date, the precessing vernal equinox would have made its closest approach to the Galactic anticenter. Thus, whereas the onset of global darkness is associated with the Sun’s “passage into Scorpio” (the arrival of the superwave from the Galactic center), the reappearance of light is associated with the opposite sky location, the direction the superwave would have been traveling when it departed from the solar system. In particular, on 4266 B.C.E. the ecliptic’s Galactic anticenter longitude would have just begun to cross the Celestial Equator to rise in the northern celestial sphere for the first time in almost 26,000 years. No wonder the ancient Egyptians honored this occasion by beginning their sacred calendar on this date!

The triumph of Horus over the forces of darkness was immediately followed by the resurrection of Osiris’s soul from its near death state in the netherworld. In this resurrected form, Osiris was often depicted standing erect and journeying through the heavens in his celestial boat, his soul being pictured as the constellation of Sahu, identical with the present-day constellation of Orion. So, in the context of the Galactic center battle symbolism described above, Orion would stand as a metaphor for mankind’s survival of the superwave onslaught, consistent with myths about the Orion constellation (chapter 3).

Robert Bauval and Adrian Gilbert have uncovered evidence of a close association between the Egyptian constellation of Sahu (Orion) and the Giza pyramids.¹⁶ They show that the three main pyramids—the Great Pyramid of Cheops, the pyramid of Chephren, and the Menkaure pyramid—are positioned in relation to one another on the Giza plateau in a manner that closely resembles the arrangement of the three stars making up Orion’s belt (Zeta, Epsilon, and Delta Orionis).^{*14} These belt stars held great importance for the ancient Egyptians, who used them in hieroglyphs as a symbol for Osiris (Sahu). Bauval and Gilbert also find that several other pyramids proportionately map out the positions of two other stars in Orionis as well as two key stars in the constellation of Taurus. They also note that

the southern air shafts of the Great Pyramid, which angle upward from the King's Chamber at 45 degrees and from the Queen's Chamber at 39.5 degrees, would have targeted, respectively, the stars Zeta Orionis (Osiris) and Sirius (Isis) at the time of their meridian transits (highest culmination), this occurring in the century 2500 B.C.E., about the time when the Great Pyramid is said to have been built. This supports their star map conclusion, as Zeta Orionis is the same star that the Great Pyramid would be representing in Giza's Orion belt map.

Robert Bauval and Graham Hancock further develop this land-sky correlation in their book *The Message of the Sphinx*.¹⁷ They show that the Sphinx, the three Great Pyramids, the causeways leading to the pyramids, and other monuments of the Giza necropolis form a huge astronomical diagram that maps the heavens as they were at the time when the vernal equinox was just about to enter the constellation of Leo—that is, around 10,730 B.C.E. (or 12,670 years B.P.). (Although Bauval and Hancock propose an earlier date of 10,500 B.C.E., we adopt the more accurate date of 10,730 B.C.E. calculated using the detailed precession equations of A. Berger.¹⁸) Bauval and Hancock find that on this date the star Zeta Orionis, and the Orion constellation as a whole, would have moved to its most extreme southward declination as a result of polar precession. Moreover, they find that in this epoch, Orion's three belt stars and the Leo constellation would have lain along the predawn horizon at the time of the vernal equinox. Thus, constellations associated with the Giza Sphinx and the Great Pyramid were both heliacally rising on this vernal equinox date! In that ancient time, Leo was oriented with its crouched body extending parallel to the horizon and looking much like the Giza Sphinx, which would have cast its gaze in that easterly direction.^{*15} Egyptian astronomers traditionally accorded great importance to heliacal star risings, the rising sun being regarded as a symbol of the first creation as well as of the reappearance of light and order in the world. Furthermore, funerary texts are known to link the Giza region with the Osirian netherworld, whose sky counterpart was believed to lie in the vicinity of the Orion constellation. For example, following his death, the king of Egypt was regarded as an incarnation of the deceased Osiris and was believed to resurrect skyward

from his tomb to take a place among the stars in Osiris's constellation, Sahu (Orion).

Reviewing this evidence, Bauval and Hancock suggest that the Giza temple complex and its associated funerary rites together compose an intricate message calling attention to particular constellations in a prehistoric epoch, but they do not entirely understand the purpose of this message:

Together with the ancient texts and rituals that are linked to them, could the vast monuments of the Giza necropolis have been designed to transmit a message from one culture to another—a message not across space, but across time? . . . the big question is no longer *whether* the monuments of Giza were designed to express key astronomical and mathematical principles, but *why*.¹⁹

Perhaps this question of *why* can now be answered if we realize that the Osirian myth was encrypting knowledge concerning events in prehistoric times connected with the arrival of a galactic superwave. As shown in subsequent chapters (6, 7, and 8), geological evidence indicates that a mass extinction episode occurred around 10,750 B.C.E. associated with a sudden heating of the Earth and abrupt release of meltwater from the glaciers. This appears to have been brought about by a solar event, possibly a nova-like outburst, triggered by the incursion of cosmic dust. As we shall see later, the solar heat and flood themes, traditionally associated with the constellations of Leo and Aquarius, which compose the form of the Giza Sphinx, appropriately call attention to this ancient catastrophe.

Coincidentally, close to this time, in 10,890 B.C.E., the Galactic center would have reached its highest sky elevation and the anticenter its lowest sky elevation. Of all the stars in Orion, the celestial meridian of the Zeta Orionis target star comes closest to the Galactic anticenter meridian, deviating from it by just one degree. Thus, Zeta Orionis may also have been intended as a visible marker for the Galactic anticenter, the anticenter itself having no visible star counterpart.

Like the zodiac, the megaliths at Giza were apparently constructed in an attempt to inform future civilizations of this ancient catastrophic flood and

to perhaps warn them that such an event could repeat. In validation of traditional lore, we see that these wondrous stone structures indeed stand as monuments to posterity, commemorating mankind's survival of this terrifying event and memorializing those who perished long ago.

Horus's Nearly Fatal Sting

The ancient Egyptians had another myth that more specifically referred to the dimming of the luminaries and to a period when the Earth was subjected to a fierce heat. This tragedy occurred when Horus, the god of light, had a close brush with death. This event took place during Horus's youth, when he and his mother were living in the swamps of the Nile Delta hiding from Set, the evil god of darkness, who then controlled the world.

As the story begins, Isis has left her child alone to go begging for food for the two of them. During her absence, Horus has the misfortune of being stung on the foot by a scorpion while walking through the delta marshes. (In some versions he is bitten by a snake.) As he lies close to death, darkness comes to the world. Finding her son limp, Isis frantically entreats the High God, Atum-Re, to intervene. Her crying request reaches Re's boat, variously known as the Boat of Millions of Years and the Boat of the Sun. Upon hearing her pleas, the divine crew causes the cosmic wind to cease its blowing and the boat comes to a standstill. When it draws level with her, the sun stops in the heavens and remains stationary.

Then Thoth, the scribe of the gods, descends from the boat to speak with her. He tells her that all has become dark and that light has been driven away until Horus recovers his health. Thoth then attempts to exorcise the poison out of Horus by reciting the following magical spell:

Back, O Poison! You are exorcised by the spell of Re himself.

It is the speech of the Greatest God which turns you away.

The boat of Re will stand still and the sun remain in its place of yesterday until Horus recovers—to his mother's delight . . .

All the present misery of [the world] will keep coming back until Horus recovers—to his mother's delight.

Darkness will cover everything and there will be no distinction of times, nor will any shapes of shadows be seen until Horus recovers—to his mother's delight.

Wells are dry, crops wither, vegetation is withheld from mankind, until Horus recovers—to his mother's delight.

Down to earth, O Poison! so that all hearts rejoice and the light of the sun go round once more . . . [20](#)

Soon after Thoth finishes his recitation, empowered by the sun god Re, he precipitates this poison to the Earth, and Horus eventually revives. Things then again return to normal, as the Sun recommences its usual circuit through the heavens.

The scorpion sting may be referring to the cosmic ray volley emitted from the Galactic core near the Scorpius constellation that eventually poisons the solar system with light-occluding cosmic dust particles. As light scatters from this dust and bathes the Earth in a uniform twilight glow, it appears as if the Sun has stopped moving through the heavens. Nevertheless, this poison is eventually expelled by the Sun's power (Re's power)—that is, through the force of its radiation and particle wind pressure. Light returns to the world and the Boat of the Sun resumes its normal course through the heavens.

Note the strong similarity between this myth and the story of Orion's death from a scorpion sting to his foot (chapter 3). This parallelism is better appreciated when it is realized that the Egyptians identified the constellation of Orion with Osiris, Horus's resurrected father. The Orion myth, then, appears to have descended from this ancient Egyptian story of how the Earth became shrouded in darkness.

Validation

In mid-1979, after deciphering the zodiac's Galactic core explosion message, I began an investigation to determine whether a Galactic core explosion cosmic ray volley had affected the Earth's climate and biosphere in the relatively recent past and, if so, to evaluate what impact it may have had. Study of this subject had considerable scientific merit in its own right

regardless of whether the zodiac cipher was interpreted correctly. I realized that proper investigation of this phenomenon would require delving into a wide variety of science disciplines (figure 4.4). Fortunately, at the time, I was enrolled in the Portland State University Systems Science Ph.D. program, one of the few doctoral programs in the United States that emphasized an interdisciplinary approach to research and problem solving. Seeing that this project was particularly well suited to such an approach, I chose the galactic superwave phenomenon as the subject of my doctoral investigation.²¹

Very early in this study I realized that an intense cosmic ray wind would have exerted sufficient pressure to push forward interstellar dust particles and that if high concentrations of dust existed just outside the solar system, a substantial amount of that dust could have been pushed into the Earth's vicinity. I reached this conclusion at a time when astronomers had no cause to believe that interstellar dust lurked in the immediate vicinity of the solar system or that such dust may have recently entered the interplanetary environment. Thus, at the time, this dust incursion hypothesis was quite a novel idea.

I further surmised that if large quantities of such cosmic dust had entered the solar system during the last ice age, a substantial amount should have fallen on the Earth's surface, and the best place to look for such evidence would be in the Earth's polar ice record. Ice hundreds of meters below the surface, dating from the end of the last glacial period, would be expected to contain much higher concentrations of cosmic dust than more recently accumulated snows. Since terrestrial dust falls onto the ice cap surface at a very slow rate, cosmic dust makes up a substantial fraction of the total dust influx, and hence would be much more easily detected in polar ice as compared with land and ocean sediments in the more temperate regions. Also, polar ice has the advantage that it preserves its contents in a relatively undisturbed frozen state, unlike ocean sediments, whose layers are regularly mixed by bottom-dwelling organisms, or land sediments, which are subject to wind erosion and disturbance by burrowing animals.

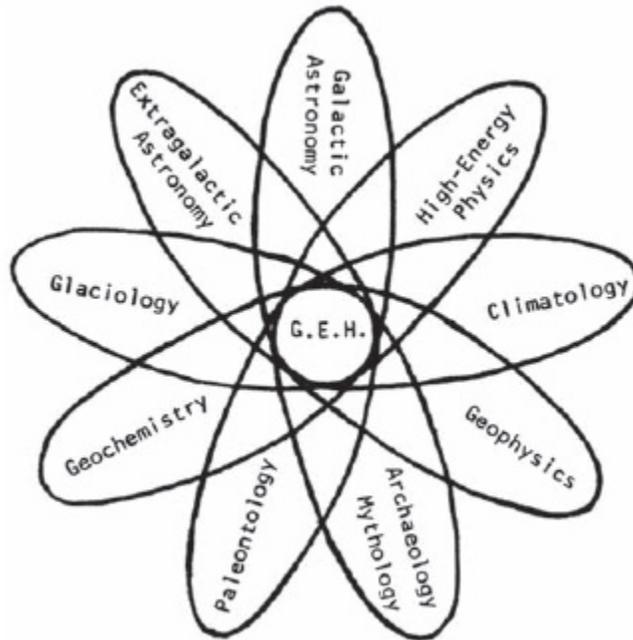


Figure 4.4. The variety of disciplines brought together to evaluate the superwave concept.

The amount of cosmic dust present in a sample of prehistoric ice may be determined by measuring the sample's content of iridium. Like platinum, osmium, and gold, the precious metal iridium is very rare on Earth but quite abundant in extraterrestrial material. By using a sophisticated analytical technique called *neutron activation analysis*, it is possible to determine the amount of iridium in an ice sample and use this as a direct indicator of the sample's cosmic dust content. In carrying out neutron activation analysis, the dust samples are irradiated in a nuclear reactor for about a month, then they are transferred into special counting vials, and finally their emitted gamma ray activity is counted using a gamma ray spectrometer. By analyzing the heights of the gamma ray peaks in the resulting spectrogram, it is possible to determine a sample's elemental abundances. This is the same technique used by the group of University of California Berkeley scientists in their discovery that 65million-year-old sediments contained high concentrations of iridium, a key piece of evidence indicating that an impacting asteroid or comet had caused the extinction of the dinosaurs.²²

Ice-age polar ice, though, is relatively precious. To get a sample of it, one must drill hundreds of meters beneath the ice cap surface using elaborate equipment. The deep ice cores drilled at Camp Century,

Greenland, and at Byrd Station, Antarctica, in the early 1960s had total lengths measured to bedrock of 1,387 and 2,164 meters, respectively. Several summer seasons are often needed for the operation, and because the locations are remote from coastal waters, the drilling teams and their support operations depend heavily on air transport; see figures 3.7 and 4.5 for locations. Not surprisingly, such drilling projects cost millions of dollars to complete.

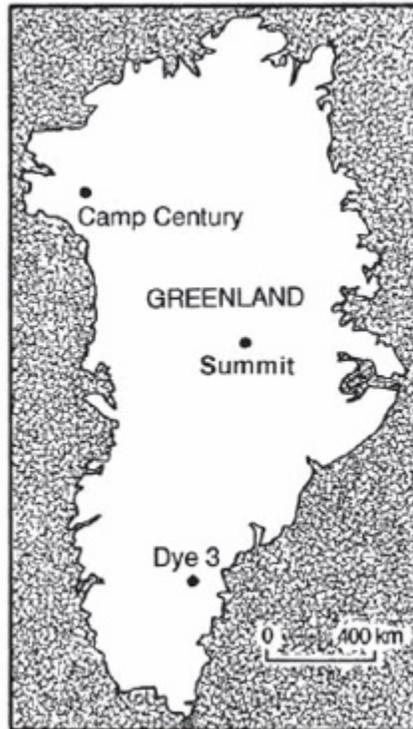


Figure 4.5. Map of Greenland showing sites where deep ice cores have been drilled.

Nevertheless, it became evident that the zodiac's Galactic core explosion message could best be tested by checking whether polar ice samples dating from that terminal ice age period contained unusually high concentrations of extraterrestrial dust. At that time, scientists had determined just present-day cosmic dust influx rates, analyses having been made only of recently deposited snows and ice core samples dating as far back as 700 years. Although ice core samples dating from the last ice age had been available as early as 1963, no attempts had been made to determine the cosmic dust content of those samples. For more than a century, books had been written suggesting that biblical catastrophes might

be due to some kind of cosmic event, such as the impact of a comet or asteroid,²³ ²⁴ or to the passage of a planetary body.²⁵ Glaciologists, however, either were not aware of these theories or did not take them seriously enough to warrant a check of prehistoric ice. Assuming that the cosmic dust influx rate has not changed appreciably for many millions of years, they expected that their studies of recent snow and ice would accurately represent the long-term situation.

The ice core study I carried out in 1981 and 1982 showed that this uniformitarian assumption is unfounded. I discovered that ice samples dating from the last ice age contain much higher concentrations of cosmic dust than do present-day snow and ice, indicating that cosmic dust must have been entering the Earth's atmosphere at a much faster rate at that early time. I arrived at my findings by analyzing eight dust samples filtered from ice from the ice-age section of the Camp Century, Greenland, core. I had tried to pick samples that spanned the date of the superwave event described in the zodiac cryptogram. However, several years after the study's completion, the chronology of the ice record became revised due to the appearance of new ice core data. As a result, these samples turned out to be much older than I had first thought. Their ages have now been determined to range from about 35,000 to 73,000 years B.P., indicating that they span the early and middle part of the ice age, rather than the more recent Late Wisconsin stage.^{*16}

Unfortunately, I was unable to secure funding to carry out additional tests on the correct portion of the ice core; see the struggles described in appendix C. My discovery of ice core evidence of the 15,800-years-B.P. event had to wait almost two decades, until September 2000, when I was to discover "smoking gun" evidence of this cataclysm in Antarctic polar ice; see the next section. Nevertheless, the results of the Portland study, presented in figure 4.6 (lower profile), were a very important geological and astronomical find. They showed that, at certain times during the last ice age, cosmic dust was accumulating on Earth's surface hundreds of times faster than it does today.²⁶ ²⁷ ²⁸ This polar ice cosmic dust discovery was the first of its kind. It was comparable to the discovery of extraterrestrial material at the Cretaceous/Tertiary boundary marking the extinction of the

dinosaurs. In this case, however, the discovery was of a much more recent event, one that occurred within the time span of the human race.

As in the Berkeley study, the Portland study determined the content of cosmic material in the ice core dust samples by measuring the content of iridium and nickel. Both of these elements are considered good indicators of cosmic dust content because about one hundred times more nickel and over ten thousand times more iridium are found in extraterrestrial material as compared with rocks that typically compose the Earth's crust. Consequently, it was not entirely a surprise to find that the iridium and nickel in the ice samples had the same relative ratio as the iridium and nickel found in extraterrestrial material. By knowing the weights of these elements in each ice sample, it was possible to accurately calculate the corresponding amount of cosmic dust. In this way, I found that six of the eight samples tested contained unusually high concentrations of cosmic dust.

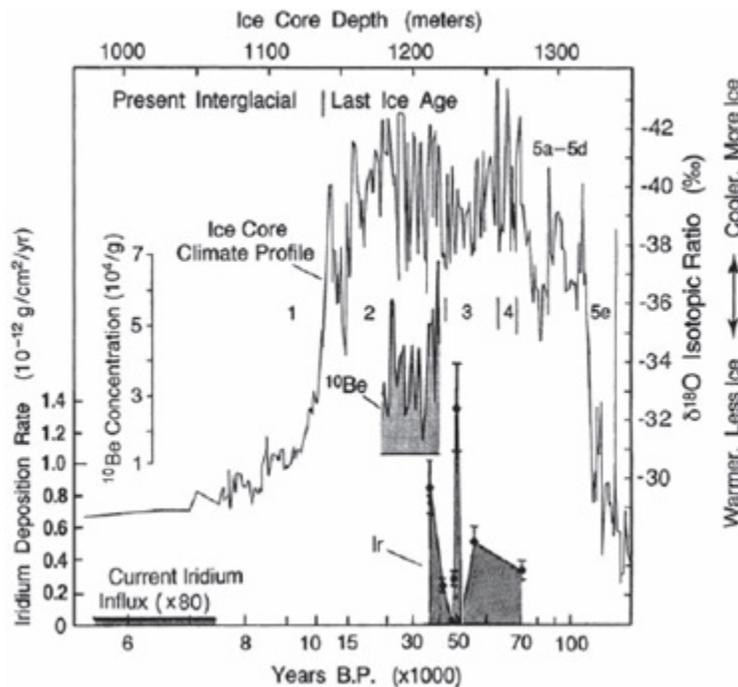


Figure 4.6. Variation of cosmogenic beryllium and iridium in Camp Century (Greenland) ice. Upper curve: The ice core oxygen isotope climatic profile. Middle curve: Beryllium-10 concentration (Beer et al., *The Last Deglaciation*, p. 140). Lower curve: Rate of iridium deposition during the last ice age and recent years indicating a change in cosmic dust influx rate (LaViolette, *Meteoritics*, vol. 20, p. 551).

We now know that the most recent of these cosmic dust peaks, dating from 35,300 years B.P., coincides with a period of high cosmic ray activity, possibly indicative of a superwave event. As seen in the middle profile in figure 4.6, a beryllium-10 (cosmic ray) peak spans the period 39,000 to 34,000 years B.P. This same cosmic ray peak is registered in the Vostok ice core Be-10 profile (figure 3.8), where it appears as one of the most prominent peaks of the entire series. The Lake Mungo and Laschamp geomagnetic excursions occurred around this time, an indication that the Earth's radiation belts were being overloaded with charged particles from intense solar flare activity.^{*17}

Five of the Camp Century ice core dust samples that I had analyzed for cosmic dust content had been sent to me by Ohio State University glaciologist Lonnie Thompson and had come from a collection of dust samples he had filtered in an ice core dust particle study he had carried out in 1975.^{29, 30, †18} In that earlier study, Thompson found that some of his dust samples from the ice-age portion of the Camp Century core had a very unusual composition, five out of seven of them containing dust particles enriched in tin, copper, and zinc. In particular, he found that two of these samples, dating from 50,000 and 121,500 years B.P., contained unusually high concentrations of tin-bearing particles. These particles were absent from the part of the ice core that spans the present interglacial.

These particles did not seem to be of volcanic origin, for they did not resemble volcanic dust particles in shape. Besides, volcanic dust particles occur relatively rarely in these dust samples. Moreover, these particles could not have been blown from ice-free continental regions that lay 3000 kilometers away, since many of the particles are so large (about a quarter of a millimeter) that they could not have stayed airborne long enough to have made the journey. The tin-bearing particles also were unlikely to be bedrock debris scraped up by the slowly moving Greenland glacier, as they are found in ice layers situated far above Earth's surface (at up to 180 meters in elevation). Besides, bedrock chips were absent from the samples, and there was no evidence that the ice in which the particles were found had been mechanically disturbed since the time of its initial accumulation.

The mystery of the origin of these tin-bearing particles, however, was soon resolved by the Portland ice core investigation. One of the tin-rich dust samples that Thompson had filtered from 50,000-year-old ice was among the eight dust samples that were analyzed to test the superwave hypothesis. As it turned out, of all samples tested, this one was found to contain the highest concentrations of iridium and nickel, indicating that it contained the highest concentration of cosmic dust. Tin was found to be the most abundant element, making up about 60 percent of the sample's weight. The sample was found to be enriched in gold, silver, and antimony as well. In total, about 70 percent of the dust in this sample appeared to be of cosmic origin! Some of the other samples having high iridium and nickel abundances also had traces of some of these heavy metals.

The Portland study was the first glaciological investigation to discover gold in polar ice. Gold is normally found to be about 35 times more abundant in meteorites as compared with terrestrial sediments; thus, it is not entirely surprising that it was found in conjunction with high levels of iridium and nickel. It was surprising, though, that it was present at a concentration of 19 parts per million, more than 100 times higher than is typically found in meteorites. If this dust had been easily accessible, rather than 1.2 kilometers below the surface of the remote Greenland ice cap, it would have been economical to mine as gold-bearing ore. Interestingly, the Scythians, from the northern Black Sea area, have a tale of how sacred gold once fell burning hot from heaven. In addition, the Peruvian Indians worshipped a god of riches whom they depicted as a horned and hairy rattlesnake with a tail of gold. They said that once long ago it had descended from the heavens in full view of all the people.³¹ Perhaps there is some truth to these tales that gold once rained from the sky.

Tin is a relatively minor constituent in meteorites, usually being present at only about two parts per million; therefore, the tin-bearing dust is unlikely to have come from meteorites entering Earth's atmosphere. Nevertheless, it could have been a major constituent of the interstellar dust that was being blown into the solar system during the ice age.

Tin has been found in cosmic dust particles that are currently entering Earth's atmosphere. During the mid-1970s, NASA began a program to use a high-flying U-2 aircraft to capture interplanetary dust particles drifting

down through the stratosphere. This produced a large inventory of particles representative of what is currently floating in Earth's immediate space environment. In 1981, one investigator reported finding that one of these interplanetary dust particles contained 3 percent tin, more than 10,000 times the concentration typically found in meteorites.³² In 1989, a researcher reported finding tin in another stratospheric cosmic dust particle at six times meteoritic abundances.³³, *19 The idea that interstellar dust might be entering the solar system became more soundly established in 1993, following the Ulysses spacecraft discovery that dust is currently coming into the solar system from the direction of the Galactic center.

Besides checking for iridium or nickel content, a way of determining whether the tin-bearing polar dust is of cosmic origin is to see whether the ratios of its tin isotopes match those found in terrestrial tin. Often the relative abundances of an element's isotopes can be quite different in material of cosmic origin as compared with standard ratios found in terrestrial rocks. This is because extraterrestrial dust drifting in space is exposed to relatively high intensities of cosmic ray radiation, which upon impacting the dust can induce nuclear transmutations and thereby alter its relative isotopic abundances. This is especially true of material that has been processed through a supernova explosion. Consequently, when a dust particle is found to contain an element that has anomalous isotopic ratios, this is a good indication that it is of extraterrestrial origin.

In 1982, then, I attempted to determine whether the tin in the 50,000-year-old glacial dust sample might contain such an isotopic anomaly. At that time, no one had investigated tin in meteorites to see if it contained any isotopic anomalies, although cosmochemists had noted that such anomalies might very well be found as tin has the most isotopes of any element, ten in all. The lighter and least abundant tin isotopes (tin isotopes 112, 114, and 115) were expected to be the most likely of all to have anomalous ratios. However, the neutron activation analysis technique I was using is not the best method to use in searching for such anomalies. As a result, I was able to determine the abundances of certain isotopes only to an accuracy of ± 5 percent. Because isotopic anomalies found in extraterrestrial material usually involve much smaller departures from the norm, they would be too

small to detect by this method. To detect such subtle deviations, one must instead do mass spectrometric analysis.

Finding someone capable of doing such mass spectrometry proved to be a relatively difficult task. Not only are mass spectrometers expensive pieces of equipment, but the experimental procedure to carry out the analysis is quite involved as well. Usually a scientist sets up to do just one group of elements, and may practice for years to perfect his measuring technique. Fortunately, at the 1983 Meteoritics Conference in Germany, I happened to meet John de Laeter, a mass spectrometrist from Western Australia who had substantial expertise in studying tin isotopic ratios. Several months earlier, he and his colleagues had developed an ionization technique that for the first time allowed accurate measurements to be made of tin's minor isotopes, the isotopes most likely to exhibit anomalies in extraterrestrial material. This brought them to prominence as world experts on tin isotopic abundances. Up to that time, his group had concentrated on making accurate measurements of terrestrial tin. Nevertheless, de Laeter took an interest in the tin-rich glacial dust sample and agreed to analyze its isotopic ratios.

Shortly thereafter, I sent him a small piece of the original dust sample, an amount sufficient for a single analysis run. Interestingly, the results showed that its tin contained significant isotopic anomalies. The tin-115 isotope was found to be abnormally overabundant by 3.3 ± 0.4 percent and marginal deviations were also found in the abundances of tin-112, -114, and -117. The results for this one analysis were consistent with an extraterrestrial origin for the tin. This was the first time that an isotopic anomaly was ever found in tin, and the first time that an isotopic anomaly of any kind was found in dust from polar ice. These discoveries would not have been made had the Portland polar ice study not been carried out. Unfortunately, the Australian group never found time to do a repeat check of their findings even though additional sample material had been made available to them, and as a result this data has remained unpublished in the scientific literature.

Particularly intriguing is the discovery of a cosmic dust episode that occurred about 121,500 years ago, when Earth was free of ice sheets, as it is today. During this episode, Earth's climate changed abruptly from

interglacial temperatures that were warmer than today's into full glacial conditions in much less than 100 years. Then, just as rapidly, Earth's climate rewarmmed, although it did not reach the warmth it had prior to the event. This cold spike is evident in the oxygen isotope climatic record shown in figure 4.6, where it is seen as a vertical line to the right end of the diagram in climatic stage 5e (ice core depth of 1,341 meters). When this feature was discovered, it alarmed climatologists. A group of glaciologists wrote a paper calling attention to the abruptness of this "catastrophic event" and to the fact that it came seemingly without warning during a period of climatic warmth similar to what we enjoy today.³⁴ At the time, glaciologists could find no satisfactory explanation for its cause. However, the results of the Portland ice core study provide a clue. Ice deposited during this event happens to contain high concentrations of tin-bearing dust particles similar to the ones found in the 50,000-yearold dust sample; thus, this earlier dust is in all likelihood extraterrestrial in origin. It is then reasonable to conclude that this event too was produced by an interstellar dust incursion episode. A high-resolution study of beryllium-10 in this portion of the ice record should tell us whether a brief superwave episode occurred at that time.

Discovery of the 15,800-years-B.P. Cosmic Event

In 1997, three glaciologists—Hammer, Clausen, and Langway—published a paper calling attention to a puzzling discovery of a highly acidic ice section found in the Byrd Station, Antarctica, ice core.³⁵ This feature, which they termed the Main Event records a century-long period when highly acidic aerosols were being deposited on the Earth's surface. The Main Event is easily seen in figure 4.7 (B) as the prominent acidity spike that juts up above the background average. Further investigation revealed that these deposited acids consist of hydrochloric and hydrofluoric acids (HCl and HF), whose concentrations rise and fall with time in a very regular manner; see the detailed plot in figure 4.8. Each meter of ice core depth here spans about 24 years.

Nearby volcanic eruptions have been known to deposit acidic aerosols in Antarctic ice. However, the discovery team found this interpretation

difficult for a number of reasons. First, the total amount of acid represented by the Main Event was found to be 18 times greater than the largest volcanic eruption registered in the entire Antarctic record! Second, this event lasted about one century, whereas volcanic eruptions typically last only two to five years. Finally, the timing of volcanic eruptions is highly irregular and hence volcanism fails to explain the unusual regularity of the peaks. Their paper left its origin essentially unexplained.

When I first came across this discovery in 2000, I quickly realized that the acids deposited during this event and their associated dust must have come from an extraterrestrial source, possibly an incursion of interstellar dust; see paper published in *Planetary and Space Sciences*.³⁶ The first thing that struck me was the timing of the Main Event. I noticed that it coincided with a time when global temperature abruptly dropped by an average of one degree centigrade, evident as the upward peak in figure 4.7A. Also, this event was followed by the climatic warming that brought an end to the last ice age.

The date of the event also caught my attention. Earlier I had developed a detailed chronology for dating the Byrd Station ice core by correlating its ice core depths with those of the well-dated Summit, Greenland, ice core profile.³⁷ My ice core chronology dated the Main Event at $15,800 \pm 500$ years B.P., which is 1,700 years earlier than the 17,500 years B.P. date assigned by its original discoverers. More specifically, it placed its beginning about 13,880 B.C.E. and its ending about 13,785 B.C.E. This essentially overlapped the date of 13,865 B.C.E. indicated by the zodiac constellation cipher!

Next, I noticed that the period between these acidity peaks averaged 11.5 ± 2.4 years, which matched the period of the eleven-year solar cycle. Unless this was just a strange coincidence, it would indicate that these acids had an extraterrestrial origin. The solar wind is known to wax and wane in strength with a similar eleven-year cycle. However, the idea that this material might have originated from the Sun, for example, as a result of some major solar outburst, didn't make sense, as its elemental composition did not match that of the solar wind. The answer did not come until 2003, when Markus Landgraf and the Ulysses team published observations made

with the Ulysses spacecraft. Ten years earlier, their data had shown that a wind of interstellar dust is presently blowing into the solar system from the direction of the Galactic center. Now, they found, in addition, that the rate of this dust influx is modulated by the phase of the solar cycle. At times when the Sun is at solar maximum, sunspot maximum, the interplanetary magnetic field becomes more turbulent and allows interstellar dust particles to penetrate more easily.

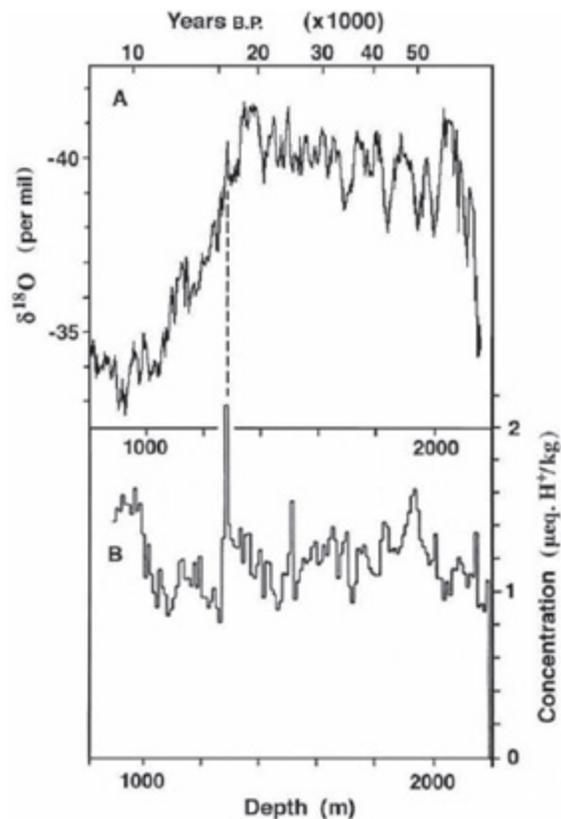


Figure 4.7. The 15,800-years-B.P. Byrd ice core acidity feature. (A) A record of Earth's climate as indicated by the oxygen isotope ratio of the ice (Johnsen et al., 1972). More negative values, toward the top of the graph, indicate cooler temperatures. (B) The degree of ice acidity as indicated by measurements of the electrical conductivity of the ice (Hammer et al., Climatic Change 35 (1997): 1–15). The height of the 15,800-years-B.P. spike is underemphasized here because the deposition of the Main Event spans just four meters of ice, whereas each data point graphed in B represents an average for a 10-meter-long ice core section.

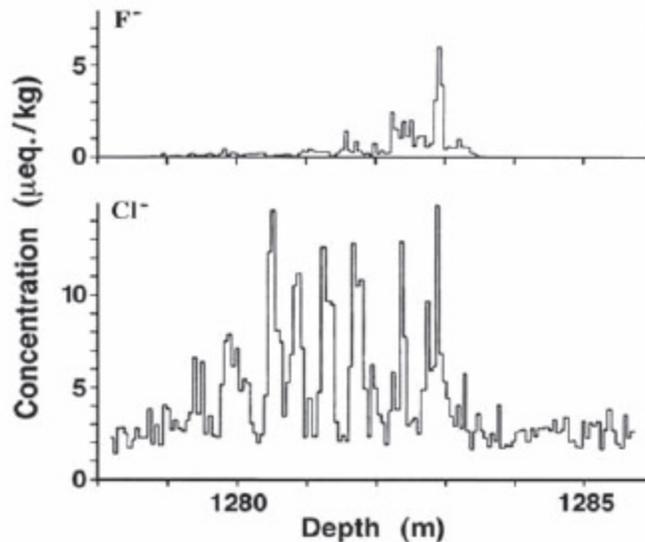


Figure 4.8. Cyclical acidity peaks recurring approximately every 11.5 years for fluorine ion (upper profile) and chlorine ion (lower profile). (Hammer et al., *Climatic Change* 35 [1997]: 1–15.)

Because interstellar dust currently enters the solar system in relatively low concentrations, it makes up a very small fraction of the dust falling onto the polar ice sheets and consequently its eleven-year cycle is masked by the much larger influx of terrestrial dust falling on the ice sheet. However, if an impacting superwave had vaporized frozen debris and caused the resulting dust and gas to invade the solar system at a much higher rate, say 30 million times the current influx, its eleven-year periodic signature would be sufficiently prominent to be visible in Antarctic ice above the terrestrial dust background. Thus, I concluded that the Main Event was, in fact, evidence of the cosmic dust incursion event that earlier I had sought in the Portland State University cosmic dust study.

Based on the quantities of acids and associated dust deposited in Antarctic ice during the Main Event, it is possible to calculate that the congestion of submicron interstellar dust particles in the inner solar system would have been high enough to have attenuated the sun's visible radiation beam by 18 percent, this absorbed fraction being subsequently reradiated in the infrared.³⁸ Moreover, there could even have been short periods when the Sun was almost entirely blotted out in the daytime sky. The resulting substantial change in the Sun's spectrum would have initiated significant changes in Earth's climate.

Although the HCl acidity peaks recorded in Antarctic ice faded out about one hundred years after they began, this does not necessarily imply that the interstellar wind had diminished at that time. More likely, the solar wind grew strong enough to deflect this incoming interstellar dust before it reached the inner solar system, thereby leaving Earth's immediate vicinity relatively dust-free. Indeed, there is evidence that the Sun became more active at this time, most likely due to the presence of this dust; see chapter 6. The energized Sun, then, would have been responsible for the global climatic warming that ensued.

By understanding the interplay that was going on between the incoming acidic interstellar wind and the outward-pushing solar wind that was shielding Earth, we gain a new appreciation of many ancient myths that allude to this cataclysm. One example is the ancient Egyptian myth related earlier that describes the battle between light, symbolized by Horus, and dark, symbolized by Set as the Scorpion. Horus is revived when Thoth, empowered by the sun god Re, precipitates this poison to Earth, a symbolic reference to these acidic aerosols entering Earth's atmosphere. Also recall that the Bundahis sacred text describes "noxious creatures . . . biting and venomous" diffused over Earth and making "the world dark as night." Ice core analysis reveals that the acid component of the Main Event outweighed the insoluble dust component by a factor of about three to one. Ancient reference to this acidic cosmic rain as "poisonous," therefore, would be quite justified.

Of course, there is much yet to be done to further establish the extraterrestrial nature of this acidic dust. The feature will need to be located in other ice cores and will need to be tested for the presence of iridium, nickel, chlorine-36, and other cosmic dust indicators.

In summary, the discovery of high concentrations of cosmic dust in Wisconsin-era polar ice and, in particular, the discovery of the Main Event, with its eleven-year solar cycle signature, provide some of the strongest evidence to date that our solar system was being flooded with large quantities of cosmic dust during the last glacial period. This and other astronomical evidence reviewed below suggests that our solar system was very dusty in prehistoric times, and suggests that there may be much truth to ancient legends that describe long periods of darkness and other strange

phenomena in the heavens. This is strengthened by the success of the Galactic superwave hypothesis, which as of this date has had fourteen of its *a priori* predictions verified by observation; see appendix C.

Dusty Aftermath

Once the superwave barrage had passed the solar system, our cosmic environment would have gradually begun to clear up. The cosmic ray wind force pressing the heliopause sheath inward would have subsided, leaving this shock interface free to move back out to its present position. At the same time, the influx of cosmic dust into the solar system would have progressively diminished. Much of the dust that once obscured the Sun and planets would have either fallen into the Sun or become expelled by the Sun's radiation and solar wind pressure. The interplanetary medium would have gradually returned to its present relatively dust-free state, allowing the Sun and Moon to be seen once again. Farther out, in the vicinity of the heliopause and its bow shock, cometary material would have stopped vaporizing, allowing these outer regions to clear up and the stars again to shine through clearly.

Today, only faint traces of this dust can be seen orbiting the Sun. Most of it is concentrated toward the ecliptic plane, forming what astronomers call the zodiacal dust cloud. Sunlight reflecting off these particles produces the "zodiacal light," a faint glow that can be seen on very clear nights extending along the ecliptic. Due to the dust's tendency to backscatter a significant amount of incident sunlight, this zodiacal light is perceptibly brighter over a twenty-degree-diameter area at a place in the night sky exactly opposite the Sun's daytime position. This "countershine," or *Gegenschein*, as it is called, is essentially a faint mirror image of the Sun that is most clearly visible at the midnight zenith. The zodiacal light and gegenschein are all that remain today of the strange bright illumination effects that once dominated the heavens during the last ice age.

Dust particles present in the inner solar system mostly orbit the Sun in prograde (counterclockwise) orbits—that is, in the same direction as the planets. As a result, astronomers have presumed that much of the dust in this portion of the zodiacal dust cloud has originated from short-period comets and asteroids, which happen to orbit in a similar direction. However,

they find that such sources cannot supply dust fast enough to account for all the dust currently amassed in the zodiacal cloud. The rest must be either interstellar dust that is left over from a time during the last ice age when the solar system was heavily dust-congested or interstellar dust that is currently penetrating the heliopause barrier despite the expelling action of the solar wind.

When observations of the zodiacal dust cloud are carefully examined, evidence may be found that it is composed predominantly of interstellar dust that has entered the solar system from the direction of the Galactic center. Infrared observations made with the IRAS satellite show that the orbital plane of the zodiacal cloud is tilted by 3 degrees with respect to the ecliptic plane, and that the ascending node marking the intersection of these two orbital planes is aligned close to the Galactic center direction.³⁹ Point A in figure 4.9 shows the position of this node based on measurements made in 1998 with the COBE satellite.⁴⁰ As I showed in 1987, interstellar dust particles entering the solar system from the direction of the Galactic center would have produced just such an alignment.⁴¹

Data received in 1992 from the Ulysses spacecraft provided further confirmation that much of the zodiac's dust does have an interstellar origin.^{42, 43} To the surprise of the Ulysses science team, dust particle detectors aboard the spacecraft indicated that most dust particles in the outer solar system do not come from the solar system but rather from interstellar space. They found that they are entering from the direction of the Galactic center along high-speed trajectories, thus confirming what the earlier IRAS data indicated! The particles were found to be of such a size (0.1 to a few microns in diameter) that they could effectively scatter and absorb sunlight. Point B in figure 4.9 indicates the direction from which this interstellar dust wind and its accompanying stream of helium gas are presently entering the solar system.^{44, 45} An interstellar wind of hydrogen gas has also been found to blow toward the solar system from this same general direction; see point B in figure 4.9.⁴⁶

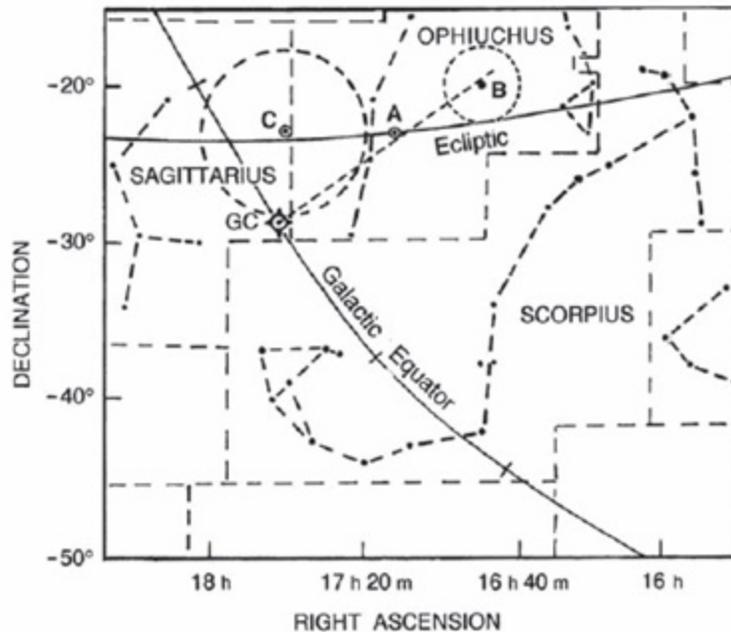


Figure 4.9. Sky map of the Scorpius region. GC marks the location of the Galactic center. Point A indicates the ascending node that marks the intersection of the zodiacal dust cloud orbital plane with the ecliptic plane. Point B indicates the direction from which the interstellar helium wind and the interstellar dust particle wind are entering the solar system. Point C indicates the direction from which the interstellar hydrogen wind enters the solar system.

Note that the interstellar dust and helium wind entry direction (point B) and the zodiacal dust cloud node (point A) lie within a few tenths of a degree of the Galactic center 0° longitude meridian (straight dashed line). These close alignments with the Galactic center are just what would be expected if a galactic superwave cosmic ray volley had recently passed through the solar system and propelled forward gas and dust, thereby implicating superwaves as the episodic driving force behind this wind. During such events, this wind would have been blowing with far greater force than is seen today.

In addition, there is evidence that the local solar environment is being bombarded by a low-energy flux of cosmic ray particles. The discovery that interstellar clouds contain high concentrations of ionized molecular hydrogen (H_3^+) has led investigators to conclude that these clouds are being excited by a low-energy galactic cosmic ray background wind that is 40 times more intense than previously thought.⁴⁷

Another piece of evidence suggesting that the solar system has experienced a recent superwave event comes from observations of the rings around the outer planets. From telescope observations, astronomers had known for some time that Saturn was surrounded by six concentric rings. These were presumed to consist of relatively homogeneous distributions of rock or ice. However, close-up pictures taken by the Voyager 1 and Voyager 2 spacecraft revealed that each of these rings consists of hundreds of thousands of fine ringlets resembling the grooves of a phonograph record (see figure 4.10). This discovery was perplexing, for it was thought that Saturn's rings had been in existence for many millions of years and that any such irregularities should have smoothed out long ago as the ring debris diffused from one region to another. Efforts were made, then, to think up various kinds of pattern-maintaining mechanisms that might be at work countering such natural diffusion processes. Photos taken several years later by Voyager 2 revealed that Uranus and Neptune also have rings with intricate, groovelike features. Therefore, astronomers attempted to devise explanations for those ring systems as well. In so doing, they overlooked the most obvious explanation—namely, that the rings of the outer planets are actually quite young and, as a result, simply have not been around long enough to become homogenized.

Several years prior to Voyager's Saturn encounter, two British astronomers had suggested that Saturn's rings may be a short-lived phenomenon.⁴⁸ Observing that one of the inner rings has been slowly moving inward toward Saturn, they concluded that all of Saturn's rings must have been in existence for no more than ten to twenty thousand years.

The superwave theory offers a natural explanation for the apparent youth of the planetary rings. A passing superwave would have pushed the heliopause sheath inward past the orbits of Neptune, Uranus, and Saturn, and within a few weeks the resulting high cosmic ray intensities would have vaporized any ice chunks that once composed their former rings. After the superwave had passed and the heliopause had expanded back out to its former position, nebular material in the outer part of the solar system would have been able to freeze again. This refrozen debris would have soon become gravitationally captured by the outer planets to form new sets of rings, each displaying an intricate pattern of grooves indicative of its youth.

Consequently, the rings of the outer planets offer one more piece of evidence that catastrophic events have indeed taken place in our solar system in the relatively recent past.

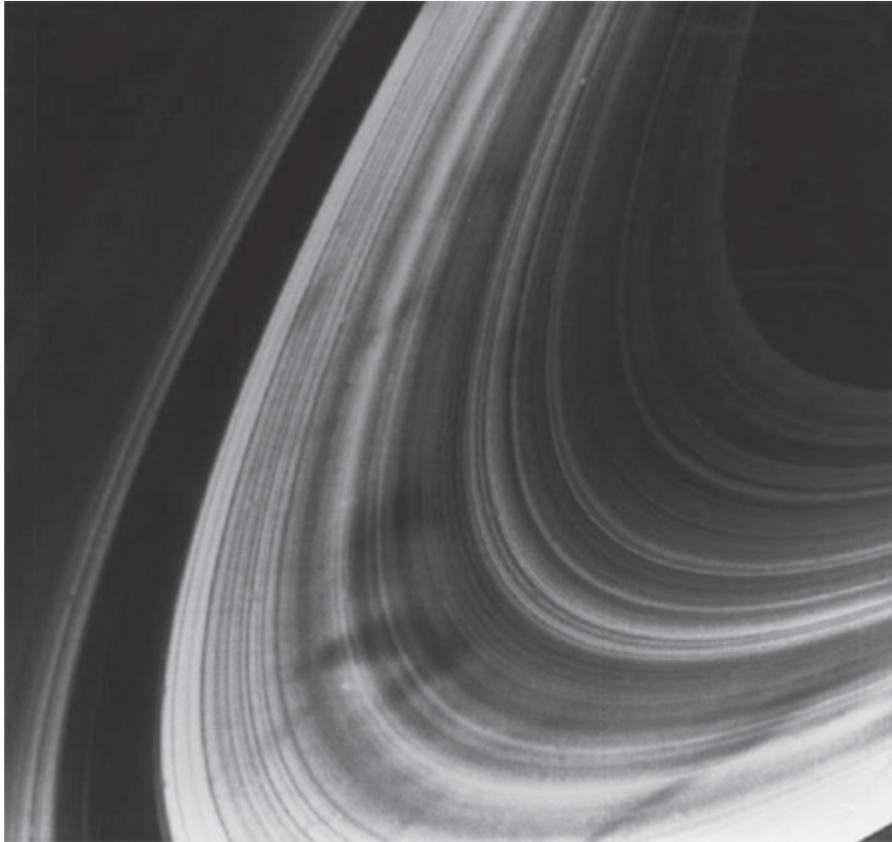


Figure 4.10. The rings of Saturn as photographed by the Voyager 2 spacecraft. (Photo courtesy of NASA.)

Thus we can see that the notion that interstellar cosmic dust has entered our solar system in large amounts, driven by a cosmic ray wind and affecting the Earth's climate in relatively recent times, has now become quite plausible.

Venus: The Star That Smoked

As the invading dust approached the Sun, it would have begun to vaporize and a portion of the resulting gases and submicron-sized smoke particles would have been pushed away by the outward pressure of the solar wind.^{[*20](#)} As this dust-produced smoke drifted out through the solar system,

considerable quantities would have accumulated on the leeward side of each planet, sheltered from the expelling action of the solar wind.

Unlike most other planets of the solar system, Venus does not generate a measurable magnetic field, so solar wind particles are able to bombard its upper atmosphere. Together with solar UV, this radiation ionizes Venus's atmosphere, producing an electrically charged ionosphere, or "ionopause," that envelops the planet. Electrodynamical interactions cause a portion of the solar wind magnetic field to become entrained so that this ionopause also behaves as a weak magnetopause. As the solar wind confronts this ionopause, it becomes compressed and forms a bow shock front on the upwind side as it deflects around the planet. Behind the bow shock on the upwind side, Venus's ionopause clings close to the planet. But on the leeward side, the ionopause is blown outward to form a cometlike tail extending for thirty million kilometers or more, a distance of more than twenty solar diameters (see figure 4.11).

During a superwave dust incursion event, smoke particles vaporized from the invading dust would become electrically charged and trapped within Venus's ionopause/magnetopause. Being partially protected from the expelling action of the solar wind, this smoke would accumulate there, attaining concentrations far higher than in the immediate interplanetary environment. The trailing veil of smoky dust would have scattered and reflected sunlight, giving Venus a cometlike appearance. Venus's cometary tail would have been visible to the naked eye extending outward perhaps ten degrees of arc. Other planets would also have developed dust plumes; however, such dust tails would have been most easily seen on the two innermost planets. Not only do Venus and Mercury receive more light due to their close proximity to the Sun, but because they are inner planets, their plumes would have extended perpendicular to our line of sight during part of their planetary orbit, making them easily visible. Since Mercury has a weak magnetic field, it also has a magnetopause with a cometlike tail. However, being 15 times more massive than Mercury, Venus would have accreted much more dust, thus making its tail more prominent.

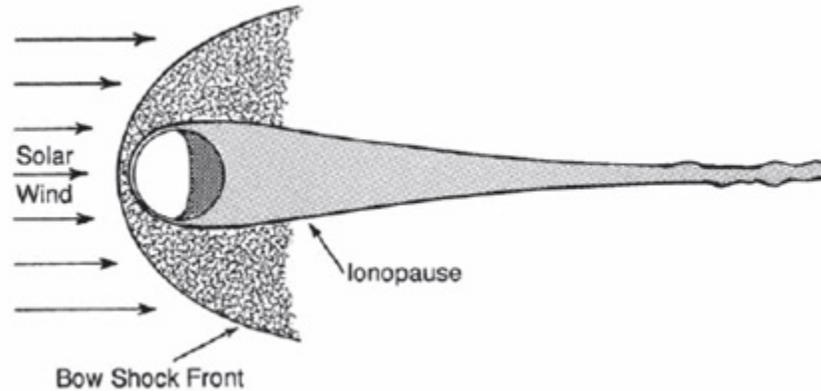


Figure 4.11. An illustration of Venus's ionopause and crowning bow shock front.

Traditions from pre-Columbian Mexico refer to Venus as “the star that smoked,” or sometimes as “the mane.”^{49, 50} The Vedas speak of Venus as looking like fire with smoke.⁵¹ The Chaldeans spoke of Venus as having “a beard.”⁵² These may be ancient observations of Venus being viewed at a time when its ionosphere was congested with dust. Depending upon the circumstances of its illumination, Venus's dust tail could have appeared as either fire or smoke, or, if in the form of filaments, it could have resembled hair. In fact, both the Arabs and the Babylonians named Venus *Zebbaj*, or “one with hair.”⁵³ The Peruvians still call Venus *Chaska*, meaning “wave-haired.”⁵⁴

Babylonian astronomical texts contain numerous references to “horns” appearing on Venus. The Phoenicians and Syrians referred to Venus as *Asheroth-Karnaim*, Ishtar of the Horns. The Hindu Vedas compare Venus to a bull, and the Egyptians worshipped her in the form of a bull. Venus could have had a hornlike appearance if its ionopause sheath had accumulated large concentrations of dust. In such a case, more scattered light would be seen coming from the sheath's outer layer, or rim, where one's line of sight would necessarily pass through a greater optical depth of dust. The parabolic shape of this rim on the leeward side of the planet would have given the appearance of a set of horns directed away from the Sun. Velikovsky suggests something similar in his book *Worlds in Collision*.^{*21} A set of horns could also have been produced by dust accumulating behind the bow-shaped shock front formed upwind of the

ionopause. The initially supersonic solar wind drops to subsonic speeds behind this front as it deflects around the planet and would be less effective there at sweeping away any cosmic dust particles. Therefore, large quantities of cosmic dust might accumulate in that region.

Such visual effects could also have been interpreted as wings, making Venus appear like a flying serpent or dragon. In fact, the ancient Toltecs of Mexico identified the Morning Star with their god Quetzalcoatl, whose name means “feathered serpent” and whose arrangement of feathers represented flames of fire. In his book on Mexican folklore, Brasseur de Bourbourg notes that this form of Venus was associated with an ancient cataclysm. He writes:

. . . Tiahuizcalpanteuctli or the Morning Star appeared for the first time following the convulsions of the earth overwhelmed by a deluge . . . This serpent is adorned with feathers; that is why it is called Quetzalcohuatl, Gukumatz or Kukulcan. Just as the world is about to emerge from the chaos of the great catastrophe, it is seen to appear. [55](#)

FIVE

THE AGE OF ICE



Thermal Freeze

The stories of global catastrophes left by our ancient ancestors are better understood if we examine how the invading dust would have disturbed the Earth's climate. Let us first consider the interplanetary hothouse effect that this dust would have produced (recall figure 4.1). Under the present conditions of low solar system dust concentrations, the Sun's radiation is able to shine outward relatively unimpeded. However, in a dust-congested solar system, a significant fraction of the light radiation would be absorbed and scattered. As much as several percent of the Sun's outgoing radiation could be returned toward the Earth and inner planets, partly as backscattered light and partly as infrared radiation from heated dust particles, adding to the radiation that the Earth normally receives directly from the Sun. This interplanetary hothouse would have substantially affected the Earth's climate, particularly in high-latitude regions. Due to the low angle of the Sun's rays, such polar regions normally receive little direct sunlight, so an increase in total received energy of even a few percent would have had an enormous impact.

As a second effect, the dust would also have altered the spectrum of the radiation coming directly from the Sun. As the encroaching dust became gravitationally drawn inward, it would have formed a dense, light-occluding cocoon around the Sun. This shroud would have absorbed a large fraction of the Sun's visible light and reradiated this absorbed energy as heat. As a result, the Sun's spectrum would have shifted toward the infrared as shown

in figure 5.1. Although this effect would have diminished the amount of visible light, it would not have affected the total amount of radiation reaching the Earth directly from the Sun.

With the current solar spectrum, a large fraction of incident sunlight is reflected from clouds and glaciated surfaces and thus is returned to space without having warmed the Earth. This would not be the case under a dust-obscured infrared Sun. Being more opaque to infrared radiation than to visible light, the Earth's atmosphere would capture much of the light that normally is reflected and would instead be warmed by it. Consequently, a dark infrared Sun would have produced global warming rather than global cooling. This radiation trapping-and-warming effect would have been greatest at the Earth's poles, where sunlight necessarily strikes at a low angle and hence passes through a greater amount of atmosphere than at mid-latitudes.

As a third effect, the inflowing dust would have caused the Sun to become much more energized than it is at present. Kinetic energy acquired by the dust as it became gravitationally drawn toward the Sun would have been released as heat when the dust impacted the Sun's surface. The added energy would have activated the Sun and caused it to become more luminous. The increased solar output would have added to the excess radiation the Earth was already receiving from the interplanetary hothouse and solar spectral shift effects.

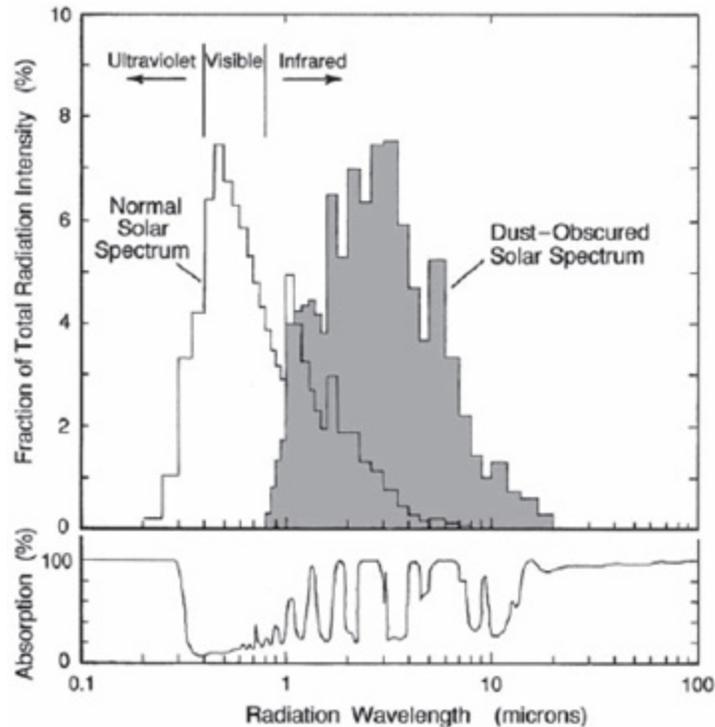


Figure 5.1. Upper profile: solar spectrum under its present dust-free condition and as it would be when altered by a light-obscuring dust cocoon. Lower profile: percentage of solar radiation absorbed by the Earth's atmosphere at various wavelengths for a 50° solar elevation.

By these various means, a cosmic dust invasion would have drastically changed the character of radiation reaching the Earth. Although our planet would have received less insolation at times when large concentrations of light-reflecting dust particles accumulated in its stratosphere or when a particularly dense intervening dust cloud scattered sunlight away, on the whole, a dust-congested interplanetary medium would have *increased* the amount of radiation reaching the Earth.

Strange as it may seem, moderate amounts of excess radiation input to the Earth's atmosphere would have induced glacial growth. Greater glacial cover, in turn, would have led to a global climatic cooling, as a cover of snow and ice would reflect sunlight that might otherwise have been absorbed by the ground. Only when the radiation input became excessive would this cooling effect be counteracted sufficiently to create a condition of global warming and ice sheet recession. This counterintuitive effect, whereby increased atmospheric heating would lead to a buildup of the

continental ice sheets, was well recognized by the 19th-century catastrophist and myth historian Ignatius Donnelly, who wrote:

Let us reason together: —

The ice, say the glacialists, caused the Drift [the vast deposits of clay, sand, and gravel found around the world]. What caused the ice? Great rains and snows, they say, falling on the face of the land. Granted. What is rain in the first instance? Vapor, clouds. Whence are the clouds derived? From the waters of the earth, principally from the oceans. How is the water in the clouds transferred to the clouds from the seas? By evaporation. What is necessary to evaporation? *Heat*.

Here, then, is the sequence:

If there is no heat, there is no evaporation; no evaporation, no clouds, no rain; no rain, no ice; no ice, no Drift.

But, as the Glacial age meant ice on a stupendous scale, then it must have been preceded by heat on a stupendous scale.^{[1](#)}

Another factor to consider is the tendency for the infrared component of this radiation to produce temperature inversion conditions that would be conducive to glacial growth. On a normal sunny day, sunlight is able to penetrate to the Earth's surface to warm the ground, thereby making the air temperatures warmest at ground level and progressively cooler at increasing altitudes. However, different circumstances would have prevailed during a dust incursion episode. Under a dark, dust-obscured Sun, where a large fraction of the incident solar radiation would have been received as infrared rays, little visible light would have reached the ground to warm its surface, whereas a relatively large infrared fraction would have been absorbed by the atmosphere. This would have produced an atmospheric temperature inversion, with temperatures being relatively cool at ground level and increasing at progressively higher altitudes.

The resulting temperature inversion would have been most severe in high-latitude regions, where infrared rays from the obscured Sun would necessarily pass through a greater amount of atmosphere and hence suffer greatest absorption. In addition, the inversion would have been more pronounced over high-latitude continental regions than over the ice-free

oceans since warm equatorial currents circulating toward the poles would have helped to moderate ocean surface temperatures. The combination of warm moist air coming from the oceans and the freezing ground temperatures that would have prevailed over the continental landmasses would have been ideal for rapid precipitation of hail, sleet, and freezing rain. Moreover, cool surface temperatures would have helped to maintain the accumulated ice cover all year around.

In this way, a superwave cosmic dust incursion could have either initiated an ice age or deepened an existing glacial period by increasing its glacial coverage. And, as mentioned earlier, a more extreme atmospheric warming could have terminated a prevailing ice age by causing its ice sheets to melt rapidly and recede. Thus, a superwave could have shifted the Earth's climate in either direction, depending on the circumstances.

Dark Clouds Up Ahead

The Earth has been in the midst of an ice epoch for the past 3 million years. Within this epoch, the Earth's ice caps have alternately expanded over the continents and contracted again, each glacial cycle lasting for 50 thousand to 100 thousand years. The previous ice epoch similar to the present occurred about 275 million years ago. In all, our planet is believed to have experienced seven ice epochs during the past 20 billion years, with long periods in between in which the continents have remained relatively free of ice sheets.

What causes these ice epochs? In particular, why is the Earth going through an ice epoch at this particular time in its history, after having enjoyed almost 275 million years of relatively ice-free conditions? Some believe that the positions of the continental landmasses play an important causal role. The slow process of continental drift has pushed the continental landmasses so that they are now positioned far to the north, isolating the icebound Arctic Ocean from the warmer currents of the Atlantic and Pacific and providing a surface where glacial ice sheets might secure a foothold. However, the positions of the continents do not tell the whole story. They do not explain why the Earth was relatively free of glacial cycles as recently as four or five million years ago, when the landmasses were not far from

their present positions. If the continents' positions were the cause, why didn't the present ice epoch begin much earlier?

Clearly, some other factor is involved, and that is cosmic dust. In the course of its orbit around the Galaxy, the Sun periodically passes through a supernova remnant or giant interstellar gas cloud, where it temporarily enters regions that are dustier than normal. During such a trek, which might last several million years, passing superwaves would push greater amounts of cosmic dust into the solar system, thereby perturbing the Earth's climate to a greater extent and bringing about a sequence of ice ages. On some occasions, a cosmic dust incursion might initiate a glacial period; on other occasions it might end a glacial period. Or, it might just produce a temporary climatic disturbance without appreciably changing the planet's state of glaciation. The Earth's response to these dust incursions would depend on a number of factors: the intensity and duration of the cosmic dust injection episode, the Earth's existing glacial state (e.g., whether ice sheets were present), the state of the ocean current "conveyor belt" that transports warm water into the North Atlantic, and the phase of the Earth's polar precession cycle. The Earth is plagued by the current ice epoch, with its ongoing series of glacial cycles, because the solar system presently is immersed in one such dusty environment. Once the solar system emerges from this region, the current ice epoch should gradually fade away.

Figure 5.2a presents a record of the Earth's glacial state over the past two million years. This includes the entire Pleistocene geological epoch, an interval that began about 1.8 million years ago and ended 11,600 years ago with the termination of the last ice age. Profiles 5.2b and -c present expansions of this record showing the more recent of these glacial cycles in progressively greater detail. The most recent ice age cycle is best seen on the left side of profile 5.2c. As in figures 3.8 and 4.5, the troughs, designated Stages 1 and 5e, represent the current and previous interglacials; the shaded peaks, designated Stages 2, 3, and 4, represent the Wisconsin ice age; and the intermediate peaks and valleys, marked Stages 5a through 5d, denote the semiglaciated Sangamon stage.

As seen in 5.2a, the nature of the glacial cycles changed rather suddenly about 800 thousand years ago. Before that time, the cycles had a shorter duration and the climatic swings were less extreme, with the Earth, most of

the time, enjoying a period of relatively moderate climate (below the central zero line). Following this event, the climatic cycles lasted almost twice as long (70 thousand to 100 thousand years) and the swings became more extreme, with the Earth spending most of its time in a cold glaciated state (above the zero line). This period of increased climatic cycle severity had an exceedingly abrupt onset, taking place within the space of a single glacial cycle. What might have initiated the current two-million-year-long ice epoch and subsequently caused it to experience a sudden and long-lasting climatic deterioration?

The answer to this mystery may be found in the southern heavens, where an immense nearby supernova remnant looms over about two thirds of the sky. The stellar explosion that produced this remnant is estimated to have occurred one million years ago at a site between the constellations of Lupus and Centaurus (figure 5.3).^{*22} The remnant has been named the North Polar Spur because part of its shell is positioned in such a way that it resembles a spur jutting from the vicinity of the Galactic center toward the Galaxy's north pole. The North Polar Spur is distinguished as being the closest supernova remnant to the solar system. Its center is estimated to lie 425 ± 250 light-years away. Because of its close proximity and very expanded size (about 750 light-years), it fills almost the entire southern sky.

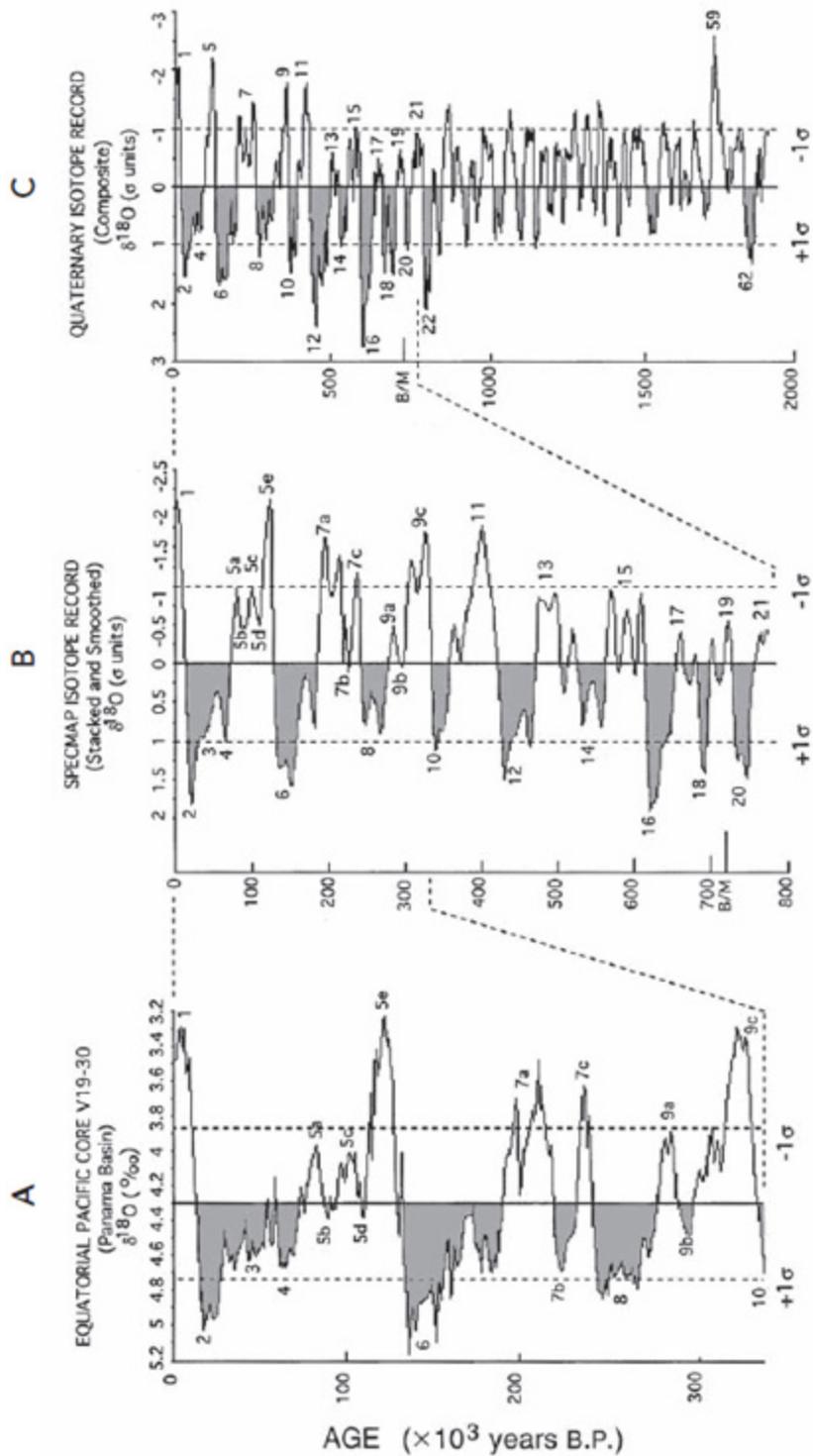


Figure 5.2. Marine oxygen isotope climate records (from Porter, *Quaternary Research*, figure 1). The shaded regions below the horizontal line indicate glacial periods; the peaks rising above the upper dotted line indicate warm interglacial periods. The numbers assigned to the peaks and valleys indicate climatic stages and substages.

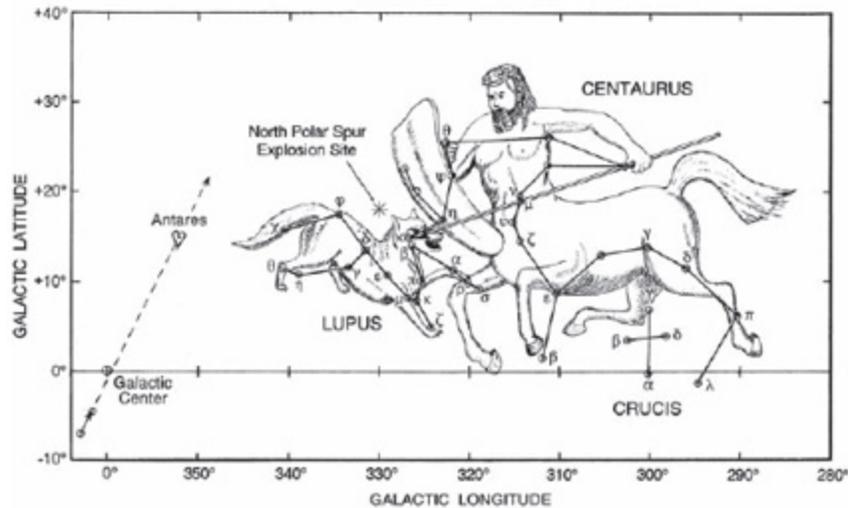


Figure 5.3. A galactic coordinate sky map showing the locations of the North Polar Spur, the Centaurus and Lupus constellations, and the Galactic center.

Figure 5.4 shows the remnant's position relative to the solar system from a perspective that looks down onto the galactic plane. Some astronomers suggest that the proximal side of the remnant has already engulfed us and brought clouds of frozen stellar debris (including cometary bodies) ominously close.² During a superwave passage, the cosmic ray radiation zone that would have formed around the solar system would have moved through this field of frozen material, vaporizing it and propelling the disseminated dust and gas into the planetary environment. As mentioned earlier, the influx of such material could have seriously disturbed the Earth's climate. The increased severity of ice ages over the past 800,000 years, then, may be attributed to the solar system's present immersion in this supernova shell.

It may be no coincidence that Centaurus is pointing the tip of his spear to a position about 4 degrees of arc from the spot where this supernova explosion occurred. As may be recalled from chapter 2, Centaurus is associated with the Crucis asterism, which serves as the Galaxy's southern one-radian marker. Hence, like Crucis, the Centaur was symbolically meant to stand immediately in front of our solar system, facing the Galactic center, which lies one "Galactic-radian" distance away from us. Poised with shield slung on his right arm, he attempts to fend off the onslaught of the cosmic ray "one-radian arrows" (Sagitta) that have journeyed the long distance

from the Galactic center. He thrusts out a spear in his left hand, ready to defend himself (and our planet) against Lupus, the Wolf, who challenges him with bared teeth. This scene is reminiscent of Orion with his lion-skin shield raised in an attempt to ward off the relentless charge of Taurus. By pointing with his spear, Centaurus appears to be telling us to beware of the North Polar Spur and the threat it poses. The constellation of Lupus, which is positioned between Centaurus and Scorpius, would signify the shroud of cosmic debris that now intervenes between the Sun and the Galactic center. It may represent the same Fenris-wolf that, in the Nordic tale of Ragnarok, swallows the Sun, Moon, and stars and brings darkness and ice to the world (see next section, Ragnarok). It also calls to mind Set, the wolflike beast of ancient Egypt who killed Osiris and brought darkness to the world.

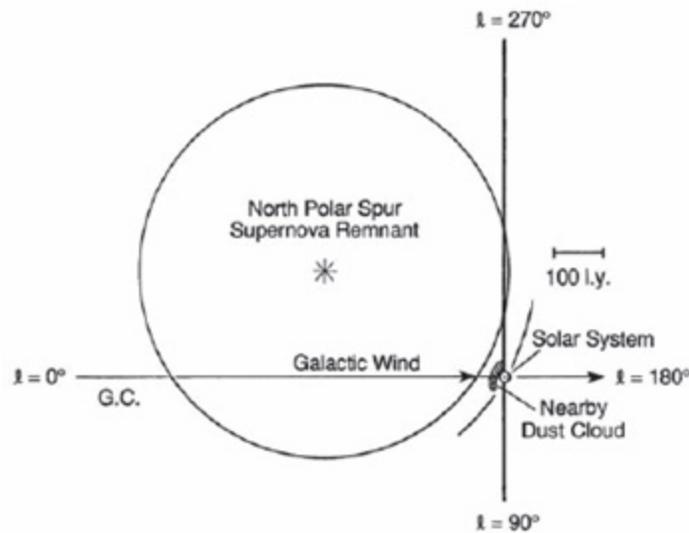


Figure 5.4. A view of the galactic plane as seen from above, showing the location of the Sun in relation to the North Polar Spur and the Galactic center. The arrow indicates the direction of approach of the interstellar wind. The arc added to the lower right indicates how a near lobe of the remnant may now be enveloping the solar system.

The debris from the North Polar Spur is accompanied by gas, whose presence in space is revealed by its tendency to partially extinguish ultraviolet light coming from nearby stars. Several clouds of gas have been detected close to the solar system. One cloud, whose densest portion measures 80 by 50 by 20 light-years in size, is centered about 25 light-years from the solar system on the side that faces the North Polar Spur and Galactic center (figure 5.4).³ Other observations show that the solar system

is itself immersed in a cloudlet of interstellar gas and positioned about 0.1 light-year from its edge (see figure 5.5).⁴ The interstellar dust particles that the Ulysses spacecraft observed entering the solar system most likely originate from this surrounding cloud. This cloudlet and the larger cloud that surrounds it are believed to be part of the North Polar Spur supernova debris. According to one estimate, a few thousand years from now our solar system should leave this cloudlet and enter an adjacent cloudlet within the larger cloud. A much longer period of time, perhaps as much as 100,000 years, will be required before we emerge from the larger cloud, whose edge lies about 4 light-years away from us. Perhaps the current 800,000-year period of severe ice-age cycles is due in part to our presence in this material.

Sky maps made with NASA's IRAS satellite also show that the solar system is closely surrounded by wisps of infrared-emitting dust, termed "infrared cirrus."^{5, 6} Other infrared observations made with a ground-based telescope indicate that the Sun, like other nearby stars, is enveloped in a thick sheath of dust 500 times denser than had previously been supposed.^{7, 8} Thus, there is abundant evidence that the solar system is currently surrounded by interstellar debris most probably left over from the North Polar Spur supernova explosion.

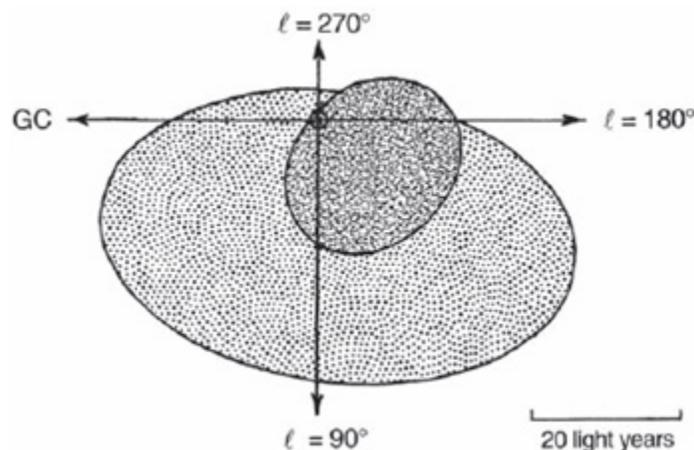


Figure 5.5. A view looking down onto the galactic plane showing the Sun's position within the local interstellar cloudlet. This cloudlet, which measures about 20 by 25 light-years in size, lies within a larger cloud measuring about 40 by 65 light-years. (Adapted from Linsky et al.)

In addition to microscopic light-absorbing dust particles, larger dust and ice aggregates are very likely to be present. This material would cover a whole range of sizes, from specks of dust to meteor-sized ice boulders and comet-sized masses. In fact, telescope observations made at Mauna Kea observatory in the early 1990s and confirmed in 1995 with the Hubble Space Telescope indicate that the outer part of the solar system harbors a belt of cometary bodies that begins just beyond the orbit of Neptune and extends outward many billions of miles.⁹ This so-called Kuiper belt is estimated to contain a billion or more frozen dust-laden masses ranging up to 100 kilometers in diameter. Short-period comets, those that circle the Sun with orbital periods of 200 years or less, are now believed to originate mostly from the Kuiper belt. Although astronomers speculate that this cometary reservoir has been present since the formation of the solar system billions of years ago, it is more likely composed of interstellar debris that has been captured much more recently, originating mostly from the North Polar Spur.

Such may be concluded by studying the trajectories of long-period comets. These are comets that originate from outside the solar system and make just one pass around the Sun, never to return. They are believed to have a much more distant origin than short-period comets. At first, long-period comets were thought to come from a spherical cloud of material that was believed to surround the solar system out to a distance of one light-year and be gravitationally bound to it. This Oort Cloud, as it came to be known, was believed to have existed since the time the solar system was formed and to contain from 100 billion to 1000 trillion cometary bodies. It was thought that random encounters among these bodies would occasionally send one careening into the solar system, where it would be temporarily visible as a long-period comet.

However, if this theory were correct, long-period comets should enter the solar system from all directions with equal probability, and this is not found to be the case. Instead, they consistently enter from the direction toward which the Sun and solar system are moving through the local interstellar medium. This indicates that long-period comets belong to a debris field that is at rest in the local interstellar frame of reference, rather than in the Sun's frame of reference, and that the Sun's own motion relative

to this field is responsible for the entry of these comets. The comets' relative motions and gravitational attraction to the Sun would cause them to swing into the solar system and out again along hyperbolic trajectories (figure 5.6). As the Sun moves through this field, some of these frozen bodies pass close enough to heat up. The larger ones would develop cometary tails sufficiently bright to be visible to astronomers as long-period comets. Thus, the occasional entry of these comets is a sign that the Sun is currently passing through the edge of the North Polar Spur supernova remnant.

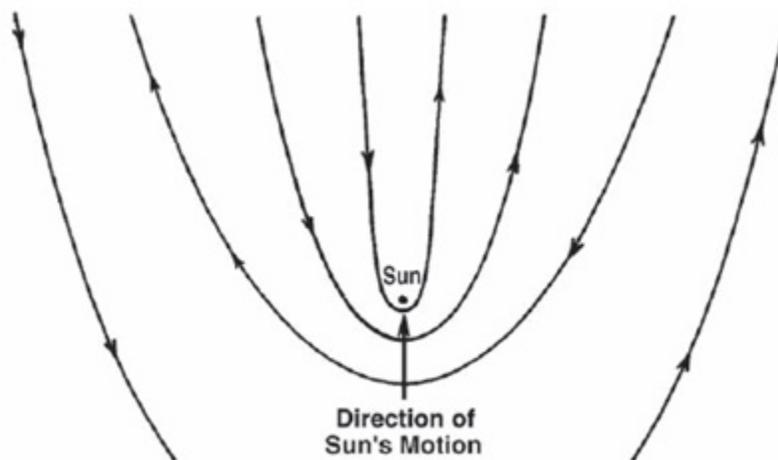


Figure 5.6. Hyperbolic comet trajectories resulting from the solar system's relative motion through a cloud of frozen debris. For simplicity, the trajectories are viewed from the perspective of an observer who is stationary with respect to the moving solar system.

In summary, there is overwhelming evidence that our solar system is currently transiting a region containing dust and large frozen masses in quantities sufficient to seriously affect the Earth's climate during a galactic superwave event. In particular, the current series of ice ages appears to be a direct result of the presence of this supernova debris.

Ragnarok (Twilight of the Gods)

The Edda legends of the Norse describe the frightful consequences of the passage of a galactic superwave in prehistoric times. The *Younger Edda* allegorically describes the cosmic circumstances that caused the ice sheets to form, whereas the *Elder Edda* allegorically describes the events that suddenly brought the ice age to a close. The *Younger Edda* conveys its

information through an interesting tale that explains how the Norse gods first emerged and how they created the Earth.[10](#), [11](#) It explains that in the beginning, the universe was a mighty chaotic void called Ginnungagap, or Yawning Gulf. This region was flanked to the north by Niflheim, the land of fog, and to the far south by Muspell (or Muspellheim), the land of the destroyers of the world. These two domains were characterized by extreme temperatures. Niflheim was icy cold; Muspell was bright and hot and burned with fierce flames. At the center of Niflheim lay a mighty ageless font of waters called Roaring Cauldron, from which flowed numerous rivers of poisonous scum, like “the slag that runs out of a furnace.” As it emerged, it hardened into black ice to form a slowly creeping glacier. The foglike vapors that rose from this glacier froze into layers of rime (ice formed by supercooled rain). Successive layers of this rime accumulated until, eventually, the entire northern quarter of the Ginnungagap was filled with a heavy crushing wasteland of ice and frost. Winds of hail and frozen torrents of rain whirled across these ever-growing mountains of ice.

Up to this point, the story appears to be describing the formation of the glacial ice sheets. The Ginnungagap was the name that the Norsemen of the eleventh century gave to the ocean lying between Greenland and North America[12](#)—that is, the body of water that includes Baffin Bay and Davis Strait. It is well known that during the last ice age a “wasteland of ice and frost” called the North American ice sheet covered this region as well as the North Sea. The above account from the *Younger Edda* may be one of the few surviving records that give a firsthand account of how the ice sheets formed. If it refers to events initiating the Late Wisconsin glacial advance, it could be reporting events that date back as far as 30,000 years. On the other hand, if it is referring to the beginning of the Wisconsin glaciation, it could be reporting events that took place as far back as 68,000 years ago! Interestingly, the story of the incessant freezing rain and the continuous ice buildup fairly accurately describes what could have occurred during a cosmic dust incursion episode.

The myth goes on to further develop this glacial theme. It explains that the frozen scum which flowed from Niflheim melted and dripped away where it met the livid heat of Muspell. These drops then fused to form the first living creature, an evil ice giant named Ymir. For long ages Ymir lay

sleeping in this seething slurry of mud and ice. However, eventually, as his body congealed, he began to sweat, causing a male and female to grow from under his left arm. From the union of his feet, there emerged a six-headed son. These creatures together begat the race of the Frost Giants.

The filling of the Ginnungagap with ice, the creation of the ice giant, Ymir, and the birth of the Frost Giants all appear to be metaphorically describing the formation of the continental ice sheets. Muspell, the “fiery center of the universe” whose heat forms these extensive ice fields, could signify the exploding core of our Galaxy.

The myth relates that a giant cow, Authumla, also took form where the heat of Muspell melted the ice of the Ginnungagap and that Ymir suckled on her milk. Seeking sustenance, Authumla licked the continents of ice stretching out about her and in so doing uncovered the form of a man frozen in the ice. This was Buri, the ancestor of the gods. He begat a son, named Borr, and Borr wedded a giantess who gave him three powerful sons: Odin (Spirit), Vili (Will), and Ve (Holy). With the birth of the gods, good emerged into the universe. However, out of hatred, the evil ice giants began to fight with the gods. After some time, Borr and his three sons succeeded in slaying Ymir, their deadliest foe. The resulting flood of blood drowned all the giants with the exception of Bergelmir and his wife, who escaped in a boat. This “Noah” of the giants took up his abode in a place called Jotunheim, the home of the giants. Here, he and his wife begat a new race of Frost Giants, who were ever ready to venture forth and raid the territory of the gods.

The Younger Edda seems to suggest that the ice age was ended by a warm interval in which the continental ice sheets, represented by Ymir, rapidly melted and flooded the surrounding land. This is what actually took place. The Greenland ice core climatic profile in figure 5.7 shows the sequence of warming events that ended the ice age. First there was a moderate period of warming called the Pre-Bölling interstadial, which began around 15,800 years B.P., close to the date indicated in the zodiac cipher.^{[*23](#)} This was followed by several centuries of cold weather known as the Lista stadial. Then around 14,500 years B.P., the Earth’s climate abruptly and dramatically warmed with the onset of the Bölling (Bö) and Alleröd (AL) interstadials. It is known that substantial continental flooding

occurred during this period due to the rapid melting of the ice sheets. This 1,950-year-long warm period came to an abrupt end around 12,700 years B.P. with the beginning of the very cold 1,150-year-long Younger Dryas stadial (YD). Around 11,550 years B.P., another period of excessive warmth and meltwater flooding occurred, which ended the Younger Dryas and returned the Earth's climate to its present warm interglacial state. The ice sheets gradually retreated to their present homes in Greenland and Antarctica, portrayed in the myth as Jotunheim, the home of the Frost Giants. There they wait, ever ready to sally forth and regain their former territory, just as the myth states.

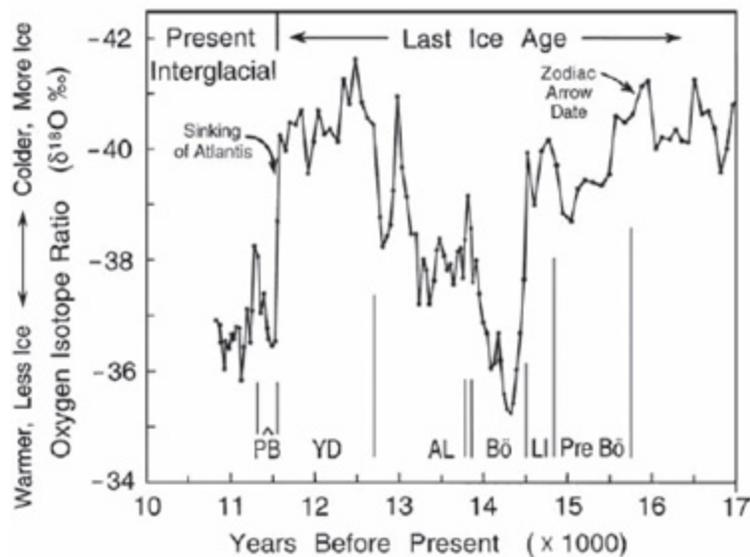


Figure 5.7. Climate profile charting the oxygen isotope ratio in the GISP2 ice core as an indicator of air temperature over Summit, Greenland. Dating of the data points has been modified to conform to the GRIP Summit ice core chronology. Higher temperatures (and less glacial ice) plot downward. Climatic zones include Pre-Bölling interstadial (Pre Bö), Lista stadial (LI), Bölling interstadial (Bö), Alleröd interstadial (AL), Younger Dryas stadial (YD), and Preboreal warming (PB).

The *Younger Edda* goes on to describe the emergence of the new land contour at the end of the ice age. It states that the gods rolled Ymir's corpse into the yawning abyss and began to create the world out of his various parts. At the very center of the Gunnungagap they fashioned the Earth, which they called Midgard (middle garden). Its solid portion was encircled by an ocean formed from the giant's watery blood. Ymir's bones, teeth, and hair formed the hills, cliffs, and vegetation, and his skull, when raised, formed the vaulted heavens. The gods then took sparks from Muspell and

studded the heavens with them to form the stars. They fashioned the most vivid of these as the Sun and the Moon.

Muspell, again, plays a key role in this ancient myth about the Creation. Whereas earlier Muspell was responsible for forming the glacial ice sheets, here it spawns the Sun, Moon, and stars. With Muspell identified as the core of the Galaxy, the *Younger Edda* myth presents a cosmology very similar to that encoded in astrology, the tarot, and many ancient myths wherein a primordial site at the center of the Galaxy serves as the place of creation. This also accords with certain modern cosmological theories which propose that galactic cores are primordial sites for matter and energy creation and that, like Muspell, they periodically expel fiery clouds of high-energy cosmic rays.

Just as Muspell is said to lie “to the far south,” so too the Galactic center is positioned in the southern heavens, 29 degrees below the celestial equator. For people living in Scandinavia, around 60° to 70° north latitude, the Galactic center would today barely be visible above the southern horizon. Nevertheless, it would have been easily seen around 13,000 years ago as at that time it would have been positioned some 45 degrees farther north, due to polar precession. But even at this maximal northern position, the Galactic center would have appeared to northerners to shine forth from the south.

The Norse universe consisted of nine worlds, all supported by an immense ash tree called Yggdrasil. Yggdrasil had three roots, one of which wound down to Niflheim, the land of fog and residence of Hel, the goddess ruled over the deceased. This root was continually gnawed by the dreaded dragon Nidhug, who lived beneath the Roaring Cauldron and was helped in his work of destruction by countless worms. A second root, which supported Midgard, wound through the city of Jotunheim, the home of the evil Frost Giants and Mountain Giants. A third root went up to Asgard, the golden heavenly home of the gods, the Aesir.

The dismal tale of Ragnarok, related in the *Elder Edda*, prophesies that almost all the gods one day will heroically perish in fierce battle as they attempt to save their kingdom Asgard from being destroyed by the Giants and their powerful allied celestial forces emanating from the bright and flaming Muspell. The word *Ragnarok* is believed to derive from *regin*,

meaning gods, and *rokr*, meaning darkness, or possibly in earlier usage from *rok* (dissolution or destiny). Hence it translates as “Twilight of the Gods.” Ragnarok is said to have begun on the day when the dragon Nidhug gnawed completely through Yggdrasil’s root.

Among the evil powers that were aligned against the gods, one of the most formidable was Ymir’s son Loki, the god of fire and evil. Together with the giantess Angur-boda (anguish-boding), Loki fathered three monsters: Hel, goddess of death; Iormungandr, the terrible Midgard serpent; and the grim wolf Fenris. In the days before Ragnarok, the satanic Loki was bound in a subterranean cavern; Hel was confined to the depths of Niflheim; the Midgard serpent was banished to the sea; and the Fenris-wolf was bound fast to a boulder sunk deep into the ground in Asgard. The fierce fire giant Surt also played a leading role among the forces of evil. From the very beginning of things, he stood guard over Muspell (the Galactic center), home of the combusting fire giants. Fiercely brandishing his flashing sword of fire, he continually sent forth great showers of sparks (cosmic rays).

Odin, the solemn sky father, was the leader of the gods. Among Odin’s forces, five names are particularly noteworthy: Tyr, Thor, Freyr, Heimdall, and Balder. Tyr was the god of war. Thor was the hammer-wielding thunder god. Freyr was the god responsible for watching over the fruits of the Earth. Heimdall was the caretaker of Bifrost, the rainbow bridge that led from Earth to Asgard. Balder, the son of Odin’s wife Frigga, was the most beloved of the gods, both on Earth and in heaven. Despite Frigga’s efforts to protect him, Balder was finally slain by the evil fire god Loki. Anglo-Saxon cultures have celebrated some of these gods by naming the days of the week after them. Tuesday was once Tyr’s day, Wednesday was Odin’s day, Thursday was Thor’s day, and Friday honored both Frigga and Freya, the goddess of love and beauty.

The gods were aided in their battle by the heroes, whose ranks were made up of men who had died bravely in battle. It is said that, at the time of their death, half of the slain heroes were claimed from the battlefield by Freya, the other half by Odin. Odin’s armored maiden attendants, the Valkyries (Choosers of the Slain), would ride onto the battlefield to carry off Odin’s share of the braves and lead them up to Valhalla, Odin’s Hall of the Slain in Asgard (heaven). There they would live in a joyous state,

continually training to keep in shape for the time when they would be needed to help save Asgard during the final days of Ragnarok. The remaining dead, not lucky enough to be chosen, were destined to go down to Hel's underworld realm, where they would exist in a miserable state receiving punishment for their sins.

According to the *Elder Edda*,[13](#), [14](#), [15](#) the coming of Ragnarok, the great Day of Judgment, is foreshadowed by many signs:

Evil and violence increase. High up in Asgard the cock with the golden comb crows to waken the Heroes of Odin's retinue; the drab cock in Hel's keeping crows likewise; so also does the red cock in the world of the Giants; and Garm, the hound with the bloody mouth [who guards the gates of Hel], bays vehemently outside the rocky fastness of Gnipa. Three winters pass accompanied by great wars throughout the whole world. The earth is filled with strife and wickedness. Brothers kill each other for the sake of gain, and son spares not his own father.

Then come three other years, like one long winter with no summer between. Everywhere the snow drifts into heaps; the sun yields no warmth, both sun and moon are hidden by storms; there are hard frosts, and biting winds blow from all quarters. That winter is known as Fimbul Winter (the Great Winter). The first year of Fimbul Winter is called the Winter of Winds. Storms blow, snows drive down, and frosts are mighty. Children hardly keep alive in that dread winter. The second winter is called the Winter of the Sword. Those of mankind left alive rob and slay for what is left to feed on. Brother slays brother; mighty battles occur around the world. The third winter is called the Winter of the Wolf. In this year the wolf named Skoll swallows the sun. People see this as a great disaster. Also the wolf named Managarm, who feeds on unburied men and on the corpses of those who fall in battle, grows mighty and devours the moon. The heavens and the air become sprayed with blood, and the stars become quenched. This is a sign to the gods that the time of the last battle is approaching.

The Fimbul Winter (Great Winter), which the legend says caused all the Earth to be covered by a thick layer of ice, must be an allegorical reference to the Wisconsin ice age (ca. 68,000 to 11,550 years B.P.). The division of the Great Winter into three continuous winter “years” parallels modern geology’s division of the Wisconsin ice age into three parts: early, middle, and late, stages 4, 3, and 2 (figure 3.8). The Winter of the Wolf, the most severe of the three Fimbul Winter stages, would be the Late Wisconsin stage (after 33,000 years B.P.), the most severe of the three glacial subdivisions. At the peak of that cold period, the ice sheets advanced farther south than at any other time during the entire Wisconsin glaciation.

Skoll and Managarm, the wolves who swallow the Sun and Moon, and the Fenris-wolf, the monster whose release triggers the main invasion against Asgard and the Earth, would represent the clouds of cosmic dust that invaded the solar system. As mentioned earlier, the constellation of Lupus (the Wolf) signifies the nearby clouds of frozen debris left over from the North Polar Spur supernova explosion, material that occasionally becomes vaporized by passing superwaves and propelled toward the Earth. Thus, this Nordic myth appears to contain symbolism similar to that encountered in stellar mythology.

The spraying of the heavens with blood and the quenching of the stars refer to the kind of light-occlusion effects that an encroaching shroud of dust would create. This graphic passage suggests that the invading cosmic dust took on a reddish hue. Possibly the dust immediately around the Sun preferentially absorbed the shorter wavelengths (the blues and greens), leaving the Sun to illuminate its dusty surroundings with a reddish cast.

Perhaps the English folklore tale about the three pigs and the wolf who “huffs and puffs and blows their house down” is also a recollection of this ancient cosmic disaster. The story teaches that only those who have taken precautions against the wolf by building a solid house of brick and stone are able to survive his unexpected advance. Is modern society ready for the next superwave and cosmic dust incursion event, or are we more like the little pigs who thought there was nothing to fear and instead built their houses out of straw and sticks?

Further on, the tale of Ragnarok relates the evil deeds of the Fenriswolf, a demon far more frightening than Skoll or Managarm:

Jotunheim, and Muspell, and the Realm of Hel wait trembling, for it might be that Fenris the Wolf is unable to burst the bonds wherewith the gods had bound him. Without his being loosed, the gods might not be destroyed. Then this comes to pass, the whole surface of the earth and the mountains tremble so [violently] that trees are uprooted from the ground, mountains crash down, and all fetters and bonds are snapped and severed. The Fenris-wolf then gets loose. Then is heard the galloping of the horses of the riders of Muspell, the laughter of Loki, the blowing of Heimdall's horn of fate; then is heard the opening of Valhalla's five hundred and forty doors, as eight hundred Heroes make ready to pass through each door. Where best might the Aesir and the Wanen and the Heroes meet with the forces of Muspell and Jotunheim and the Realm of Hel? The head of Mimir [the fount of all wisdom] counsels Odin to meet them on [the field of] Vigrid, and to wage there such war that the powers of evil would be destroyed forever, even though his own world should be destroyed with them.

The riders of Muspell call to mind the fiery invading horsemen of the Book of Joel and the Maruts described in Vedic hymns. They are also reminiscent of the horsemen described in the Book of Revelation (see figure 12.2). The riders would signify the superwave cosmic rays approaching the Earth from the Galactic center (Muspell). Vigrid might represent a region in the heavens in the direction of the Galactic center, which is brilliantly lit up by the intense emissions given off by these cosmic rays. The *Elder Edda* continues:

Midgard, the serpent that encircles the world, now rears itself up from the sea. Seeking to reach dry land, it swims with such force that the seas wash over their banks, sweeping away all that remain of the world's inhabitants. The mighty flood frees the ship known as Naglfar, a vessel that the Giants were so long in building. It is made of dead men's nails, so if anyone dies with uncut nails, he greatly increases the material for that ship which both gods and men devoutly hope will take a long time building. With Hrym the giant steering it, Naglfar sails against the gods with all the powers of Jotunheim aboard. Close behind, Loki steers the ship of Hel with the Fenris-wolf aboard.

The Fenris-wolf advances with wide open mouth, his upper jaw against the sky, his lower on the earth; he would gape more widely still if there were room. His eyes and nostrils blaze with fire. The Midgard Serpent blows so much poison that the whole sky and sea are spattered with it; he is most terrible and is on the other side of the wolf.

In the above passage, the Edda tells how a cataclysmic flood swept away the Earth's inhabitants and how this was followed by a second cosmic dust incursion event, which it depicts by the Fenris-wolf engulfing the Earth and by the Midgard Serpent blowing poisonous venom. The Ragnarok tale continues:

In this din the sky is rent asunder and the sons of Muspell ride forth from it. Surt rides first and with him fire blazes both before and behind. He has a very good sword and it shines brighter than the sun. Surt and the sons of Muspell then begin to ride over the Rainbow Bridge called Bifrost to storm the City of the Gods and fill it with flame. However, the bridge breaks under their weight and the city is spared.

One and all, the sons of Muspell, the Fenris-wolf, Midgard Serpent, Loki, Rym, and all the Rime-Thursar, direct their course toward the plain of Vigrid. From the broken end of the Rainbow Bridge the riders come, all flashing and flaming, with fire before them and after them. Surt's sword flashes terribly bright. On this field which measures 100 miles square, they muster their hosts for battle, and the radiance of their conscription gleams far and wide.

The Champions [the heroes] led by Odin, ride down to Vigrid through the waters of Thund. Odin with his helmet of gold, magnificent coat of mail, and spear presses on to confront the Fenris-wolf. In his company are Thor and Tyr, Freyr, and Heimdall. But they can give no aid to Odin. Thor soon finds himself in mortal conflict with the Midgard Serpent, who is about to overwhelm all by pouring forth venom; Freyr battles Surt; Tyr deals with the dog Garm, who has broken from his fetters; and Heimdall fights against Loki.

Thor in the end kills the Midgard Serpent, but is himself killed, borne down by the venom which the Serpent spews over him. Freyr is eventually slain by Surt. Tyr and Garm kill one another, as do Heimdall and Loki. The Wolf swallows Odin. But, Vidar, the Silent God—Odin's son—at once steps into the breach. He thrusts one of his feet into the nether jaw of the Wolf, grasps the upper jaw with his hand, and thus tears open the Wolf's throat. In this way dies Fenris, the fiercest of all the enemies of the gods.

Now the riders of Muspell come down on the plain. Bright and gleaming are all their weapons. Wasting fires spring up before them and behind them. Thereupon Surt flings fire over the whole earth and all things perish. The World Tree is wasted in the blaze. But the fearful fire that Surt brings on the earth destroys him and all his army.

The wolf Hati catches up with the sun and the wolf Managarm seizes on the moon; they devour them; stars fall, and darkness comes down upon the world. The seas flow over the burnt and wasted earth, and the skies are dark above the sea, for the sun and moon are no more.

In the final episode of this celestial battle, the Fenris-wolf is killed, but the evil demon manages to bring a great conflagration upon the Earth as cosmic dust clouds in the form of wolves engulf the Sun and Moon, and all falls into darkness. Here, we find the cosmic dust invasion being associated with an incident in which the Earth is burned. As described in the next chapter, this encroaching dust would have substantially energized the Sun and caused its surface to erupt with flares of almost nova-like intensity.

However, all is not lost. The gods manage to prevail over the forces of evil and bring the heavens back into control:

Modi and Magni, the sons of Thor, find Thor's hammer and slay the monsters that still rage through the world, the hound Garm and the wolf Managarm.

At last the seas draw back; earth appears again, green and beautiful. A new sun and new moon appear in the heavens, daughters of the former orbs. No grim wolves keep them in pursuit.

Four of the younger gods, Vithar, Vali, Modi, and Magni, stand on the world's highest peaks. Vithar and Vali found the wisdom of the elder gods which tells of a Heaven that lies above Asgard, that is untouched by Surt's fire. Balder and Hod return from Hel's habitation and sit together on a peak, where they call to mind the secrets and the happenings that they had known before Ragnarok. Deep in a wood, two of human-kind are left, which the fire of Surt did not touch; they slept, and when they awoke the world was green and beautiful once again. From this man and woman, Lif and Lifthrasir, and from their children came all of humanity.

Without a doubt, we must agree with Donnelly who, in speaking of the Edda, writes:

What history, what poetry, what beauty, what inestimable pictures of an infinite past have lain hidden away in these Sagas. . . . What else can mankind think of, or dream of, or talk of for the next thousand years but this awful, this unparalleled calamity through which the race has passed?¹⁶

Fierce Winds

The *Younger Edda* mentions that strong winds blew during the period of ice sheet formation in the icy cold northern land of Niflheim. Also, the *Elder Edda* recounts the occurrence of bitter winds, storms, and blizzards during the first phase of the Great Winter, termed the "Winter of the Winds." In fact, the last most severe phase of the Wisconsin ice age, the period from about 33,000 to 15,000 years B.P., was characterized by very strong winds. Evidence for this is preserved in the Earth's polar ice record. Studies of Greenland and Antarctic ice cores have shown that snows that fell during the last third of the ice age, the Late Wisconsin, contained up to seventyfold higher concentrations of windblown dust as compared with snows that fell during the interglacial period of the past 11,600 years (see figure 5.8).

Glaciologists have been puzzled as to what might have caused these blizzards. They cannot attribute the winds merely to the existence of the ice sheets, since there were times during the ice age when the air was not as

dusty and the winds were not blowing as hard. The answer to this mystery lies not on the Earth, but in the heavens. The battle ensuing between the solar wind and the opposing, highly variable superwave cosmic ray wind would have caused interplanetary cosmic dust concentrations to change dramatically within decades. This would have altered the input of visible and infrared radiation to the Earth's atmosphere, which, in turn, would have changed the degree of windiness on the planet and varied the amount of dust deposited on the polar caps.

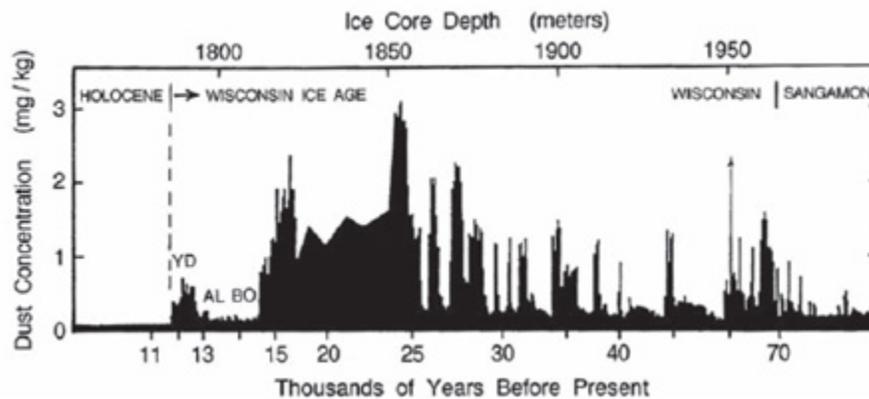


Figure 5.8. Dust concentration in the ice-age portion of the Greenland Dye-3 ice core indicates that the Earth's climate was particularly windy during the late Wisconsin stage (Hammer, Geophysics, Geochemistry, and the Environment, figure 1).

The Toba Indians of Argentina have a catastrophe myth that tells of the occurrence of a “great cold” whose onset was accompanied by strong winds. This could be a reference to the last glacial period, as the northern edge of the South American Cordilleran ice sheet was situated just a few hundred kilometers south of the Toba's present territory. They say that the coming of this disaster was predicted by Asin, one of their heroes. Anticipating that a time was approaching when the weather would turn extremely cold, Asin warned a man to gather as much wood as he could and to cover his hut with a thick layer of thatch. As soon as the hut was ready, the two men shut themselves inside and waited. When the cold weather set in, people were freezing and crying through the night. Shivering people came to the two men begging for firebrands, but they could spare only a few embers from their fire:

The wind was blowing . . . and tearing off the thatching of the huts . . . People and animals were dying. This period of ice and sleet lasted for a long time and all the fires were put out. Frost was as thick as leather.[17](#)

The Toltec Indian legend mentioned in the last chapter describes how fierce winds and cold swept the Earth during the second of the four destructions of mankind. The plumed serpent Quetzalcoatl warns two people who survive the disaster:

“Listen to me carefully,” he whispered melodiously. “Take your hearth fire and hide yourself in a cave in the nearby mountain.” He was the beneficent wind from the east, from the garden of paradise, but soon he warned he would blow from the north and from the south as a furious hurricane and sweep over the entire world . . . Whirlwinds and cyclones swept over the world, picking up sand, stones, rocks, waters and finally trees, houses and human beings. The snowy caps of the mountain peaks were whisked away, covering the whole world with an immense white sheet. Nowhere could the panic-stricken humans find safety . . . The gods turned them into monkeys . . . The chosen man and woman in their cave beside their red hearth fire continued their conversation, unperturbed by the roar of the wind, not feeling the glacial cold that gripped the world.[18](#)

These oral traditions were handed down by people who had lived in the Western Hemisphere during the last ice age. For a long time, anthropologists had been under the impression that the New World became populated for the first time 12,000 years ago at the close of the ice age. They theorized that around that time, the North American ice sheet had receded sufficiently to allow Asian people, who had migrated into Alaska, to continue southward to North and South America. However, during the past few decades, an increasing quantity of evidence has turned up indicating that humans occupied the Americas at a much earlier time.[19](#) For example, in an ancient cliff dwelling in southwestern Pennsylvania, archaeologists have found charcoal-filled hearths and hunter-gatherer

artifacts that date back as far as 19,600 years ago. Excavations at Orogrande cave in southern New Mexico have turned up stones worked by human hands 38,000 years ago and a clay fireplace with embedded fingerprints from 28,000 years ago. At Pedra Furada, in northeastern Brazil, ash-filled stone hearths are found to date back 47,000 years to the early part of the ice age. The same site has stone artifacts and hearths dating from 32,000 years ago and red ochre cave paintings dating from 17,000 years ago, indicating that this region was occupied for most of the ice-age period.

SIX

THE CONFLAGRATION



The T Tauri Effect

Numerous cultures around the world preserve legends of a vast conflagration that swept the planet long ago. The Ipurinas, a tribe of northwestern Brazil, relate that long ago the Earth was overwhelmed by a hot flood.¹ This occurred when the Sun, personified as a cauldron of boiling water, tipped over. The Australian Aborigines have a similar myth, about an old man who opened the door of the Sun and caused a stream of fire to pour down upon mankind. The Inuit claim the waters of the Arctic Ocean became so hot that they finally evaporated. According to the Druids, the great God punished man for his universal wickedness “by sending a virulent poison on the earth” via a violent wind (a superwave-induced cosmic dust invasion?). This was succeeded by “a tempest of fire, which rent the earth asunder and flung the sea upon Britain, submerging the whole country.”²

These various tales of conflagration may be seen to have a reasonable scientific explanation when understood in the context of the galactic superwave phenomenon. For example, it is well accepted in astronomy that dust and gas falling onto the surface of a star will convert their acquired kinetic energy into heat at the moment of impact. In a similar manner, large amounts of cosmic dust and gas injected into the solar system during a superwave passage and subsequently drawn onto the Sun’s surface would have caused the surface of the Sun to warm up. Such a warming could also occur if the Sun happened to pass through an interstellar dust cloud.

According to astronomers Fred Hoyle and R. Littleton, such an encounter could draw material onto the Sun's surface fast enough to cause the Sun to brighten by ten percent or more, the excess energy appearing primarily as ultraviolet (UV) radiation.³ They reasoned that the resulting increased energy flux to the Earth could initiate an ice age.

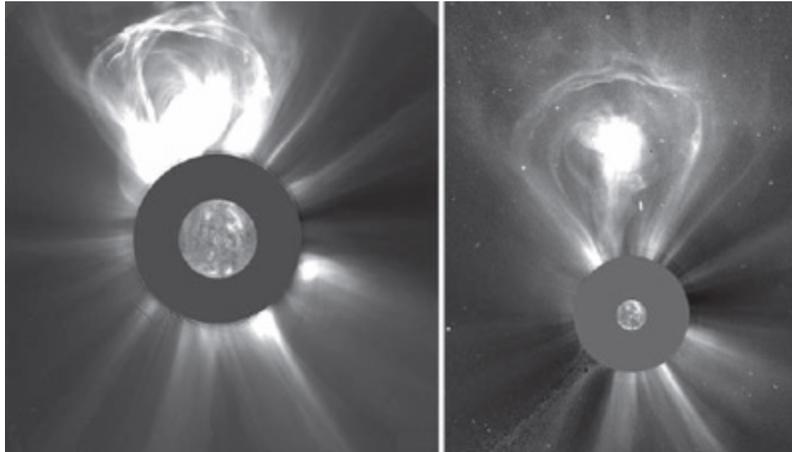


Figure 6.1. A solar flare coronal mass ejection observed with the Large Angle and Spectrometric Coronagraph (LASCO) on February 27, 2000, during the solar cycle peak. At 1:54 AM (left) the ejection measured 2 solar diameters in size and by 7:42 AM (right) it had expanded to 8 solar diameters. The shaded disk in the upper two images is a mask in the LASCO instrument that blots out direct sunlight. The solar disk displayed inside the mask shows the size and actual position of the visible Sun for comparison. (Courtesy of J. Gurman, S. Plunkett, S. Hill, S. Vidar Haugan, and NASA.)

Material drawn into the Sun during a superwave event would also cause solar flare activity to increase. The Sun's flaring activity presently varies cyclically in phase with the eleven-year sunspot cycle, reaching a peak at sunspot maximum. Solar luminosity also varies in phase with this cycle, the Sun being 0.16 percent brighter at sunspot and solar flare maximum. Longer-term modulations of sunspot activity are known to have had a substantial impact on the Earth's climate. For example, sunspots were absent from the Sun for a period of 70 years between 1645 and 1715, an interval known as the Maunder sunspot minimum. During this time, Europe experienced a period of cold weather called the Little Ice Age. Thus, long-term variations in solar luminosity and flare activity can apparently have a substantial effect on terrestrial climate.

Considering the amount of cosmic dust that was entering the solar system during the Wisconsin ice age, the rate of solar flaring at times could have increased by as much as a thousandfold.⁴ Whereas solar flares currently recur anywhere from one to ten times a year and last anywhere from ten minutes to several hours, during a superwave dust incursion episode, solar flares at times would have been recurring so frequently that they would have been continuously present on the Sun's surface. During this time, the Sun's energy output could have been elevated by several percent.

Based on what is known about solar flares, it can be estimated that about 46 percent of the energy of these flares would have gone to increase the force of the solar wind, another 30 percent would have been radiated as optical and UV radiation, and about 24 percent would have been emitted as high-energy X rays and solar flare cosmic ray particles. Of these emissions, probably the worst hazard to terrestrial life would have come from the UV and solar flare particle radiation. Not only would an active Sun produce more UV radiation, but also a greater percentage of it would have been able to reach the ground, since solar flare particle radiation tends to destroy the Earth's UV-absorbing ozone layer.

It is possible to learn a great deal about how the Sun would be affected by dust accretion by studying other stars in the Galaxy that are presently immersed in dense dust clouds. T Tauri stars are particularly interesting in this regard. They have masses similar to the Sun, but are accreting large quantities of dust concentrated along their equatorial planes. Were it not for the energizing effects of this engulfing dust, these stars would probably look very much like the Sun.

Extensive studies of T Tauri stars have shown that they have a number of unusual characteristics.^{5, 6, 7, 8, 9, 10, 11} For one thing, they emit an unusually large percentage of their radiation as infrared. For the most part, this comes from the dense cocoon of dust that surrounds the star and absorbs a large fraction of its visible light. In absorbing the star's radiation, the grains of dust in the cocoon become heated to temperatures averaging between 500° and 1200°C and reradiate this energy as infrared radiation. Astronomers detected a very faint infrared-emitting dust shell around the

Sun during solar eclipses in 1966 and 1983.[12](#), [13](#), [14](#) It appears to be a transitory feature, since subsequent measurements made during a 1991 eclipse failed to detect it. This variability would reflect year-to-year changes in the rate at which cosmic dust and cometary material fall into the Sun. During a superwave-induced cosmic dust incursion, this dust shell would have become dense enough to have significantly darkened the Sun.

As a second characteristic, T Tauri stars exhibit an enormous amount of flaring activity, presumably a direct result of their dust and gas accretion. Flares occur continuously on their surfaces, with individual flare prominences being estimated to carry 100 to 1000 times more energy than prominences typically observed on the Sun. Because of this flaring, the intensity of light coming from T Tauri stars is observed to fluctuate dramatically, changing by as much as twentyfold within a few minutes. These flares are also believed to be the source of their prodigious X-ray, ultraviolet, and cosmic ray emissions. T Tauri stars typically radiate 100,000 times more X-ray radiation and 10 times more ultraviolet radiation than does the Sun. Their ultraviolet emission is equivalent to the amount that would come from the Sun if solar flares were to continuously cover the Sun's surface. Because of their intense flaring, the atmosphere of a T Tauri star is in continuous turmoil. It generates a very strong stellar wind, expelling gas at speeds up to 1000 times that of the solar wind.

In addition, T Tauri stars are observed to have unusually expanded sizes. This is because their atmospheres receive extra energy from the constant flaring and continuous matter accretion on their surfaces. A T Tauri star's photosphere—its outer light-radiating envelope—can be inflated by a factor of two to five, giving it a diameter two to five times that of the Sun. As a result of its large size, the star's photosphere has a much lower surface temperature than that of the Sun; hence, it appears red in color, rather than yellow-white.

Another characteristic is that their photosphere is in turn surrounded by a very large ionized chromosphere region. In the case of the Sun, the chromosphere is quite thin, visible during a total solar eclipse as a pinkish halo hugging its surface. In a T Tauri star the chromosphere can be anywhere from 3 to 15 solar diameters in size, or up to 4000 times thicker than the Sun's. It is kept ionized by the enormous flux of cosmic ray flare

particles coming from the star's surface. Whereas the Sun's chromosphere is quite faint, that of a T Tauri star is so luminous that in some cases its radiation output can substantially exceed that coming from the star itself. The chromosphere, in turn, is surrounded by a relatively transparent dust-free region where the temperature is so high that dust particles in this region vaporize into gases. This "vaporization zone" extends out about 13 million kilometers from the star's surface (about 16 to 20 solar radii). Figure 6.2 shows the relative sizes of the photosphere, chromosphere, and vaporization zone of a typical T Tauri star.

Cosmic dust that was pushed into the solar system by a passing superwave would have activated the Sun and caused it to behave like a T Tauri star. Along with various other radiation-altering effects, the resulting increase in solar luminosity would have produced a major warming of the Earth's climate. The tropics would have become unbearably hot while high-latitude regions would have been flooded by meltwater issuing from the rapidly melting ice sheets. Such horrendous happenings are borne out by legends from around the world that describe the occurrence of a global conflagration and flood.

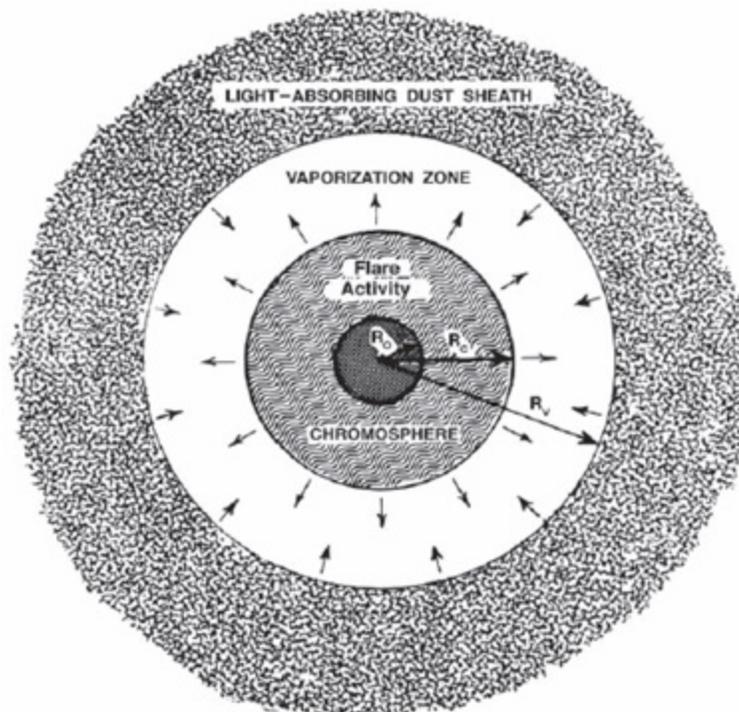


Figure 6.2. A schematic of a typical T Tauri star. R_O —radius of the star's photosphere; R_C —radius of its chromosphere; and R_V —radius of its vaporization zone boundary.

Lunar Evidence of an Active Ice Age Sun

Moon rocks harbor considerable evidence indicating that the Sun was indeed quite active during the ice age. Because the Moon has no protective atmosphere, micrometeorites (high-speed dust particles) and solar flare cosmic rays are able to reach the lunar surface unimpeded to etch permanent records of their arrival in lunar rocks. A number of these rocks were collected on the Apollo mission and were brought back to a repository at the Johnson Space Center in Houston, Texas, for subsequent analysis. Microscope studies showed that the surfaces of these rocks were covered with tiny micrometeorite craters and that the glassy surfaces of these craters, in turn, were finely etched with tracks produced by impacting solar flare cosmic rays. By studying these craters and their cosmic ray tracks, the NASA scientist Herbert Zook and two of his colleagues were able to construct a record of solar flare activity dating back over the past 16,000 years. Surprisingly, they found that in the earliest part of their cratering record, solar flare cosmic ray tracks were being formed 50 times faster than at present (figure 6.3). Their data showed that the rate had dropped about fivefold by 11,000 years B.P., when the present interglacial had gotten under way. They suggested that this increased solar flare activity somehow warmed the Earth's climate sufficiently to cause the retreat of the continental ice sheets at the end of the last ice age. Indeed, the increased solar radiation flux associated with such an elevation of the flaring rate would have supplied sufficient energy to induce the ice sheets to melt.

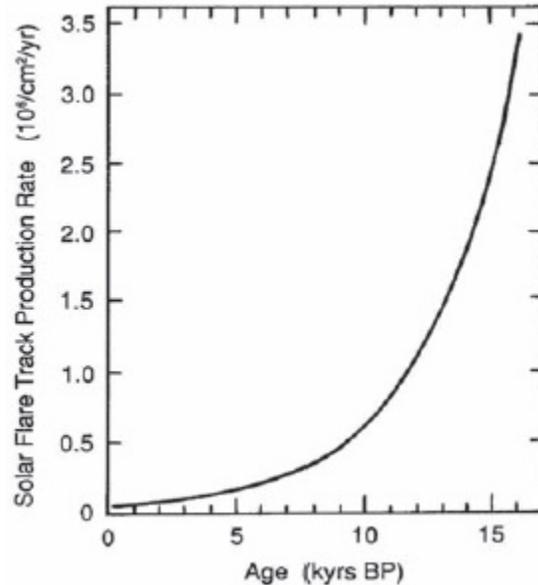


Figure 6.3. A history of solar flare activity, as judged from solar flare track abundances in moon rocks. (After Zook et al., *Icarus*, p. 112.)

In graphing solar flaring intensity, the NASA researchers assumed that the rate of micrometeorite cratering on the Moon's surface has remained constant at its present level throughout the past 16,000 years. However, if the interplanetary dust concentration was much higher in the early part of the record, as seems to be the case, the time scale on the diagram would change, moving the peak to a more recent date. Most likely, solar flaring reached a peak between 14,000 and 15,000 years ago, coinciding with the period when the Earth's climate was unusually warm and the rate of ice sheet recession was at an all-time high.

Further evidence for prehistoric solar activity comes from a set of soil samples brought back from the bottoms of lunar craters 20 to 150 centimeters in diameter. Apollo astronauts noticed that the bottoms of these craters contained lumps of soil whose upper surfaces were coated with glassy patches ranging from about half a millimeter to one centimeter in size. The astronomer Thomas Gold, of Cornell University, describes the microscope analysis of this material:

The glazed areas are clearly concentrated toward the top surfaces of protuberances, although they exist also on some sides. Points and edges appear to be strongly favored for the glazing process. In some

cases, droplets appear to have run down an inclined surface for a few millimeters and congealed there.¹⁵

Eliminating a variety of alternatives, Gold concluded that this glazing was produced by an episode of intense heating. He estimated that some time in the last 30,000 years the Sun's luminosity must have increased by as much as a hundredfold for a period of 10 to 100 seconds to have produced the observed effects. He suggested that this increase occurred either in the form of a very large solar flare or as a nova-like outburst. Because temperatures at crater bottoms typically are 10 to 20 percent higher than on flat ground, soil particles in such regions would have been the first to melt.

Gold proposed that either the Sun undergoes spontaneous outbursts on rare occasions or a single outburst may have been triggered by something such as a giant comet falling into the Sun. Although he did not specifically mention it, a prolonged period of cosmic dust infall could also explain this episode of high solar luminosity and flaring. We might surmise that dust influx caused the Sun's activity to gradually build up into a T Tauri condition in which the Sun's erupting corona was continuously producing a series of "coronal mass ejections" far larger than any observed today. One of these would have eventually struck the Earth and Moon. In a matter of days, as it raced toward the Earth, this bubble of hot coronal gas and solar cosmic rays would have expanded to form a dome-shaped cloud front tens of millions of miles in diameter. Upon arriving, this fiery hot plasma would have temporarily engulfed the Earth and Moon, producing temperatures high enough to melt dust particles on the surfaces of lunar rocks.^{*24}

The Canyons of Mars

Giant coronal mass ejections issuing from the Sun during its T Tauri phase would also have impacted Mars. The planet's almost negligible magnetic field would have offered it little protection. Upon contacting Mars's surface, this hot coronal plasma would have caused the upper permafrost layer to rapidly melt, releasing floods of water, not in one place, but over much of Mars's surface.¹⁶ This could explain the immense outflow channels and canyons seen primarily within 40° of Mars's equator. Studying early photos

taken by the Mariner and Viking spacecraft, geologist Victor Baker noted in 1978 that the morphology of these outflow channels resembles land features on Earth which have been cut by catastrophic floods, such as the Missoula glacial meltwater flood that carved out the Channeled Scablands of eastern Washington about 14,500 years B.P.¹⁷ Many of the Martian outflow channels, however, are considerably larger. By one estimate, the floods that formed some of them would have reached as high as one cubic kilometer per second, or ten thousand times the mean discharge rate of the Amazon river.¹⁸ Baker has concluded that floods on Mars, and the warm climate associated with them, have occurred right up to recent times.¹⁹

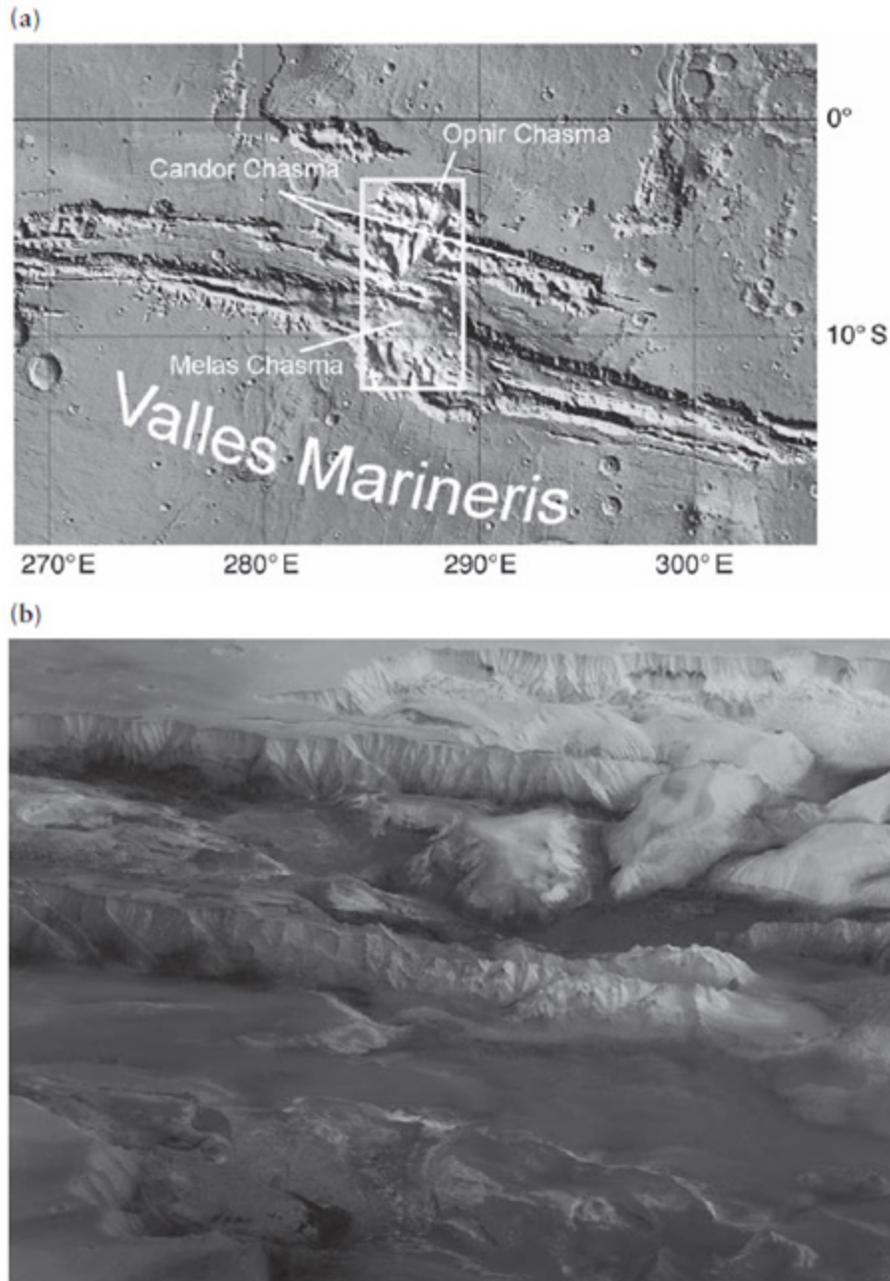


Figure 6.4. (a) A map showing part of the Valles Marineris generated with the Mars Observer Laser Altimeter (MOLA) (photo courtesy of NASA, JPL, USGS). The rectangle indicates the region imaged in (b) below. (b) A 300-kilometer-wide perspective view of the valley's central region from an image taken by the Mars Express spacecraft (photo courtesy of ESA, DLR, FU Berlin, and G. Neukum).

Missions completed between 1997 and 2005 have provided a wealth of high-definition photographs of Mars's surface. For example figure 6.4a presents an altimeter map of a portion of the 4000-kilometer-long Valles Marineris which is located just south of the equator. This is the largest

system of canyons on Mars, three times longer and four times deeper than the North American Grand Canyon. It originates in the Martian highland area to the west (the map's left) and empties into a basin to the east which connects with the large flat lowland region in the north. This northern region may have been an ocean during a warmer past. Figure 6.4b presents a northward-looking perspective view of the chasm's 300-kilometer-wide central portion (3° – 13° S, 284° – 289° E). The canyon floor seen here lies up to 8 kilometers below the surrounding Martian plateau.

Careful study of these photos and of images of other gorges and valleys on Mars has led planetary geologists to the unanimous conclusion that these features have been formed by floods. Still, they have been puzzled by their existence, wondering where the water came from and how was it able to flow on Mars's surface since present conditions on Mars do not permit water to exist in liquid form. During the course of a Martian summer, day temperatures on average vary between -140° to 20° Centigrade. Therefore, on Mars, water should for the most part remain frozen. Windblown salts mixed in with the ice would allow ice to melt at subzero temperatures and solar radiation absorbed by dust covering its surface would provide enough warmth to cause a minimal amount of melting during summer daylight hours. However, space scientists have had difficulty explaining how water could have been produced in sufficient quantities to have carved these features and how it would have stayed liquid long enough to have journeyed the hundreds of kilometers through these gorges. The atmospheric pressure on Mars is only 6 millibars, less than one percent of what it is on Earth, and at such low pressures ice sublimates when heated, bypassing the liquid phase to change directly to vapor. Due to the rapid boiling that would occur at these low pressures, the water surface would cool and freeze over, and as a result, its ability to move would be severely restricted.

In the late 1970s several theories had been put forth to account for the outflow channels evident in the Viking spacecraft photos—icy comets striking the surface of the planet, water kept liquid by geothermal heat and suddenly bursting to the surface as a gigantic artesian spring, or volcanic melting of surface ice. But, it is highly unlikely that such events would

supply water at the required rates or could have recurred so often to account for the hundreds of canyons and channels seen on Mars's surface.

The mystery becomes easily solved when two things are realized. First, the surface of Mars is not arid, as has previously been supposed, but is almost completely covered in water currently locked up in the form of ice sheets and glacial permafrost. Second, the Sun and solar system have not always been as they are today; as recently as 10 to 16 thousand years ago, the Sun was much more luminous and active and the solar system was incubating within a cocoon of interstellar dust injected by a passing superwave. Mars, like the Earth, was then receiving more solar radiation than it does today, both from the increased heat output from the flaring Sun and from the interplanetary hothouse effect produced by the invading dust. This would have softened the upper surface of the Martian permafrost and formed vast subsurface lakes. The surface temperature would have risen especially fast if Mars, like the Moon, had been engulfed by a large mass of coronal gas.

This solar radiation theory would explain why there are so many of these outflow features scattered over the surface of Mars with canyons tending to occur most frequently near the equator, the region receiving the greatest insolation. It also would account for the large size of the headwater regions, which are seen to cover tens of thousands of square kilometers, and for the observation that their origins tend to have abrupt beginnings without feeding tributaries. Finally, it would explain why these flood features are relatively young, their youth being indicated by the fact that they cut across older, extensively cratered terrain and are, themselves, virtually crater free.

The elevated temperatures would not only have caused these ice and permafrost sheets to melt but due to the large amounts of water vapor released into the atmosphere would have raised the atmospheric pressure sufficiently to keep the resulting meltwater stable in liquid form. For example, if just one meter of ice were to have sublimated or evaporated from the planet's surface and remained in a gaseous state, the atmospheric pressure would have risen to about 0.1 atmospheres which would have allowed surface water to remain liquid anywhere from its freezing point up to a temperature of 65°C. Furthermore, fog banks and clouds formed by the evaporating water would have created a greenhouse effect, retarding

nighttime heat loss from the planet's surface. This would have acted to increase the planet's temperature and moderate its diurnal temperature extremes. These warmer climatic conditions could explain the presence of lacustrine terraces and Gilbert-type deltas on Mars's surface. Ori et al. have noted that these features could only have been formed if lakes had persisted on Mars's surface for 103 to 104 years.²⁰

Recent spacecraft data has established that water ice covers Mars's North polar cap to a maximum depth of 3 kilometers over an area about 1200 kilometers across, a region about the size of Greenland. The ice cap is seen to be dissected by canyons and troughs up to one kilometer deep, suggesting that this relatively young polar ice sheet has been subject to recent melting.

Measurements made remotely by the Odyssey spacecraft to probe the composition of the upper one meter of Mars's surface indicate that Mars is covered with a layer of water-rich permafrost. These measurements suggest that the uppermost few centimeters or so may be dry soil with no ice, transitioning down into a layer several centimeters thick in which ice fills the pore spaces between the soil grains. Finally, beneath that would be a very ice-rich layer. The upper layers are drier because the ice there has sublimated away due to surface heating of the soil. The overlying dust blanket that remains acts to insulate and protect the underlying ice from further sublimation. They estimate that for regions lying between 55° latitude and either pole, the uppermost meter contains 60% to nearly 100% water ice, while for regions lying between 55° latitude and the equator the upper meter is comparatively drier, averaging 2% to 10% water by weight (or ~5% to ~35% water by volume). Since the equatorial region receives more insolation, the upper soil layer here would sublimate water at a faster rate which would explain why it is observed to be drier.

The bulk of the permafrost lying below the upper meter, not directly accessible to observation, would likely exceed 75% water ice at all latitudes. William Feldman, one of the Odyssey team investigators, has speculated that the depth of the Martian permafrost could range anywhere from one meter to a kilometer or more.²¹ The upper end of this depth estimate may be closer to the truth. Craters over 5 kilometers in diameter

have fluidized ejecta that indicate the presence of water or water ice in the crust, which consists of permafrost possibly to a depth of one kilometer with liquid water below that.

Extrapolating from these observations, we come to realize that the plateau seen in figure 6.4b is not rock, but ice; it is the upper surface of the permafrost ice sheet that covers much of Mars. Its low albedo, dust strewn surface camouflages the dirty ice that lurks within. The canyons would be places where this ice sheet has been dissected by melting that took place in the past on a grand scale. The outflow that carved this system of canyons did not originate at just one location; it came from the canyon's entire perimeter, generated as its very walls liquefied under the Sun's intense radiation. Meltwater may also have come from the surrounding permafrost plateau to contribute groundwater torrents that would have spilled from beneath the canyon's rim. The same warming event would have carved the canyons that currently transect the polar caps.

In February 2005 the Mars Express team reported discovering an entire frozen sea near Mars's equator in a region called Elysium Planitia, part of which is imaged in figure 6.5. This body of water ice measures 800 by 900 kilometers in extent and is estimated to be 45 meters deep. Members of the Mars Express mission have concluded that the water entered this sea in a catastrophic flood. The irregular plates seen in figure 6.5 appear to be pack ice or icebergs that at one time had been swept along in this immense outflow and were later immobilized when the surrounding water froze.

One thing that has puzzled scientists is why water ice is found at such low latitudes on Mars. Their models predict that ice should be found at Mars's poles, but not at its equator. They have come to conclude that Mars's current permafrost distribution reflects a state of disequilibrium, that the planet is in the process of emerging from an ice age and will eventually attain equilibrium as water sublimates from its equator to its poles. Furthermore, they wonder how the ice became deposited in these low latitudes in the first place. Mars's present thin, frigid atmosphere might be able to precipitate thin frost covers, but certainly nothing of the extent required to build ice sheets.

This mystery finds its answer when we realize that there was a time some ten thousand years ago, and on numerous other occasions prior to

that, when the solar system was filled with light scattering dust particles and when the Sun was in a highly energized, T Tauri state. Mars climate had warmed to the point where its surface ice had begun to rapidly melt and evaporate. Its newly created vaporous atmosphere, and the resulting high winds, would have transported immense amounts of water over the entire planet to precipitate in the form of snow, sleet, and hail during each year-long winter season. The melting that produced Mars's canyons would have most likely occurred during its summer seasons.

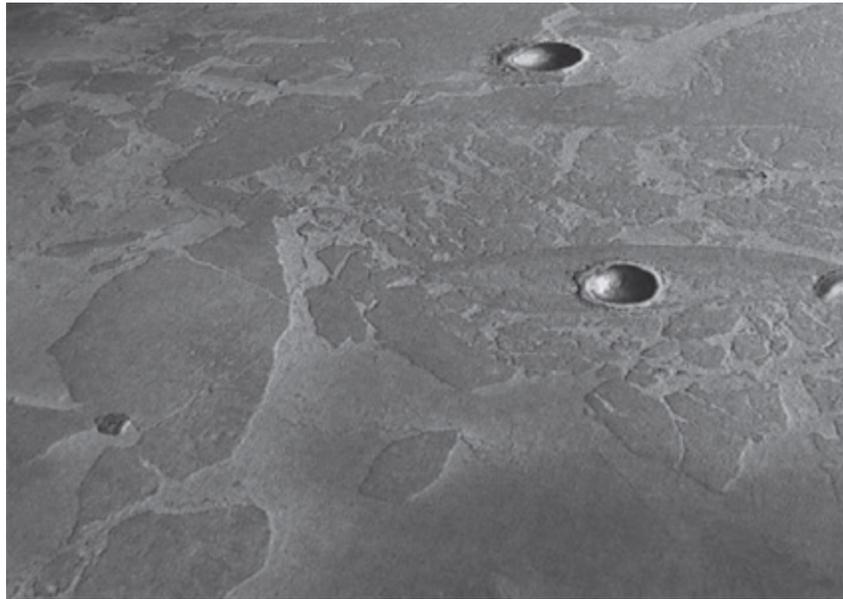


Figure 6.5. Part of a frozen sea in Elysium Planitia (5°N, 150°E). Image width is a few tens of kilometers. (Photo courtesy of ESA, DLR, and FU Berlin/G. Neukum.)

As mentioned in the previous chapter, the Earth has been in an ice epoch for the past three million years, due to the solar system's passage through an unusually dusty interstellar environment. The same would apply to Mars. However, whereas the Earth has sometimes been able to experience periods during which its ice sheets receded to its poles, as during the current interglacial, Mars has not been as quick to respond. Once formed, its equatorial permafrost would persist for a very long time. During the respite following a superwave's passage when the Sun has returned to its normal state and swept the solar system clean of invading dust, Mars's climate would cool down and its atmosphere would return to its current low pressure state. But, unlike on Earth, such conditions are not favorable to ice sheet recession. So the permafrost sheets that we currently see on Mars are

at about the same extent that they were ten thousand years ago, and are likely the result of three million years of accumulation. Similarly, its canyons would not have been carved by conflagrations occurring during just one T Tauri interval, but over a hundred or more such intervals occurring over the past three million years.

Spacecraft photos show that the walls of Mars's canyons are currently in the process of melting, but at a relatively subdued rate. For example, figure 6.6 shows a Mars Express image of the north wall of Tithonium Chasma (5.5°S, 280.5°E), a canyon that makes up one branch of the Valles Marinaris complex. The vertical pleats that extend down the face of the scarps are actually large gullies. It is the general consensus that these have been formed by ground water issuing from near the top of the cliff and that they are relatively recent, the erosional process continuing even today. The discharges forming them may be due to sudden releases rather than to a continuous outflow. From the length of the streaks it appears that the resulting meltwater outflow is able to travel downward a distance of several kilometers before totally dissipating either due to evaporation or refreezing.

The six-kilometer-wide apron which is seen to slope 95% of the way up the canyon precipice is most likely composed of refrozen meltwater that has accumulated from the dust-laden runoff. Its surface would be protected by a dust layer due to the combined processes of ice sublimation and aerial dust deposition. The cliff edge above the apron appears to be the region where melting is currently active, the permafrost ice there presumably being directly exposed to the Sun. Originally, the precipice would have been positioned close to where the foot of the apron now lies. Then, over the years, it would have progressively receded and the apron would have gradually climbed upward forming an increasingly greater part of the canyon wall.

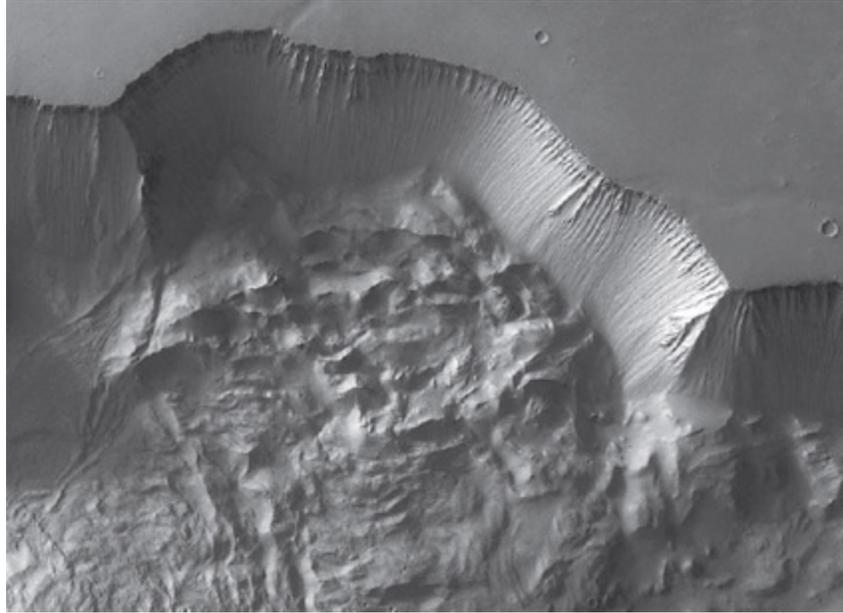


Figure 6.6. A view of the North face of Tithonium Chasma taken by the Mars Express. Image width is 40 kilometers. (Photo courtesy of ESA, DLR, and FU Berlin/G. Neukum.)

Closer views of Martian gullies are seen in figures 6.7a and 6.7b. These show two southern hemisphere craters whose walls have become blanketed with erosional aprons below the point of meltwater discharge. At the lower right of figure 6.7b, we see what may be a thermokarst lake where meltwater runoff has accumulated and refrozen.

As data flows in from recent spacecraft missions to Mars, it becomes increasingly apparent that, like the Moon, Mars's surface has undergone very strong heating in the geologic recent past. Earth also preserves a record of strong solar heating and conflagration. However, before reviewing this evidence, let us consider testimonies to this dramatic event handed down to us in ancient myths and legends.

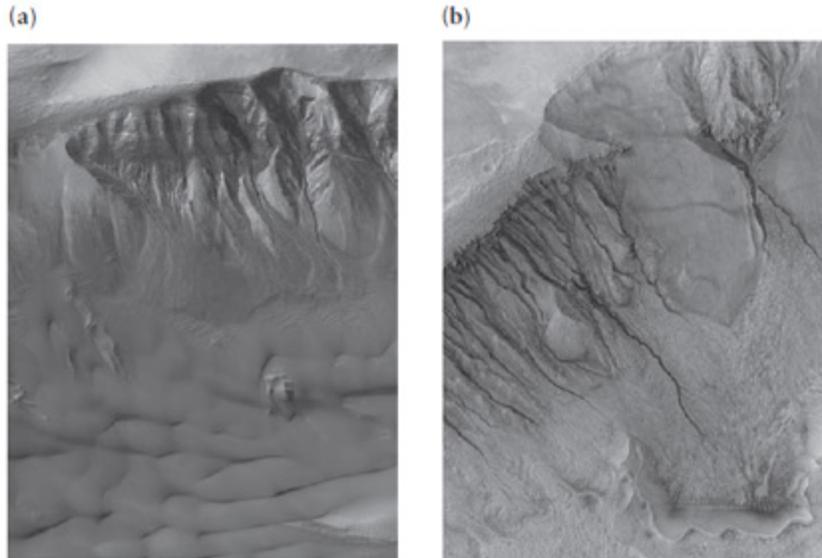


Figure 6.7. (a) Thermokarst gullies cut in the wall of a Newton Basin crater located in Sirenum Terra (42.4°S , 201.8°E). (b) A two-kilometer-wide view of another southern hemisphere crater (39.0°S , 193.9°E) whose wall is dissected with gullies. (Photos courtesy of NASA, JPL, and MSSS.)

The Myth of Phaethon and the Sun Chariot

The ancient Greek myth of Phaethon and the sun chariot gives a dramatic account of the intense global heating that resulted from the combined effects of the activated Sun and the dust-congested solar system. The metaphorical nature of this myth is emphasized in Plato's dialogue *Timaeus*. This states that Solon, the sixth-century-B.C.E. ruler of Athens, once journeyed to the Egyptian city of Sais, which was regarded as the sister city of Athens since the cities had similar guardian deities. Upon his arrival, Solon sought out the priests of Sais to learn details of their knowledge about the catastrophic events that had transpired in very ancient times. He mentioned to the priests that the Greeks preserved a record of the Great Flood through their myth of Deucalion, the Greek equivalent of the story of Noah. To this, an elder priest responded:

“ . . . O Solon, Solon, you Hellenes are never anything but children, and there is not an old man among you.”

Solon in return asked him what he meant.

“I mean to say,” he replied, “that in mind you are all young; there is no old opinion handed down among you by ancient tradition, nor any

science which is hoary with age. And I will tell you why. There have been, and will be again, many destructions of mankind arising out of many causes; the greatest have been brought about by the agencies of fire and water, and other lesser ones by innumerable other causes. There is a story which even you have preserved, that once upon a time Phaethon, the son of Helios, having yoked the steeds in his father's chariot, because he was not able to drive them in the path of his father, burned up all that was upon the earth, and was himself destroyed by a thunderbolt. Now this has the form of a myth, but really signifies a declination of the bodies moving in the heavens around the earth, and a great conflagration of things upon the earth which recurs after long intervals . . .”²²

As the priest maintained, stories describing natural cataclysms that took place long ago are sometimes conveyed *allegorically* in the form of a myth to facilitate their oral communication and thereby ensure their accurate transference to future generations. Keeping this in mind, let us now see what the ancient Greek myth of Phaethon tells us about conditions that once prevailed in the solar system.

Helios, the sun god, and Clemene, a mortal woman, produced a mortal son named Phaethon. The child lived on Earth, where he was raised by his mother. One day at school, hoping to impress his classmates, Phaethon proclaimed that Helios was his father, but the others did not believe him. Instead he received back only ridicule. At the advice of his mother, the troubled Phaethon one night journeyed to the Palace of the Sun to meet his father. He explained to Helios how his classmates teased him and asked him if Helios could find some way to give him proof that he was really his father. To accommodate him, Helios swore by the river Styx that he would grant Phaethon any wish he desired. Phaethon's choice was that his father let him drive the sun chariot across the sky for one day.

Helios very much regretted Phaethon's choice because driving the sun chariot was a very tricky task, unsuitable for a child. He tried to persuade Phaethon to choose another wish, but Phaethon would not give in. Having sworn by the river Styx, Helios could not go back on his word, so he finally consented. He took Phaethon to the stable and had his winged horses yoked

to the chariot. He anointed Phaethon with ambrosia juice so that he might better endure the great heat of the sun chariot. Then he cautioned him that he must keep to his course, that if he drove too high, he would set fire to the heavenly constellations, and if he drove too low, he would consume the Earth.

Having received these words of advice, Phaethon eagerly mounted the chariot, took the reins, and departed into the sky. At first everything went well. However, as Phaethon drove the steeds higher, the horses sensed that the chariot was lighter than usual and began to realize that their master was not in control of the reins. Becoming bold, they left the beaten track and began to rush where they chose. On their wild course they passed various constellations, causing them to warm up. As they passed Scorpius, Phaethon happened to glimpse the barbed point of the Scorpion's tail wet with black venom. He panicked and let go of the reins. The horses then began to stampede and range at large, first soaring up to the very top of the sky, then plunging downward close to the Earth.

In other words, the venom from the Scorpion's stinger—the cosmic dust propelled inward by the cosmic rays from the Galactic center—triggered an exponential increase in solar activity. The myth goes on to describe the scorching effects produced by the Sun's activated state. Quoting from Ovid:

The moon, too, wonders that her brother's horses run lower than her own, and the scorched clouds send forth smoke. As each region is most elevated it is caught by the flames . . . its moisture being carried away. The grass grows pale; the trees, with their foliage, are burned up, and the dry, standing corn affords fuel for its own destruction. But I am complaining of trifling ills. Great cities perish, together with their fortifications, and the flames turn whole nations into ashes; woods, together with mountains, are on fire . . .

Then, indeed, Phaethon beholds the world set on fire on all sides, and he can not endure heat so great, and he inhales with his mouth scorching air, as though from a deep furnace, and perceives his own chariot to be on fire. And neither is he able now to bear the ashes and the emitted embers; and on every side he is involved in a heated smoke. Covered with a pitchy darkness, he knows not whither he is

going, nor where he is, and is hurried away at the pleasure of the winged steeds.²³

The myth's description of the Sun surrounded by smoke and pitchy darkness portrays the Sun surrounded by a cocoon of cosmic dust vaporized into submicron smoke-like particles. The sun chariot's unusually intense heat signifies the excess infrared radiation that the Sun was emitting while in its activated T Tauri state. The myth then describes how large quantities of moisture evaporate from the land surface, rivers, and oceans:

They believe that it was then that the nations of the Ethiopians contracted their black hue, the blood being attracted into the surface of the body. Then was Libya made dry by the heat, the moisture being carried off . . . Nor do rivers that have banks distant remain secure . . . The Babylonian Euphrates, too, was on fire, . . . Alpheus boils; the banks of Spercheus burn, and the gold which Tagus carries with its stream melts in the flames . . . The Nile, affrighted, fled to the remotest parts of the earth and concealed his head, which still lies hid . . .

The ocean, too, is contracted, and that which lately was sea is a sea of parched sand, and the mountains which the deep sea has covered start up and increase the number of the scattered Cyclades; the fishes sink to the bottom, and the crooked dolphins do not care to arise themselves on the surface into the air as usual. The bodies of sea-calves float lifeless on their backs on the top of the water. Three times had Poseidon [Neptune] ventured with stern countenance to thrust his arms out of the water; three times he was unable to endure the scorching heat of the air.

However, the genial Earth, as she was surrounded by the sea, amid the waters of the main [the ocean]; the springs dried up on every side which had hidden themselves in the bowels of their cavernous parent, burnt up, lifted up her all-productive face as far as her neck, and placed her hand to her forehead, and, shaking all things with a vast trembling, she sank down a little and retired below the spot where she is wont to be. [The land surface sinks under the weight of the ice sheets.]

Earth pleads to Zeus, king of the gods, to do something to save the earth and heavens. Zeus then hurls a mighty bolt of lightning at Phaethon, killing him and knocking him from the chariot. The frightened horses tear themselves free, and “fragments of the chariot, torn in pieces, are scattered far and wide.” Phaethon, wrapped in fire, streaks through the air like a shooting star and falls into the river Eridanus. Zeus finally ends the holocaust by sending down a torrential rain that causes the Deluge.

The myth goes on to relate that Cygnus, king of Liguria, grieved deeply for the dead Phaethon. He continuously plunged into the river to retrieve pieces of Phaethon’s body. Taking pity on Cygnus, Helios transformed him into a swan and placed him in the heavens, where he appears as a constellation by that name. The Cygnus constellation, also known as the Northern Cross, is located on the galactic equator near Sagitta. Interestingly, it depicts Cygnus flying in the direction of the Galactic center.

Further on, the myth describes a period of darkness in which the Sun was heavily obscured.

But his wretched father [the Sun] had hidden his face overcast with bitter sorrow, and, if only we can believe it, they say that one day passed without the sun. The flames afforded light, and there was some advantage in that disaster . . . the father of Phaethon in squalid garb and destitute of his comeliness just as he is wont to be when he suffers an eclipse of his disk, abhors both the light, himself, and the day; and gives his mind up to grief, and adds resentment to his sorrow.

The myth then relates that all the deities stood around the Sun and entreated him not to be determined to bring darkness over the world. At length they succeeded in inducing him to resume his task. The Sun returned and the Earth was restored with Zeus’s help: The springs and rivers began to flow, grass returned to the ground, and green leaves to the trees. That is, the Galactic center activity subsided, the cosmic dust was expelled from the solar system, and things returned to normal on Earth.

Other Myths about the Burning of the World

Some may find it unusual that legends of an event occurring thousands of years ago toward the end of the ice age could have survived to the present through word-of-mouth transmission. However, there are a number of prehistoric geologic catastrophes that have been recorded in local folklore and whose past occurrence have been scientifically well established, thereby demonstrating that oral records of tragic events can endure over many generations. One example is the eruption of Mount Mazama in southwestern Oregon, the most severe volcanic eruption to occur since the end of the ice age. About 7200 years ago, this volcanic mountain blew off its upper half, leaving behind a water-filled caldera known today as Crater Lake. This eruption occurred much the same way as did the 1980 Mount St. Helens eruption in southwestern Washington, only it was far more severe, hurling more than 40 cubic miles of ash into the sky. The Klamath Indians who live near Crater Lake preserve a myth that tells of how that mountain once had a peak and was home to the Chief of the Underworld.²⁴ The story tells of how one day the Chief became enraged and spewed fire and ash upon the people living in the valleys below. Then finally, with the Earth trembling on its foundations, the top of the mountain disappeared, leaving a great hole, and after many years this became filled with rainwater. This geologic event so impressed the people of its time that memory of it survived for more than seven millennia.

The details of this legend conform quite well to the actual events that are believed to have taken place, thereby establishing that observations of natural events can be communicated over long time spans. This gives us some reassurance that many of the other ancient tales of cosmic and terrestrial upheaval that are reviewed here have some real basis and are not just creative inventions of the human imagination.

The Bella Coola River Indians of British Columbia have a myth that very much resembles the myth of Phaethon and the sun chariot.²⁵ It goes as follows. Once there was a woman who lived on the Bella Coola River who desired to marry the Sun. She sought out the Sun and finally reached his house. They married and after one day had passed she had a child. He grew quickly and on the second day of his life he was able to walk and talk. The boy said to his mother that he would like to meet her parents. Seeing that his wife began to feel homesick and that his son longed to see his

grandparents, the Sun gave them passage to the Earth, allowing them to descend along his sun-ray eyelashes.

As the boy was playing with the children of the village, they began to tease him, saying that he had no father. He began to cry. Then he went to his mother and asked her for a bow and arrow. He began shooting arrows toward the sky. The first stuck in the sky and each succeeding arrow struck the tail of the previous one, forming a chain to the ground. The boy ascended the chain and entered the house of the Sun. He told his father that he wanted to carry the Sun so that his playmates would stop teasing him. His father told him that he did not have the experience to do it. The Sun said that he carries many torches, burning the small ones early in the morning and late in the evening and burning the large ones at noon. However, the boy insisted. So his father gave him the torches and warned him to carefully follow the instructions he gave regarding their use. By not heeding his father's warnings, the youth caused the Sun to burn the world:

Early the next morning, the young man started on the course of the sun, carrying the torches. Soon he grew impatient, and lighted all the torches at once. Then it grew very hot. The trees began to burn, and many animals jumped into the water to save themselves, but the water began to boil. Then his mother covered the people with her blanket, and thus saved them. The animals hid under stones. The ermine crept into a hole, which, however, was not quite large enough, so that the tip of its tail protruded from the entrance. It was scorched, and since that time the tip of the ermine's tail has been black. The mountain-goat hid in a cave, hence its skin is perfectly white. All the animals that did not hide were scorched, and therefore have black skins, but the skin on their lower side remained lighter. When the Sun saw what was happening, he said to his son, "Why do you do so? Do you think it is good that there are no people on the earth?"

The Sun took him and cast him down from the heavens, saying, "You shall be the mink, and future generations of man shall hunt you."²⁶

If the Sun had undergone intense flaring activity, as evidence seems to suggest, the cosmic ray protons that these flares showered on the Earth could have produced a substantial increase in the genetic mutation rate of exposed land animals. The myth alludes to such mutational changes by suggesting that the disaster induced mutations that darkened the fur and hides of animals exposed to this radiation. Only those hiding in holes and caves were able to escape the effects of this gene-altering radiation. For evidence linking solar activity with spurts in speciation, see chapter 11.

The Tacullies Indians of British Columbia have a myth that describes the occurrence of a global conflagration after the Earth had been created:

In some unexplained way, this earth became afterward peopled in every part, and it remained, until a fierce fire, of several days duration, swept over it, destroying all life, with two exceptions; one man and one woman hid themselves in a deep cave in the heart of a mountain, and from these two has the world since been re-peopled.²⁷

The Takahlis of the North Pacific coast, the Yurucares of the Bolivian Cordilleras, and the Mbocobi of Paraguay also have myths telling of how their ancestors hid themselves in a cave to escape a global conflagration.²⁸ According to the Yurucares, this blaze was brought about by the demon Aymasune, who caused fire to fall from heaven. The myth relates:

Everything below died: bushes, creatures, the human race. Only one man, who had foreseen what might happen, had provided food and shelter for himself in a cave. When the fire-hail began, he hid himself there. Now and then, to learn if the fire still raged, he held a long stick out of the mouth of his cave. On two occasions it came back charred, but the third time it was cool. Still cautious, however, he kept himself safe four more days before venturing out. And then, the sole survivor, he beheld a dreadful sight. The whole forest was ashes, the rivers and springs had boiled away, the very mountains were blackened.²⁹

These legends give the impression that for many days the Sun produced temperatures on the Earth's surface capable of charring wood. Moreover,

they suggest that Stone Age cave dwellers did not necessarily live underground because they lacked the intelligence to build surface shelters. Rather, caves were occupied out of necessity as “fallout shelters,” places of refuge where people could escape the heat, radiation, and fierce elements that prevailed during the Sun’s T Tauri phase.

The Ojibway Indians of North America have a conflagration myth about how a boy once snared the Sun. The Sun had burned and ruined the boy’s bird-skin coat. To have revenge, the boy persuaded his sister to make him a noose from her hair. He set his trap so that the Sun would be caught just as its first rays struck the land at sunrise. The boy’s trap snared the Sun and held it fast so that it did not rise. The myth continues:

The animals who ruled the earth were immediately put into great commotion. They had no light. They called a council to debate upon the matter, and to appoint someone to go and cut the cord, for this was a very hazardous enterprise as the rays of the sun would burn up whoever came so near. At last the dormouse undertook it, for at this time the dormouse was the largest animal in the world; when it stood up it looked like a mountain. When it got to the place where the sun was snared, its back began to smoke and burn with the intensity of the heat, and the top of its carcass was reduced to enormous heaps of ashes. It succeeded, however, in cutting the cord with its teeth and freeing the sun, but it was reduced to a very small size, and has remained so ever since.³⁰

This myth alludes to the burning of the world by stating that after the Sun had become “caught at the edge of the earth,” anyone who attempted to journey toward that horizon—toward the Earth’s day side—was burned by the Sun’s intense heat. Interestingly, it describes this burning as occurring during a period of darkness—that is, during a time when the Sun was obscured by cosmic dust. Ignatius Donnelly has suggested that the giant dormouse is a reference to the mastodon, which roamed North America in prehistoric times, its ears being reminiscent of those of a mouse. If so, the Ojibway myth would be documenting the mass destruction of these great mammalia that occurred some 12,700 years ago.

The Wyandots tell a variation of this story.³¹ A boy named Chakabech climbs a tree to heaven and sets snares to catch some wild game. When he gets up at night to see what he caught, he finds everything on fire and discovers that, unaware, he has caught the Sun. All the while the Sun was held, daylight failed to come to the Earth. Chakabech dares not approach close to the Sun to release him. However, by chance he finds a mouse and blows upon her until she grows large enough that she could set the Sun free. Again, this may be a reference to the mastodon.

The Dogrib Indians of western Canada tell another variation of this story.³² A boy named Chapewee climbed a fir tree in pursuit of a squirrel. He failed to overtake it, but nevertheless continued the chase until he reached the stars. There he found a great plain and a well-traveled road. In this road he set a snare trap made from his sister's hair and returned to the Earth. In the morning the Sun appeared as usual, but at noon it became caught in Chapewee's trap, whereupon the sky was instantly darkened. Chapewee's family commented to him that he must have done something wrong when he was aloft, for they no longer enjoyed the light of day. Chapewee attempted to repair the wrong he had done by sending a number of animals to cut the snare, but the intense heat reduced them all to ashes. At last a ground mole succeeded in burrowing under the road in the sky and cut the snare. In the process, he lost his eyes, and "his nose and teeth have ever since been brown as if burnt."

The Dogrib have another myth, shared by the Slavey Indians, which describes a long period of darkness, accompanied by a prolonged northland snowfall, that finally ended with a period of warmth and glacial floods. The myth tells of a time long ago when the animals along the shores of Great Slave Lake in the territory of Alberta lived in peace and friendship. However, this paradise soon came to an end:

One night the darkness was very thick and snow began to fall. All night it fell. The night continued for so long that it seemed never to have an end. The snow became deeper and deeper. Plants and bushes were covered, and the animals had difficulty in finding food. Many of them died.

At last their chief called a council and a decision was made to send messengers to the Sky People to find out what was causing this long night and the deep snow. One member of each kind of animal flew or was carried on the backs of those who could fly. All reached the Sky World and passed through the trapdoor.

On the other side, beside the trapdoor, there stood a great lodge made of deer skins. This was the home of Black Bear, an animal not living on the earth at that time. Black Bear was at the time not at home. She had gone down to the earth to hunt caribou. Only her three cubs were left behind to look after the lodge. When the messengers entered the lodge, they spied five curious bags hanging from the overhead rafters. When they asked the cubs what they contained, the cubs at first would not answer. But the animal people persisted with their inquiries feeling that those bags had something to do with the problems the earth was enduring. Finally the cubs told them that one bag contained the winds, one the rain, one the cold, and one the fog. But they would not say what the last bag contained, since their mother had told them that the nature of its contents [was] to be kept strictly secret.

So the earth people left the lodge and made a plan to trick Black Bear and steal the fifth bag. When they pulled it down, they found it contained the sun, moon, and stars. These they threw down through the trapdoor. While they watched, the snow began to melt from the heat of the sun. But the snow melted so quickly that the earth was covered with water. The animals returned to earth and were carried on the backs of fish. When the flood waters had gone, the peaceful and friendly life on Great Slave Lake was no more. The birds and fish and beasts chose different places to live and soon they forgot the language they once shared.³³

Black Bear's bag, containing the Sun, Moon, and stars, would be none other than the invading cosmic dust that once occluded the light of the luminaries and brought darkness to the world. The first part of the myth, which describes a long snowfall during this dark period, appears to be referring to the interval of accelerated snow precipitation in high-latitude

regions that caused the advance of the ice sheets. Like the legend of Ragnarok, this myth seems to suggest that the glaciation of the Earth was induced by an astronomical event. The second portion of the myth, which describes the rapid melting of the accumulated snow and consequent flooding of the Earth, appears to be a reference to the vast floods of meltwater released from the ice sheets at the height of the global warming interval. Many legends similarly describe the conflagration as ending with a worldwide deluge, although not all are as careful in specifying the continental ice sheets as the source of the water.

An important piece of information that may be gathered from this myth, and from other myths presenting a similar sequence of events, is that the climatic warming and flooding began after the Sun returned to view and the darkness was dispelled. Trusting the metaphorical accuracy of the described events, we may conclude that the dust-congested solar system warmed the Earth's atmosphere, creating temperature inversion conditions in the polar regions favorable to glacial growth. As a result of gathering this dust, the Sun gradually entered an energized T Tauri phase in which its solar wind and light radiation became more intense and finally drove away the intruding cosmic dust. The full force of the Sun's increased intensity was then able to reach the ground to cause rapid melting of the ice sheets. During this period of intense solar flaring, the Sun may have spewed out a particularly intense prominence whose tremendous radiation intensity caused temperatures on the Earth to soar rapidly and trigger glacial meltwater floods. With the final passing of the superwave, the solar system would have gradually returned to normal; the solar wind would have slowly swept out the remaining dust, and the ice sheets would have eventually melted away, bringing the ice age to an end.

The Ute Indians of Utah and California have a myth about how their sun god, Tavi, once burned the world.³⁴ They say that Tavi, long ago, used to wander the heavens at will and cause climatic extremes. When he came too near the Earth, his fierce heat scorched the people. On the other hand, when he hid away in his cave for a long time, a long night occurred and the Earth became cold. Indeed, ice-age climate did alternate between cold, stadial periods and warm, interstadial periods, as seen in figures 3.8, 4.6, and 5.7. The periods of cold occurred when the sun god was dark and hiding in his

cave—that is, when the Sun was enveloped in a cocoon of cosmic dust. Periods of searing warmth occurred when he reemerged—when the Sun entered a more active, T Tauri–like phase and cleared away the invading cosmic dust.

The myth relates that one day the wayward sun god came so close to the Earth that he scorched the naked shoulder of Ta-wats, the hare god. Fearing the vengeance that Ta-wats would seek, Tavi fled back to his cave beneath the Earth. In anger, Ta-wats journeyed to the brink of the Earth and there waited patiently. When the sun god at last came out, Ta-wats shot three arrows at him. The third one struck Tavi full in the face and he shattered into a thousand fragments, which fell to the Earth and caused a general conflagration. Ta-wats fled from the destruction he had wrought, but the burning Earth consumed his entire body. Finally, swollen with heat, the hare god’s eyes burst and the tears gushed forth in a flood that spread over the Earth and extinguished the fire. The sun god appeared before a council of the gods, which sentenced him to travel across the firmament by the same trail day after day, keeping the days, nights, and seasons regular until the end of time.

The splintering of Tavi into a thousand pieces and the consequent ignition of the Earth could be a reference to a very energetic solar flare prominence occurring during the climax of a T Tauri phase. The solar fragments falling to the Earth could be referring to hot gases and high-energy particles that, after being blasted from the Sun’s surface, briefly came in contact with the Earth. As in other myths, the conflagration is ended by a cooling flood of water, probably glacial meltwater.

The Tupi Indians of Brazil have a story about a global fire quenched by water.³⁵ According to this legend, Monau, the author of all that is, saw the ingratitude of men and their contempt for him, so he sent upon them *tata*, the divine fire, which burned everything that was on the surface of the Earth. (Interestingly, the word *tata* has an equivalent meaning in Hindu Sanskrit.) Monau saved just one man, Irin Mage, whom he carried into heaven. However, seeing all things destroyed, Irin Mage pleaded to him: “Alas! henceforth where will be our home? Why should I live, since there is none other of my kind?” Monau was so filled with pity that he then poured

a deluging rain on the Earth that quenched the fire and, flowing from all sides, formed the ocean, which the Tupis called *parana*, the great waters.

The rain of fire coming from above could be a recollection of the incendiary temperatures produced by an immense solar flare. The deluging rain that was sent to quench the divine fire could be a reference to the floods produced by the melting ice sheet. The conflagration would have evaporated large amounts of water into the atmosphere, greatly increasing the air's humidity. The icy waters flooding over the land from the melting ice sheets would have lowered ground-level temperatures sufficiently to precipitate torrential rains from this hot humid air, just as the myth describes.

The Toba and Pilaga Indians of Argentina have a myth about the burning of the world that involved the Moon rather than the Sun.³⁶ It holds that an Indian one night noticed that the Moon was taking on a reddish hue as a result of its being eaten by jaguars—spirits of the dead. The people tried to scare away the jaguars by beating their mortars like drums and thrashing their dogs. Meanwhile, fragments of the Moon fell down upon the Earth and started a big fire that ignited the world. The fire was so large that no one could escape. Men and women ran to lagoons that were covered with bulrushes. Those who delayed were overtaken by the fire. The water was boiling everywhere except where the bulrushes grew. Those who had taken shelter there were the only ones who survived. After everything had been destroyed, the fire stopped. Decayed corpses of children were seen floating on the water. Finally, a big wind arose and a rainstorm broke out.

The Moon being eaten by jaguars and taking on a red color is reminiscent of the story of Ragnarok, in which celestial wolves paint the heavens blood red and proceed to swallow the Moon and Sun. This appears to be a prosaic way of saying that a dust-congested interplanetary medium had begun to occlude the light of the Moon. Alternatively, the Sun may have become so heavily obscured that it appeared to these people like a reddened Moon. The reference to predatory jaguars suggests a Galactic center involvement, as South American Indian mythology associates the jaguar with the Scorpius constellation. Chapter 9 further explores this jaguar spirit symbolism.

Chapter 30 of the Hebrew Bible's Book of Isaiah refers to a conflagration in which the Sun will shine at seven times its normal strength:

25. And there shall be upon every high mountain, and upon every high hill, rivers and streams of waters in the day of the great slaughter, when the towers fall.

26. Moreover the light of the moon shall be as the light of the sun, and the light of the sun shall be sevenfold, as the light of seven days, in the day that the Lord bindeth up the breach of his people, and healeth the stroke of their wound.

Chinese mythology also refers to a time when the Sun was much brighter than normal. Xi-He (sun mother) is said to have given birth to ten suns, which appeared in the sky consecutively, one for each day of the ten-day Chinese week. But after many years, the ten suns decided to appear all together. Their apparition brought a terrible heat to the world. The people asked the suns to appear one by one, but they refused, so Di Jun, the suns' father, sent the archer Yi down from the heavens armed with a magic bow and arrows to frighten the disobedient suns. Yi ended up killing nine of them, leaving one which remains as the Sun seen today. Di Jun was so angry for the death of nine of his children that he banished Yi from the heavens to live as an ordinary mortal on Earth.

Hindu tradition teaches of the passage of a sequence of ages each ended by a "universal destruction." The sage Markandeya, said to be one of the survivors of the last cataclysm, describes the events of a conflagration and subsequent deluge:

After a drought lasting for many years, seven blazing suns will appear in the firmament; they will drink up all the waters. Then wind-driven fire will sweep over the earth, consuming all things; penetrating to the nether world it will destroy what is there in a moment; it will burn up the Universe. Afterwards many-coloured and brilliant clouds will collect in the sky, looking like herds of elephants decked with wreaths of lightning. Suddenly they will burst asunder, and rain will fall incessantly for twelve years until the whole world with its mountains and forests is covered with water. The clouds will vanish. Then the

Self-created Lord, the First Cause of everything, will absorb the winds and go to sleep. The Universe will become one dread expanse of water.[37](#)

The ancient Britons describe how a select group survived the burning and flooding of Britain by shutting themselves in a safe enclosure:

The profligacy of mankind had provoked the great Supreme to send a pestilential wind upon the earth. A pure poison descended, every blast was death. At this time the patriarch, distinguished for his integrity, was shut up, together with his select company, in the enclosure with the strong door. Here the just ones were safe from injury. Presently a tempest of fire arose. It split the earth asunder to the great deep. The lake Llion burst its bounds, and the waves of the sea lifted themselves on high around the borders of Britain, the rain poured down from heaven, and the waters covered the earth.[38](#)

The Australian Aborigines have a myth that tells of people and animals going underground to escape the heat of a global fire inadvertently started by Goorda, the fire spirit. Goorda lived alone in the Sky World. He made his home in the constellation of the Southern Cross, where he kept three campfires burning, called the Pointers. These are visible as the three brightest stars in the Cross—Alpha, Beta, and Gamma Crucis. As Goorda hunted game, he moved from one campfire to the other. From his lonely abode, he looked down at the Earth and watched its people hunting in the bush and having fun bathing in the water holes. He noticed that they ate their hunted meat raw, and at night huddled together for comfort from the cold. So he decided to win the friendship of the earth people by bringing them fire.

One day Goorda swiftly followed the course of a shooting star spirit that was heading for the Earth and finally reached his destination, but as soon as his feet touched the ground, the grass burst into flames. Thinking that the amazed people welcomed him, he caught a gust of wind and flew toward them. As he did, fire sprang up from beneath his feet and flames spread wildly, eating the grass and trees. Thick blinding smoke and ashes flew

through the air. The people panicked and fled. The goanna saved itself by scampering into its hole and plugging the opening with dirt. Garwuli, the spider, quickly crawled into a deep crack in the rocks where it was cool. A man named Lualua saved himself by crawling into a hole in the rocks, like the spider. All the kinfolk whom Goorda approached to reassure them of his good intentions fell before him and died. The river began to steam and black mud formed at the water's edge. When night came, blackness and silence surrounded Goorda. Little streams of smoke rose from the charred trees.

The next morning Goorda made an effort to make friends with the earth people by changing himself into a spirit form that would not cause them harm. Eventually, he met up with a group of hunters who had come to explore the place of the great fire. He showed them how to start a fire by rubbing sticks together and gave them a piece of blackened meat to eat, which they found tasted very good. Afterward he changed himself back into the fire spirit and bounded upward to return to his camp in the Southern Cross.

Terrestrial Evidence for a Prehistoric Global Warming and Solar Outburst

Geological records corroborate ancient myths and legends reporting that the Earth's ice-age climate ended abruptly in a period of excessive warmth. Figure 6.8, for example, charts atmospheric temperature at the end of the ice age at various Northern and Southern Hemisphere locations.[39](#), [40](#), [*25](#) These records show that the Earth experienced a global warming interval that began abruptly 14,500 years B.P. and consisted of two phases, the Bölling and the Alleröd. Although these were originally regional names for climatic phases that once occurred in northern Europe, they apply equally well to other parts of the world, as these warmings were of global extent.

At the height of the Bölling-Alleröd, winter temperatures in the British Isles had increased by 25 degrees centigrade and summer temperatures by 8 degrees centigrade to levels typically found in that region today. In Chile, summer temperatures warmed by 12 degrees centigrade, reaching a level significantly higher than the average temperatures that have prevailed there

during the present interglacial. The detailed top and bottom profiles from the British Isles and southern Chile show evidence of a more moderate 900-year-long warming that preceded the Bölling. Although this earlier warming episode has been given different names in various European localities, we label it here generically the Pre-Bölling interstadial.

The warming and cooling pattern present in records from the British Isles and Chile matches that seen in the inverted Greenland climatic record (figure 5.7). The Bölling-Alleröd warming is also apparent in Antarctic climate profiles. For example, the Vostok ice core (figure 3.8) registers the event as a gradual 8-degree-centigrade rise in temperature followed by a cool period (at a core depth of 300 meters), which represents the Younger Dryas. The Bölling-Alleröd warming and Younger Dryas cooling are also apparent in ocean sediment cores from various parts of the world. These show that during the Bölling-Alleröd, sea surface temperature rose to present interglacial values. One Atlantic Ocean core drilled off the southwestern coast of Portugal registered this global warming as an 11-degree-centigrade rise in water temperature.

Climatologists have long had difficulty figuring out what caused the Earth to warm up to present interglacial temperatures at a time when ice sheets still covered the surface of the planet. Computer model studies of the Earth's climate show that, in the absence of other influences, the ice sheets should have remained fully extended. This is because glacial ice and snow absorb much less sunlight than does vegetated land or ice-free oceans and hence would tend to keep the Earth's climate in a cool state.

Changes in the Earth's ocean current and atmospheric circulation patterns do not offer an adequate explanation, as such changes merely shuffle heat around the Earth in a different fashion. They do not explain how both of the Earth's hemispheres could have warmed up simultaneously as climate profiles indicate. Whatever caused these warming episodes would have had to affect the planet's entire heat balance.

The increase in atmospheric CO₂ concentration that took place at the end of the ice age would have tended to warm both hemispheres as a result of the greenhouse effect. However, it would have been rather modest, accounting for only several percent of the total temperature increase. Some climatologists argue that various positive-feedback loops in the climate

system may have amplified an incremental CO₂ greenhouse warming into a climatic shift of much larger size. However, ice core studies indicate that atmospheric CO₂ concentration during the ice age was about 6 to 10 percent lower than its present interglacial value and not 35 percent lower, as climatologists had previously claimed.⁴¹ It becomes quite difficult, then, to attribute major changes of the Earth's climate to CO₂. Moreover, glacial records indicate that CO₂ changes followed, rather than preceded, changes in global temperature and hence must have been responding to global temperature changes rather than causing them.⁴²

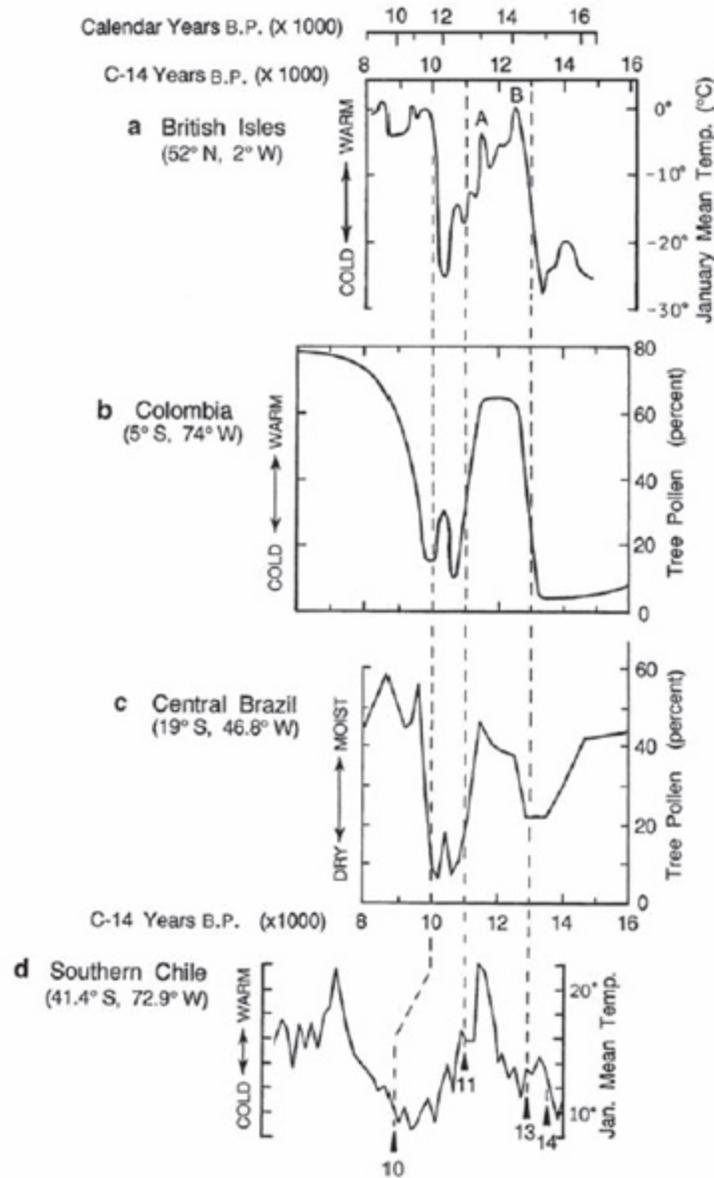


Figure 6.8. A comparison of radiocarbon-dated paleotemperature profiles from the Northern and Southern Hemispheres: (a) the British Isles, (b) El Abra Corridor, Colombia, (c) Central Brazil, and (d) Alerce, Chile. Radiocarbon years may be converted to calendar years by reference to the uppermost time scale. (After Atkinson et al., *Nature*, figure 2; Schreve-Brinkman, *Paleogeography, Paleoclimatology, Paleoecology*, figure 15; Ledru, *Quaternary Research*, figure 4; and Heusser and Streeter, *Science*, figure 2.)

The Earth's polar axis is known to cyclically change its orientation in space as a result of the 26,000-year precessional cycle and the 41,000-year nutational (nodding) cycle, and this is known to make a slight change in the relative severity of winter and summer seasons in the Northern Hemisphere. However, these orbital cycle effects occur much too slowly to explain the

rapid climatic transitions observed in the terrestrial record; more likely they are instrumental in influencing the Earth's long-term response to these climatic disturbances (see chapter 11).

With no feasible terrestrial explanation in sight, we are left to conclude that something external to the Earth must have triggered these warming and cooling episodes, something able to act much faster than orbital cycle changes. Superwave-induced cosmic dust invasions appear to be the logical answer to this climate dilemma. The interplanetary hothouse effect, reddening of the solar spectrum, and onset of T Tauri solar behavior would have combined to significantly disturb the Earth's climate. In retrospect, we come to realize that ancient stories describing periods of global darkness and extreme heat brought about by cosmic occurrences refer to phenomena that actually took place and which, until now, have eluded modern science.

The ice acidity record for the Summit, Greenland, ice core (figure 6.9) sharply defines the boundaries between the warm and cold intervals at the end of the ice age. Periods of cold weather are recorded as intervals of low ice acidity—low electrical conductivity through the ice. Correspondingly, periods of warm weather are recorded as intervals of high ice acidity—high electrical conductivity. Ice samples representing cold periods show little acidity, for they contain high concentrations of alkaline dust, which would neutralize any acidity originally contained in their snows. As seen here, the Alleröd and the Bölling were separated from one another by 100 years of cold weather called the Older Dryas (~13,900 years B.P.). Also, the Alleröd was itself interrupted by a 300-year-long cold period sometimes called the Intra-Alleröd Cold Peak (~13,000 years B.P.). The Alleröd ended abruptly about 12,700 years before present as the Earth's climate suddenly cooled back to glacial temperatures with the beginning of the 1,150-year-long Younger Dryas stadial. The Younger Dryas, in turn, concluded suddenly around 11,550 years B.P. (9600 B.C.E.) with the onset of the Preboreal global warming. Plato's myth about the sinking of Atlantis allegorically documents the glacial meltwater flooding that reached a peak around this date. With this climatic transition, the ice age came to a close and the present 12 millennium interglacial period began.

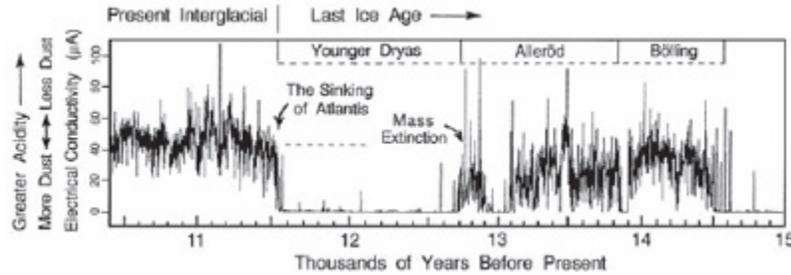


Figure 6.9. A record of ice acidity in the Greenland Summit ice core, which charts changes in windiness and solar flare activity at the close of the last ice age (adapted from Taylor, *Nature*, figure 2). The time scale shown here is based on climatic boundary dates given in appendix D.

The acidity record shows that climate in some cases shifted between warm interstadial conditions and cold, windy glacial conditions within the space of just a few years. None of the terrestrial mechanisms that climatologists have traditionally proposed, like changes in ocean current circulation patterns or atmospheric carbon dioxide concentration, is able to function fast enough to produce these climatic “flickers.” A highly variable dust-obscured Sun, however, could have caused this kind of rapid change. Hence, the acidity data corroborates the Ute myth about Tavi that states that the Sun had produced hot and cold climatic extremes as it alternated between excessive luminosity and obscuration.

The charred soil layer called the Usselo Horizon may be some of the strongest evidence for the occurrence of a prehistoric conflagration; see figure 6.10. This ten-centimeter-thick sediment layer, first identified in the township of Usselo in the Netherlands, is composed of charcoal fragments, fine bleached sand particles, and soot. The horizon dates at around 12,700 years B.P. and falls at the Alleröd– Younger Dryas boundary marking the time when the Earth’s climate suddenly cooled back to glacial temperatures. As we shall see in the next chapter, this boundary coincides with the terminal Pleistocene mammal extinction, the worst global extinction to occur since the demise of the dinosaurs. It also falls close to the 12,670-years-B.P. date encoded in the layout of the Giza temple complex (chapter 4) and the 12,650-years-B.P. conflagration and flood date encoded in both the Virgo myth and the Beth Alpha Synagogue zodiac (chapter 8). Hence, great care has been taken to pass down knowledge of its occurrence.

Dr. Han Kloosterman has argued that this black horizon is evidence of a global conflagration.⁴³ He notes that this blackened layer is also found in

the United Kingdom, Belgium, France, Germany, Denmark, and Poland and in cotemporaneous layers in the United States and other parts of the world.⁴⁴ In the southwestern United States it is called the “black mat” and is found to overlie the last of the Pleistocene megafauna as well as Clovis artifacts.



Figure 6.10. The Usselo Horizon, as seen at Ede, the Netherlands (photo courtesy of Mr. E. Zuurdeeg).

Most probably this conflagration was produced by the arrival of a very intense solar coronal mass ejection during a period of unusually strong solar activity. If so, one would expect to find high levels of the radioactive isotope carbon-14, as radiocarbon is produced when cosmic rays strike nitrogen molecules in the atmosphere. In fact, atmospheric C-14 concentrations at that time rose as high as 9.5 percent above present mean levels.⁴⁵ Because solar cycle variations typically produce a 0.3 percent change in C-14 concentration, a 9.5 percent increase would translate into a thirtyfold increase in solar cosmic ray activity if it had occurred over a comparable 11-year time period. If this C-14 anomaly were instead produced over a period of a week, rather than a decade, a much larger increase in solar cosmic ray intensity would be projected, on the order of 10,000-fold!

In some cases, the remains of extinct megafauna contemporaneous with this event have been found to have radiocarbon dates as young as 2000 C-14 years B.P. In 1983 I suggested that this radiocarbon excess was produced

within the animal remains by an unusually intense solar cosmic ray bombardment.⁴⁶ The incident cosmic rays would have produced thermal neutrons, which in turn would have transformed nitrogen in the remains into carbon-14, thereby making their radiocarbon dates appear abnormally young.

William Topping and Richard Firestone independently proposed the same mechanism to explain unusually young radiocarbon dates found in Paleo-Indian artifacts from the midwestern United States. They report that Paleo-Indian artifacts that date from this same Alleröd–Younger Dryas transition period in some cases have radiocarbon dates as much as 10,000 years younger than their true dates.^{47, 48} They suggest that the required neutron flux came from either a nearby supernova explosion or a giant solar flare. They report that chert flakes are densely pitted with “particle-like tracks” at densities as great as 70,000 per square centimeter and also contain embedded chondrules. The tracks suggest that the particles had velocities as high as 330 meters per second (about Mach 1). They appear only on one side of the artifacts—the side exposed to the sky. They note also that an excess of magnetic particles (50 to 200 micron diameter) is found in the adjacent soil layer. All of this evidence together suggests the occurrence of some sort of cosmic event. Geochemical analysis of the Paleo-Indian horizon at the Gainey site in Michigan showed elevated chromium and nickel, which are both indicators of extraterrestrial material. Their suggestion that the particle bombardment was strongest in the midwestern states (Michigan, Illinois, and Indiana) and New Mexico could be explained as evidence of a localized enhancement in the intensity of an impacting coronal mass ejection. Or it could have been due to a magnetic focusing effect occurring during the ensuing collapse of the Earth’s magnetic field.

During the entire Bölling-Alleröd, and particularly during periods of intense solar outbursts, the Earth’s continental ice sheets would have melted at an accelerated rate and produced immense floods of glacial meltwater. The renowned geologist James Dana was an early proponent of this continental flooding idea. In his *Manual of Geology*, published in 1880, he wrote:

The fact that a flood vast beyond conception was the final event in the history of the glacier (i.e. of the great American ice sheet) is manifest in the peculiar stratification of the flood-made deposits, and in the spread of the stratified drift southward along the Mississippi Valley to the Gulf . . . Only under the rapid contribution of immense amounts of sand and gravel, and of water from so unlimited a source could such deposits have been accumulated.⁴⁹

Recent oxygen isotopic studies of the shells of single-celled foraminifera deposited in Gulf of Mexico sea floor sediments support Dana's conclusions. From these isotopic measurements, scientists have been able to construct graphs that chart the rate at which glacial meltwater from the North American ice sheet was discharging into the Gulf of Mexico from the Mississippi River.^{*26} One such graph is represented by the upper profile in figure 6.11, whose shaded portions highlight times of significant meltwater output. It is apparent that during the Bölling-Alleröd, the North American ice sheet was discharging meltwater at the highest rate of its entire glacial recession history. Meltwater output dropped off during the cold Younger Dryas, but greatly increased again during the Preboreal.

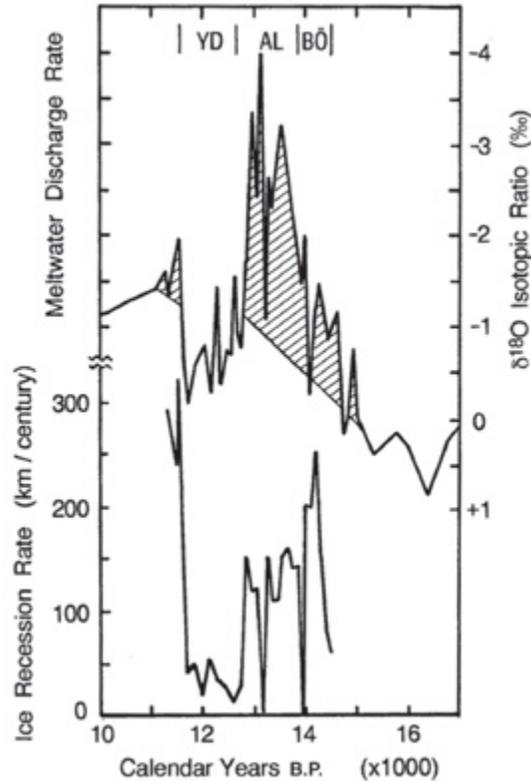


Figure 6.11. Upper profile: Rate of meltwater discharge by way of the Mississippi as indicated by the oxygen isotope profile for Gulf of Mexico core EN32-PC4 (after Broecker et al., *Nature*, figure 2; data courtesy of J. Kennett). The shaded portion charts the rate of glacial meltwater discharge. Lower profile: Ice sheet recession rate in southern Sweden (data from Björck and Moller, *Quaternary Research*, figure 18; Tauber, *Radiocarbon Variations and Absolute Chronology*, table 3). Climatic zones include YD: Younger Dryas; AL: Alleröd; and Bö: Bölling.

Other evidence that the ice sheets were rapidly melting during the Bölling-Alleröd may be seen in the lower profile of figure 6.11, which shows that the Scandinavian ice sheet was receding northward at a very high rate during that period. As in North America, the rate of ice sheet recession dropped off during the Younger Dryas but shot up again with the onset of the Preboreal warming.

This same general pattern of glacial melting is evident in figure 6.12 (upper profile), which charts the rate of sea level rise at the end of the ice age. This profile was constructed by studying a particular species of coral that lives on a coastal reef in Barbados. Since this species always lives within a few meters of the ocean surface, its place of growth on the reef would have moved progressively upward as sea level rose. By dating coral shells found at various depths, geologists have been able to date this 120

meter rise in sea level and infer the corresponding rate of meltwater discharge. As in the Scandinavian and Gulf of Mexico records, the sea level curve from Barbados indicates that the ice sheets were discharging meltwater at a very high rate during both the Bölling-Alleröd and the Preboreal warm periods. The Scandinavian ice recession rate profile is shown below for comparison. Together, these graphs suggest that there may be much truth to the many flood cataclysm stories that have been handed down to modern times in virtually every culture around the world. In particular, the 9,600-B.C.E. date that Plato's *Timaeus* gives for the time of the Deluge happens to fall at the beginning of the Preboreal at the time of the upsurge in the rate of meltwater discharge. Hence, it marks the most recent time when glacial meltwater was flooding the continents. As mentioned earlier, this key date also marks the end of the last ice age. Evidence for a 12,700-years-B.P. flood, coincident with the late Pleistocene mass extinction, is presented in the next chapter.

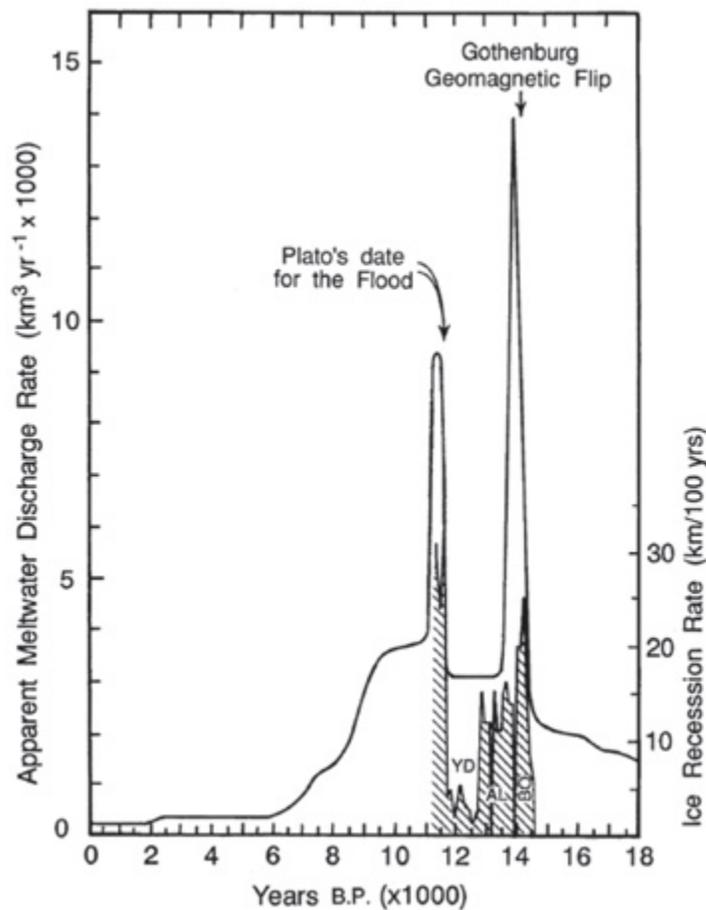


Figure 6.12. Upper profile: The rate of global glacial meltwater discharge into the oceans calculated from the rate of sea level change observed in the Barbados coral reef record (data from Bard et al., Nature, figure 1; Fairbanks, Nature, figure 3). Lower profile: Ice sheet recession rate in southern Sweden.

Ocean core studies provide evidence that these meltwater discharges from the ice sheets were quite violent, capable of transporting continental bedrock sediment thousands of kilometers out into the sea. In 1988, Hartmut Heinrich discovered that the ice-age portion of ocean sediment cores contained unusual layers recurring at 5,000 to 10,000 year intervals.⁵⁰ These so-called Heinrich layers, or Heinrich events, are made up primarily of rock grains of continental origin and have unusually low concentrations of plankton shells. It was apparent that something had transported this material in a coordinated fashion from the coastal regions and abruptly deposited it, since the layers begin with a sharp boundary. The bottommost layer of lithic debris was deposited so suddenly that it compressed the ocean bottom fluff layer, pancaking it and preserving it beneath the Heinrich layer, as would have occurred if large amounts of sediment were dumped in a matter of hours.

The theory that this debris was rafted out to sea by icebergs and gradually deposited as they melted does not fit the evidence. It is apparent that this material was transported by vast avalanches of glacial meltwater and ice chunks originating from the surface of the continental ice sheet and continuing out to sea. These so-called glacier waves, described in greater detail in the next chapter, would have tended to occur during periods of climatic warming and glacial melting. The same is true of Heinrich events. Isotopic studies indicate that shell plankton in Heinrich layers have a conspicuously lower $\delta^{18}\text{O}$ ratio, indicative of lower surface water salinity, as would be expected during a meltwater discharge. Also, as seen in figure 6.13, Heinrich events tend to occur at the beginning of major climatic warmings—for example, at the start of interstadials (H1 and H2) and close to the ice-age termination boundary (H0). These are times when glacier waves would have been most active. This novel discovery that Heinrich events correlate with periods of abrupt climatic warming and not with cold climate intervals is presented in greater detail in the update to my dissertation.⁵¹

Heinrich Event 1 is of particular interest, as it occurs near the beginning of the Pre-Bölling interstadial, the warming trend that brought an end to the last ice age. Its beginning correlates with the time of the 15,800-years-B.P. Main Event described in chapter 4, which registers a major incursion of interstellar dust into the solar system. Thus, the same energized Sun that induced the climatic warming following the Main Event was also responsible for rapid melting of the ice sheets and the ensuing production of glacier waves that created Heinrich Event 1.

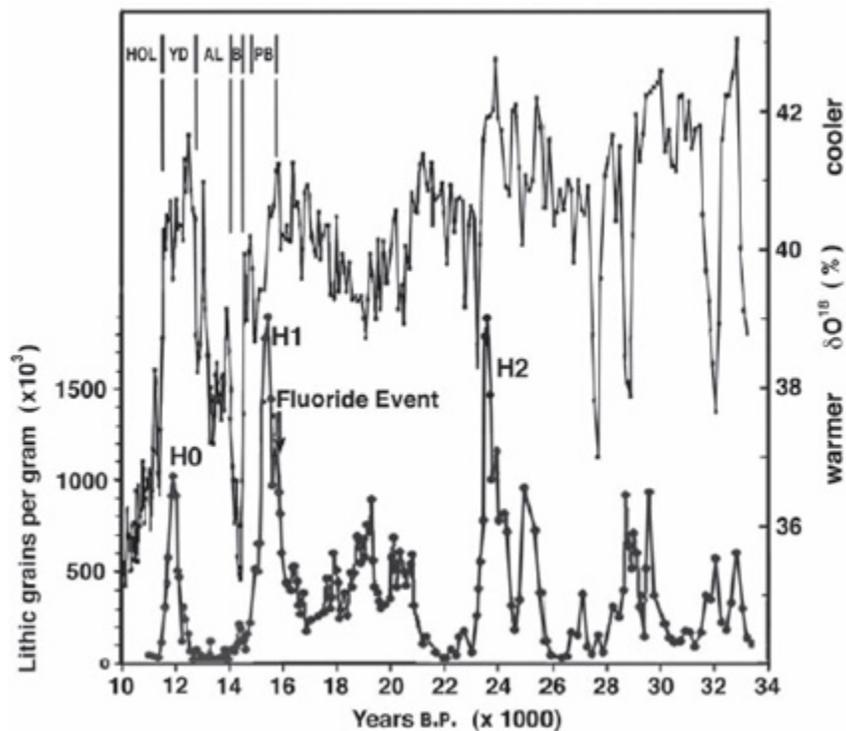


Figure 6.13. Heinrich event dates compared with major climatic transitions. Upper profile: Oxygen isotope climatic profile from the GISP2 Summit, Greenland, ice core (lower values indicate warmer climate). Lower profile: Lithic grain abundance in sediments from North Atlantic core V23-81 (data courtesy of G. Bond). Peaks designated H0, H1, and H2 indicate the most-recent Heinrich layers.

There is also evidence of stratification within Heinrich layers, suggesting that their continental debris was not deposited in a single event, but rather by a series of sudden events spanning hundreds of years. Thus, each such event appears to record the occurrence of not one but many deluges of immense proportions.

Solar Storms and Geomagnetic Flips

If the Sun had been more active at the end of the ice age, as ancient myths and lunar rock studies seem to suggest, then we would expect to find historical evidence of this in records of the intensity and direction of the Earth's magnetic field, for data on modern solar storms shows that the Earth's magnetic field is a sensitive indicator of solar flare activity. For example, when a solar flare coronal mass ejection impacts the Earth, it compresses the Earth's surrounding magnetic field sheath and causes the intensity of the geomagnetic field to temporarily increase, an event called *sudden commencement*. This always is followed by a prolonged *decrease* in field intensity termed *main phase decrease*, which occurs when the impacting solar flare cosmic ray particles become captured by the geomagnetic field and begin populating the Earth's radiation belts. Once they are magnetically captured, these particles spiral around the magnetic field lines that extend between the North and South Poles, repeatedly reflecting back and forth from one pole to the other. While traveling in this north-south direction, they also slowly drift in an equatorial direction to form a powerful equatorial electric current (see figure 6.14). This so-called ring current generates an intense magnetic field that is directionally opposed to the Earth's magnetic field and partially cancels it out to produce the observed main phase decrease.

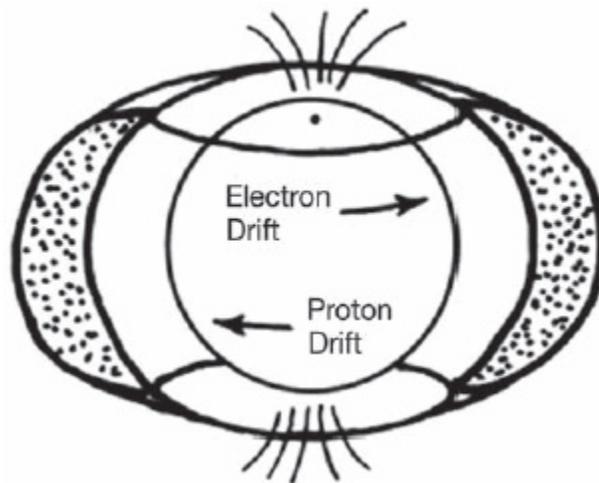


Figure 6.14. The inner Van Allen radiation belt shown in relation to the Earth. Cosmic ray electrons drifting eastward and cosmic ray protons drifting westward produce a ring current, whose magnetic field is opposed to the Earth's own magnetic field.

In past decades, solar storms have produced main phase decreases as large as one percent of the Earth's field intensity. However, much larger scale magnetic disturbances are recorded in ocean and lake bottom sediments. These show that, from about 14,500 years B.P. until the end of the ice age (~11,550 years B.P.), the intensity and declination of the Earth's magnetic field underwent major variations in step with the eleven-year sunspot cycle.⁵² The amplitude of these cycles was hundreds of times larger than modern geomagnetic solar cycles, suggesting that solar flare activity at that time was also hundreds of times more intense, approaching levels normally observed in T Tauri stars.

One sediment core, from Gothenburg, Sweden, records a 180-degree flip in geomagnetic pole declination at the boundary between the Alleröd and the Younger Dryas.⁵³ This event may correlate with the 12,700-year-B.P. solar conflagration event. Large disturbances also took place close to the beginning of the Preboreal global warming. For example, around 11,650 years B.P., the north geomagnetic pole suddenly swung 200 degrees westward to a new position, which it held for about 20 years before returning to its initial bearing. Then, one century later, around 11,550 years B.P., the Earth's magnetic field intensity increased more than fivefold.⁵⁴

The intensity and direction of the Earth's magnetic field also fluctuated irregularly from about 15,800 to 14,100 years before present. A particularly major geomagnetic excursion occurred around 14,100 years B.P., when the Earth's north magnetic pole abruptly flipped southward to point to an equatorial mid-Pacific location for around 10 to 50 years.⁵⁵ Although evidence of this event has been found in several places around the world, it is most widely known as the Gothenburg Magnetic Flip, named after the city in Sweden where it was first discovered. The flip occurred at a time when global temperatures and the meltwater discharge rate were close to the highest levels of this terminal ice-age period (figure 6.12). Galactic cosmic ray intensity also had reached a peak at this time (figure 3.8).

The Gothenburg Flip was a substantial geomagnetic disturbance. No event of comparable magnitude has occurred since that time. A ring current strong enough to have overpowered the Earth's field and to have moved the Earth's magnetic pole to the equator would have required a solar flare

hundreds of times larger than the largest solar flare observed in modern times. Particularly intense T Tauri–like solar activity would help explain why the Earth’s climate was so unusually warm at that time. [56](#), [57](#), [*27](#)

A full reversal of the Earth’s magnetic field direction might also occur at such times when the ring current field is sufficiently strong. Particle-induced magnetic field reversals have been produced in the laboratory by injecting large quantities of charged particles into the field of a strong dipole magnet. [58](#) The ring current magnetic field generated by the trapped particles at a certain point becomes strong enough to reverse the magnet’s field polarity. In a similar fashion, a sufficiently intense and prolonged radiation belt ring-current field could reverse the polarity of the magnetic dynamo in the Earth’s core, resulting in a semipermanent field reversal at the Earth’s surface that might last anywhere from a few thousand to several hundreds of thousands of years. Such field reversals, although less common, are present throughout the geomagnetic record. For example, periods of reversed field polarity persisted during the Laschamp event, (30,000 to 20,000 years ago) and the Blake event (100,000 to 90,000 years ago). Going further back we find that the Earth’s field polarity, was reversed most of the time from 2.4 million to 730,000 years ago, a period that ended with the Brunhes/Matuyama event, which brought the Earth’s field to its present northern orientation. Even this early extended reversed period was interspersed with several periods of normal polarity, such as the Jaramillo Event, the Glisá Event, and the Olduvai Events, and numerous other periods of normal and reversed polarity are apparent as we look even further back in time. Thus, we are led to suspect that super-wave cosmic ray events have plagued the Earth throughout its history.

SEVEN

THE GREAT EXTINCTION

However ingeniously and with whatever subtlety we may deal with our evidence, the facts constrain us therefore to one inevitable conclusion, namely, that the Mammoth and its companions perished by some wide-spread catastrophe which operated over a wide area and not through the slow processes of the ordinary struggle for existence, and that the greater portion of the remains we find in Siberia and Europe are not the result of gradual accumulation under normal causes for untold ages, but the result of one of Nature's hecatombs on a grand and widespread scale, when a vast fauna perished simultaneously.

HENRY HOWORTH, 1887

In Search of a Cause

The time from 1.8 million years ago up to about 11,600 years ago, when the last ice age ended, is referred to by geologists as the Pleistocene period. A study of the fossil record reveals that at no time during the entire Pleistocene did animal extinction proceed at a more rapid pace than during the Late Wisconsin stage of the last ice age. During that interval, at least 57 species of large land mammals became extinct, most of their genera being lost without replacement. By "large" we mean mammals having an adult body weight of greater than 100 pounds (45 kilograms), megafauna such as the mastodon, mammoth, ground sloth, and saber-toothed tiger.

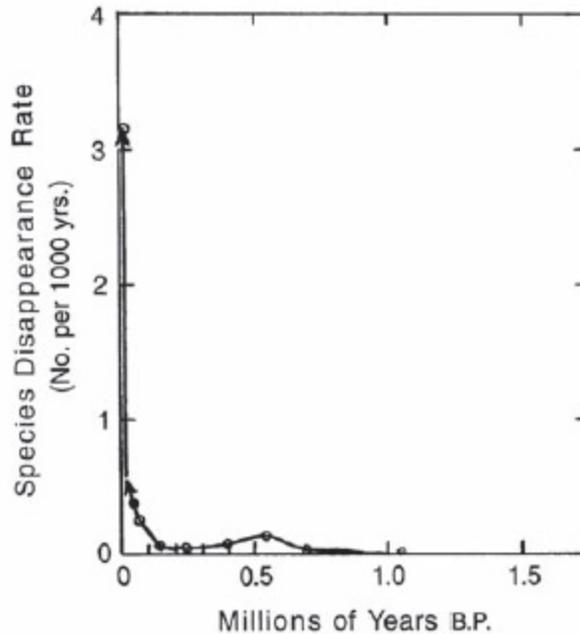


Figure 7.1. The rate of disappearance of large mammalian species in North America (data is from table 7.1). The extinction rate increase for small land mammals, although not as large, was also quite significant.^{*28}

The anomalous nature of this episode is apparent in figure 7.1, which plots the rate of disappearance of large land mammals from North America during the past 1.8 million years. This plot most likely underestimates the true magnitude of the increase, since most of the species that disappeared during the Rancholabrean-3 age did so at the very end of the Late Wisconsin, during the 1,950-year-long Bölling-Alleröd interstadial (14,500 to 12,700 years B.P.). If this is taken into account, the extinction rate for this terminal period rises elevenfold higher to 36 species per thousand years, more than 500 times the average rate that prevailed during preceding ice ages.

The large land mammals of the Rancholabrean-3 age met catastrophic deaths in greatest numbers during the Bölling-Alleröd warm period (see figure 7.2). If this mammal death rate graph is a reliable indicator of the loss of human life as well, we can appreciate the magnitude of the suffering that people must have endured, not over just a few years, but over many generations.

TABLE 7.1. RATE OF DISAPPEARANCE OF LARGE AND SMALL MAMMALS IN NORTH AMERICA

Mammal Age	Glacial Stage	Years B.P. (x 10 ³)	Duration (10 ³ Yrs)	No. Extinctions		Rate Per 10 ³ Yrs	
				Large	Small	Large	Small
Blancan 1	62 – 43	1800 – 1300	500	1	11	0.002	0.020
Blancan 2	42 – 23	1300 – 800	500	4	46	0.008	0.090
Blancan 3	22 – 16	800 – 610	190	0	26	0	0.140
Blancan 4	15 – 13	610 – 480	130	14	36	0.140	0.350
Iringtonian 1	12 – 10	480 – 330	150	12	25	0.080	0.170
Iringtonian 2	9 – 7	330 – 190	140	5	10	0.035	0.070
Iringtonian 3	6 – 5	190 – 70	120	5	29	0.040	0.240
Rancholabrean 1	4	70 – 57	13	3	5	0.230	0.380
Rancholabrean 2	3	57 – 33	24	10	12	0.380	0.460
Rancholabrean 3	2	33 – 13	20	57	21	3.170	1.170

Extinction data is taken from P. S. Martin, *Extinctions*, p. 160. The numbers in column 2 refer to glacial stages illustrated in figure 5.2c. The radiocarbon dates originally published for this data have been converted into calendar years using table D.1, appendix D.

The upper profile in figure 7.2 shows that mortality began to climb between 16,000 and 15,500 years B.P., around the time when acidic dust was entering the solar system (chapter 4). The hydrochloric acid component of that dust would have destroyed the Earth's ozone layer and allowed the Sun's harmful UV rays to penetrate to the ground. Mortality rates are seen to rise to a peak during the Bölling (14,300 to 13,800 years B.P.) and then again toward the end of the Alleröd (13,200 to 12,700 years B.P.), both times corresponding to periods of climatic warmth and to periods of particularly high solar flare activity due to the Sun's aggravated T Tauri-like state. The Bölling peak begins at the time of the Gothenburg geomagnetic excursion, a disturbance that may record a period of unusually high solar flare activity. As noted in the last chapter, the high solar flare-cosmic ray intensities prevailing at that time would also have worked to destroy the ozone layer and therefore would have worsened the situation begun by the rain of cosmic hydrochloric acids. But hazards arising from the heat of this solar conflagration and its accompanying glacial meltwater floods would have been a major cause of the megafaunal extinction at the

end of the Pleistocene, for, as the lower profile in figure 7.2 demonstrates, this unrivaled extinction episode occurred during a period when the ice sheets were discharging meltwater at a very high rate.

Despite extensive dating of large-mammal remains found in southwestern U.S. flood deposits, paleontologists failed to find any extinct species surviving past calendar date 12,700±100 years B.P. (11,000 C-14 years B.P.).¹ Consequently, the precipitous decline in death rate around 12,700 years B.P. (dashed line in figure 7.2) appears to be the true cutoff date for this mammalian extinction episode, a boundary that coincides with the sudden onset of cold weather and cessation of meltwater flooding at the beginning of the Younger Dryas. Hence, the bar graph dates that extend into more recent times, 12,700 to 11,550 years B.P., are believed to have arisen from dating inaccuracies. This species termination occurred at the time of the formation of the charred Usselo layer. As shown in the next chapter, this event, which is unparalleled in recent geological times, is explicitly marked in the zodiac cryptogram as a 12,650 years B.P. flood date.

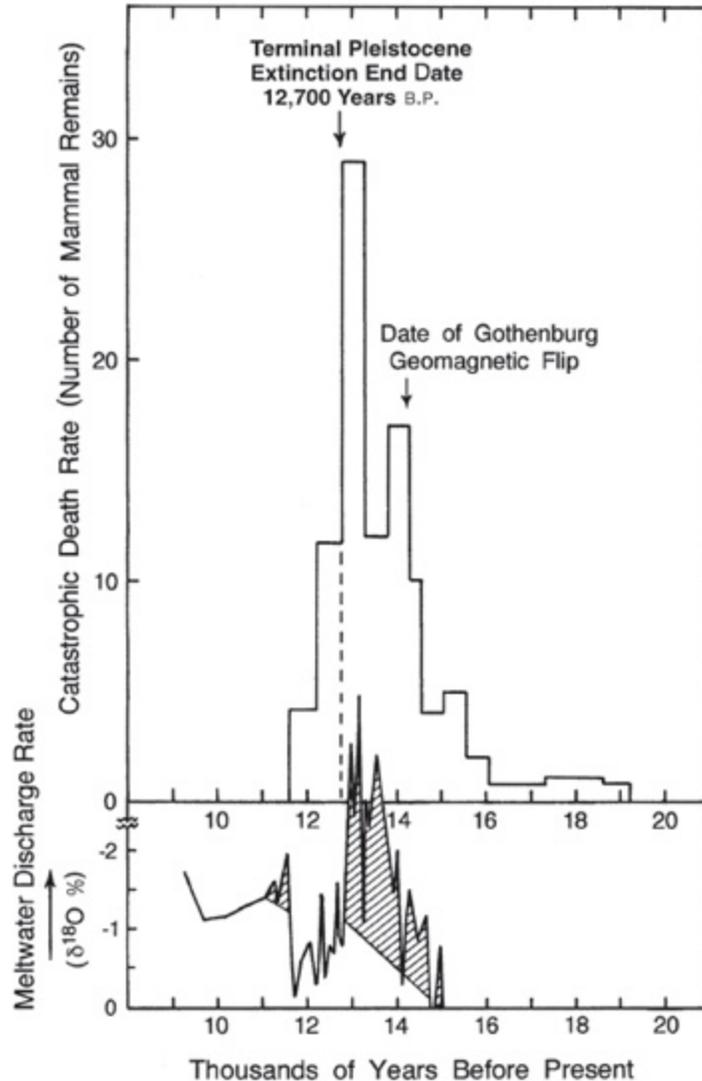


Figure 7.2. Upper bar graph: Chronological distribution of calendar dates on remains of extinct land mammals from 163 localities in North America. Lower profile: The rate of meltwater discharge from the North American ice sheet (see figure 6.8). (Upper graph based on Martin, *Nuclear Instruments and Methods in Physics Research*, figure 2; Meltzer and Mead, *Environment and Extinction*, figure 1.)

North America had the largest glacial ice sheet (see figure 7.3), and paleontological studies have shown that the terminal Pleistocene cataclysm was most severe there, some 95 percent of the megafaunal species having become extinct.² Northern Europe, northern Siberia, South America, and Australia had proportionately less glacial cover, and they correspondingly had more moderate rates of animal extinction. Southeast Asia and Africa, which had no ice sheets, except for some glaciation at Africa's

southernmost tip, had virtually no large animal extinctions. Did greater numbers of animal species become extinct in regions of greater glacial cover because they were exposed to a greater threat from meltwater floods? Or was this because animals living in such regions had a greater chance of having their remains preserved through flood burial?

Not only did an unusually high number of species disappear at the end of the Pleistocene, but in addition, the extinctions were terminal. Following this event, new genera did not replace extinct species either by immigration or by evolution. This circumstance contrasts with the rest of the Pleistocene, during which there was a reasonably orderly replacement of old genera. The paleontologist John Guilday compared the terminal Pleistocene event with the extinction of the dinosaurs at the end of the Cretaceous period:

True extinction (end of a phyletic lineage without phyletic replacement) has occurred throughout the history of life on earth. Among the terrestrial vertebrates, the fossil evidence suggests two striking episodes of extinction: one at the Mesozoic-Tertiary transition saw the extinction of the last of the dinosaurs, the other at the Pleistocene-Recent transition saw the sudden dramatic disappearance of large mammals in most but not all parts of the world.³

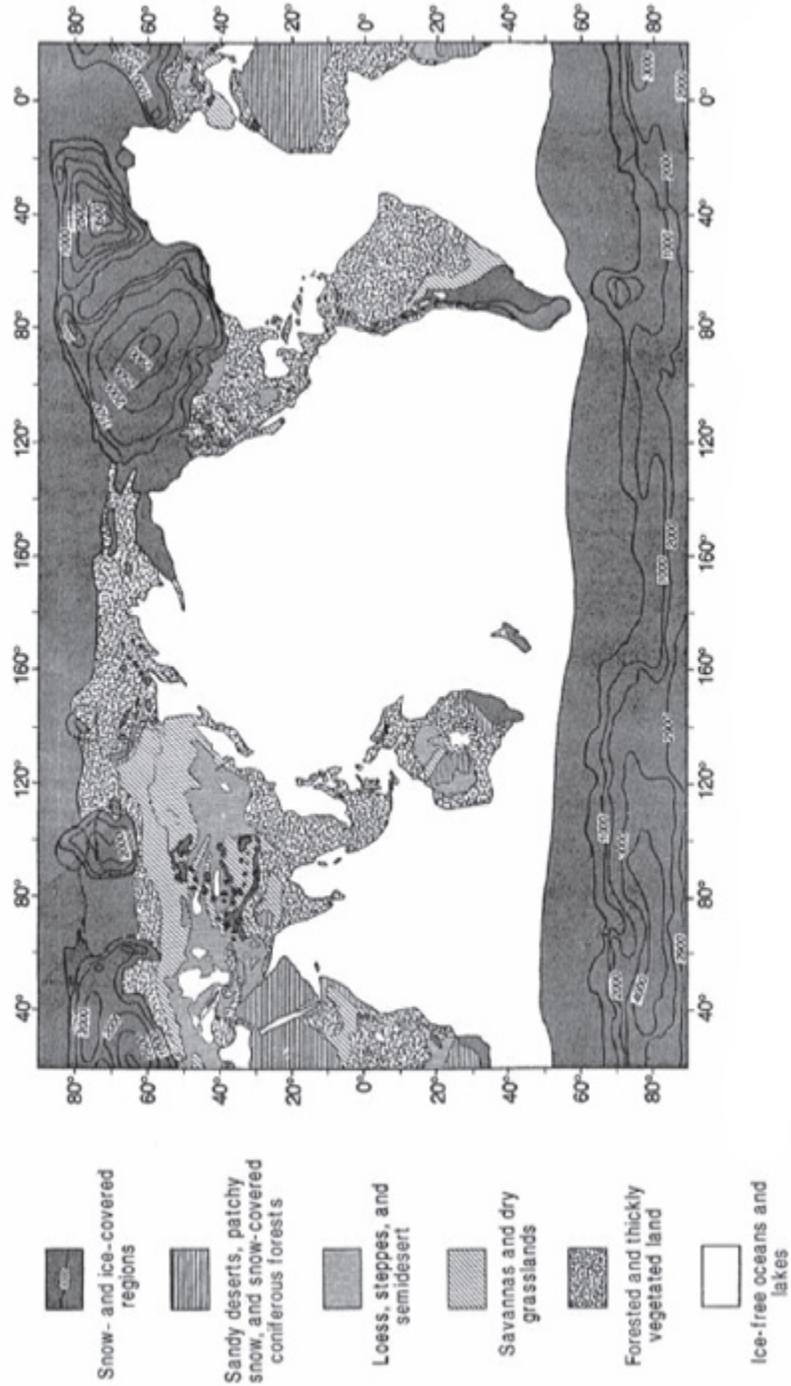


Figure 7.3. A map showing the continental ice sheets and vegetation zones at the end of the last ice age. Ice sheet contours denote elevation in meters. (After the CLIMAP Project, *Science*, figure 1.)

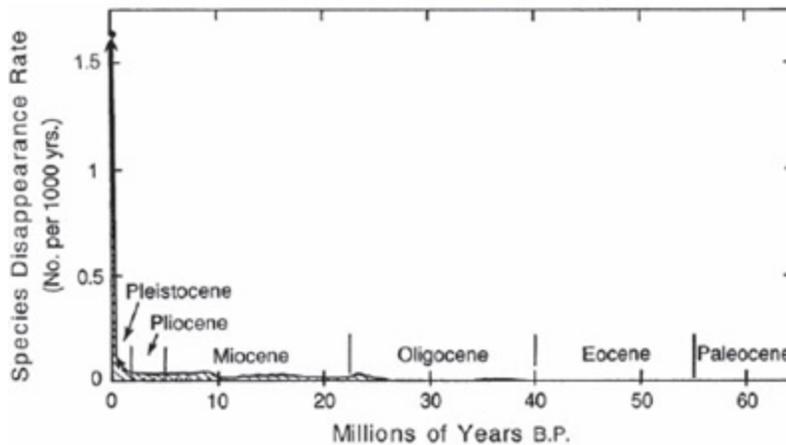


Figure 7.4. The rate of disappearance in North America of mammalian genera of the Rodentia, Artiodactyla, and Fissiped Carnivora orders. (After Gingerich, Quaternary Extinctions, figure 10.2.)

Both catastrophes affected primarily large land animals, as opposed to the smaller vertebrates and plant species. However, the dinosaur extinction was by far the more severe of the two events in that, besides land animals, sea creatures were also affected. Scientists today generally agree that the dinosaur extinction episode was precipitated by an asteroid colliding with the Earth near the Yucatán Peninsula of Central America. Not only would the impact have caused a tremendous shock wave to sweep across the planet, but it also would have produced immense ocean waves and high atmospheric temperatures. Moreover, the tremendous amounts of dust that were thrown into the atmosphere are believed to have blotted out sunlight for several years, which would have led to the temporary eradication of the dinosaurs' food chain. The terminal Pleistocene extinction also appears to have been precipitated by a cosmic event, but in this case cosmic dust was the ultimate instigator. During the course of the 65 million years that have passed since the time of the dinosaur extinction, there has been no other mammal extinction event that compares with the extinction at the end of the ice age (see figure 7.4). No wonder myths from virtually every culture around the world record this disaster.

The nineteenth-century English naturalist Alfred Wallace once commented:

We live in a zoologically impoverished world from which all the hugest, and fiercest, and strangest forms have recently disappeared . . .

yet it is surely a marvelous fact, and one that has hardly been sufficiently dwelt upon, this sudden dying out of so many large Mammalia, not in one place only but over half the land surface of the globe.⁴

Later, Wallace proposed the idea that the terminal Pleistocene extinction might have been due to the arrival of primitive man, a predator of unprecedented efficiency. This line of thought was further developed by the paleontologist Paul Martin, who suggested that prehistoric man had a carnivorous diet and hunted these large mammals as “big game.”

However, several paleontologists have objected to this “prehistoric overkill” hypothesis. For example, Donald Grayson has noted that out of 22 genera of birds that became extinct in North America during the entire Pleistocene, as many as ten (45 percent) became extinct at the end of the Pleistocene.⁵ He says it is hard to believe that primitive North American hunters could have succeeded in exterminating as many as 10 genera of birds and at the same time be responsible for killing off almost all the large mammals. Furthermore, the paleontologist Gary Haynes has noted that scratches, gouges, and fractures seen on mammoth bones, which have often been interpreted as butchering marks made by Stone Age implements, are also found on the bones of modern elephants that died of natural causes (e.g., drought) and which were presumably inflicted by elephants trampling on the bones of their dead.⁶

Martin has suggested that the demise of the mammoths and other large mammals in North America around 12,700 years B.P. (11,000 C-14 years B.P.) was due to the first migratory arrival of humans on the American continent at about that time. However, as noted in chapter 5, people had been living in the Americas at least as far back as 47,000 years ago. Settlements of similar antiquity have also been found in Europe and Asia, indicating that on both continents, ice-age man had been cohabitating with these Pleistocene faunae for many millennia. Yet in both parts of the world, there is evidence that a mass extinction occurred close to this 12,700-year-B.P. date. Thus, the cause should have nothing to do with patterns of human migration.

The anthropologist K. Kowalski points out that although man was also present in Europe at the end of the Pleistocene, there is almost no evidence that he was involved in the extermination of animals. He writes:

The hunting activity of primitive man, even over a very long period, does not necessarily bring the extinction of his prey. Extensive literature concerning the hunting habits of European Paleolithic man indicates that all large phytophagous [plant-eating] mammals were hunted, but it is very difficult to judge the size of the human population and the degree to which hunting influenced the population of particular species. Reindeer, red deer, aurochs, wild horse—all extensively hunted—were able to survive, whereas some mammals, which were probably more difficult for primitive man to kill (mammoth, woolly rhinoceros, cave bear) or were of no interest to him (lion, hyena), became extinct. When the density of the prey dropped, man with his primitive weapons could not get enough game and began to hunt other animals, migrated, or finally died of hunger.⁷

The Soviet zoologist Nikolaj Vereshchagin also believes that the terminal Pleistocene disappearance of large mammals in Siberia cannot be attributed to the hunting activities of Paleolithic man alone, but rather involved changes in climate. He writes:

The accumulations of mammoth bones and carcasses of mammoth, rhinoceros, and bison found in frozen ground in Indigirka, Kolyma, and Novosibirsk islands bear no trace of hunting or activity of primitive man.

. . . The descriptions of layers containing bones, skeletons, and carcasses of mammoth, rhinoceros, bison, and horse in the basins of the Indigirka, Vilui, Jana, and Kolyma rivers suggest that the animals died in winter, generally in great numbers and thus catastrophically. The corpses of herbivores were swept away with the floods into depressions. In summer these carcasses formed in boggy areas the so called “mammoth horizon,” a thick layer consisting of bones, skulls, tusks, peat, and tree trunks interlocked by perma-frost.⁸

The paleontologist Bob Slaughter, too, believes that climatic change was the main factor causing these extinctions. He points out that one should not overlook the fact that this extinction took place at a time of rapid climatic warming at the end of the last ice age, and suggests there must have been some causal connection.⁹ Since abrupt climatic changes have repeatedly occurred throughout the Pleistocene without having any particularly pronounced effects on animal life, we must conclude that the climatic event ending the last ice age must have been quite special.

Some have speculated that the extinction was caused by the excessively dry period that immediately followed the ice age.¹⁰ However, others have questioned this explanation, noting that the same types of habitat that were occupied by the large mammals of the last glacial cycle are also widespread today in the western United States.¹¹ Moreover, they note that a greater area, and probably a greater variety of habitats, is available to grazing animals today than existed during the glacial period. Thus, large land mammal populations should have increased, not declined, as the ice sheets retreated. They note that about 13,500 years B.P. some areas of the American Southwest probably became marginal habitats due to the prevailing desiccation, but there should have been no barriers preventing the animals from migrating into favorable regions.

The ideas of prehistoric overkill and climatic maladaptation have been knocked around for some time. Looking back to the nineteenth century we find that Sir Henry Howorth effectively countered both of these old chestnuts in his classic work *The Mammoth and the Flood*. Regarding the North American extinctions, he writes:

We cannot assign the extinction of these animals to a change of climate in America, for the climate in large parts, and this where the remains most abound, has not virtually changed at all. The same plants and the same land-shells still thrive on the same ground. The fact that the animals found were apparently in robust health when they died, with their stomachs distended with food, and the further fact that remains of many very young animals have occurred, preclude the supposition that disease or want of food destroyed them. The same

reasons adduced in the case of Asia, seem to point with even greater force in America to the impossibility of man having caused the destruction of the animals. The scattered tribes of Indians, using rude stone weapons, could hardly accomplish in the way of destroying life what their better armed and apparently more numerous successors who were found there when the Europeans discovered America, failed to accomplish with the animals which then surrounded them. If the modern Indian could barely cope with the bison and the grizzly bear, how did his ruder ancestor destroy the megatherium and the mastodon?[12](#)

So, to what should we attribute this mass extinction, one that was most severe in North America? Based on the evidence from geology and mythology, we are impelled to conclude that flood waves of unprecedented proportions issuing from the continental ice sheets were a principal cause. Not only would such high-velocity flood waves drown animals, as various legends describe, but they would destroy the vegetation that sustained them as well. Larger animals, both grazing animals and their predators, would have been at a distinct disadvantage, as they require greater amounts of biomass for their survival and take much longer to increase their population size. The few large grazing mammals that survived these cataclysms would have either starved to death or been rapidly exterminated by their predators or by human survivors searching for food.

Glacier Waves

Ponds and lakes on a glacier's surface, as well as natural caverns within the glacier, are known to store large quantities of glacial meltwater. From time to time the contents of such reservoirs can discharge suddenly to create potentially destructive floods called *glacier bursts* or *glacier floods*. Vatnajökull glacier, in Iceland, offers a good example of this phenomenon.[13](#), [14](#) Geothermal heat rising from a volcanic source located three fourths of the way to the glacier's summit melts a cauldronlike depression in the ice to form an ice-covered lake called Grimsvötn (The Lakes of Grimur). About once every decade the lake's accumulated volume of meltwater becomes so great as to cause its surrounding ice walls to fail

and release 7 to 8 cubic kilometers of water within just one or two days. The flow rates associated with these discharges have been estimated to reach as high as 40,000 to 50,000 cubic meters per second (figure 7.5). Since the lake is perched about 1500 meters above sea level, these glacier floods can be quite destructive, endangering settlements in the glacier's coastal outwash plain.

Yet, present-day Grimsvötn glacier floods pale in comparison to the deluges that were released at the end of the last ice age. During periods of intense climatic warming, the Earth's ice sheets were melting extremely rapidly, with most of this melting taking place on their upper surfaces. Consequently, large quantities of meltwater would have collected on the ice sheet surface to form numerous supraglacial lakes perched at elevations of up to 30 kilometers. In cases where the impounded waters were restrained by ice jams and where mounting pressures caused these jams to give way, large floods of glacial meltwater would have poured out over the ice sheet surface. As one such glacier burst swept forward, gradually descending the ice sheet's surface, it would have incorporated any ponded meltwater that lay in its path, triggering these supraglacial lakes to discharge their contents and add to its size (see figure 7.6). Through this snowballing effect, a single initial glacier burst would have progressively grown in size and kinetic energy during the course of its downhill journey, eventually becoming of mountainous proportions. This so-called continental glacier wave¹⁵ would have produced catastrophic floods unlike anything seen on our planet today.

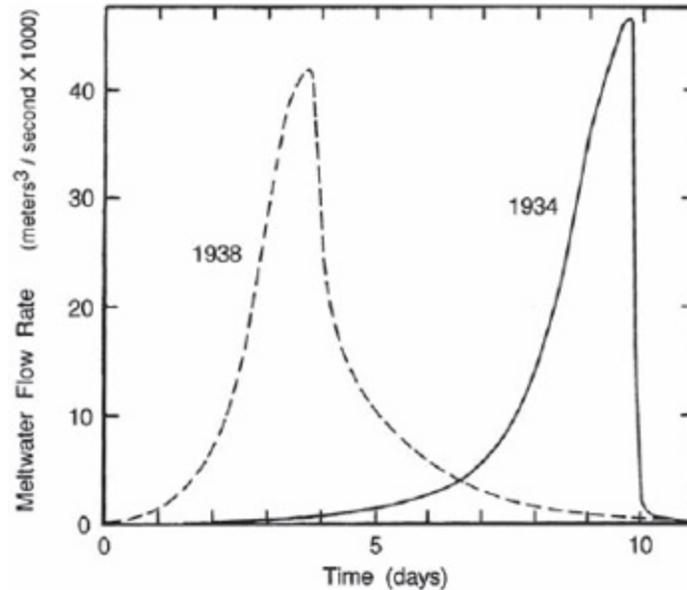


Figure 7.5. Hydrographs for glacier bursts from Grimsvötn occurring in 1934 (solid) and 1938 (dashed). (After Thorarinson, Journal of Glaciology, 271.)

The glacier wave phenomenon is the hydrologic equivalent of a pulsed laser. A laser consists of a tube of ionized gas, electrically excited to a very high potential energy state. The laser pulse is initiated by a single light photon that propagates down the length of the tube colliding with the excited gas molecules and triggering them to release additional light waves in step with itself. By the time it has reached the end of the tube, the initial photon will have become amplified many fold to emerge as a powerful pulse of coherent laser light. In a similar way, a single glacier burst progressively grows in size to emerge from the end of the ice sheet as a powerful glacier wave.

A glacier wave would have been capable of traveling long distances without dispersing. Such behavior is typical of what scientists call *solitary waves* or *solitons*.¹⁶ The soliton phenomenon was first brought to scientists' attention in the nineteenth century by the Scottish engineer John Russell. One day Russell, who was observing a boat being tugged down a canal waterway, noticed that after the boat had come to a halt, its prow wave continued down the length of the canal, traveling for a distance of several kilometers as a solitary impulse, all the while keeping its original form. Mathematicians and physicists who have subsequently studied this

phenomenon attribute the coherence of the waves to nonlinearities in the motion of the fluid medium.

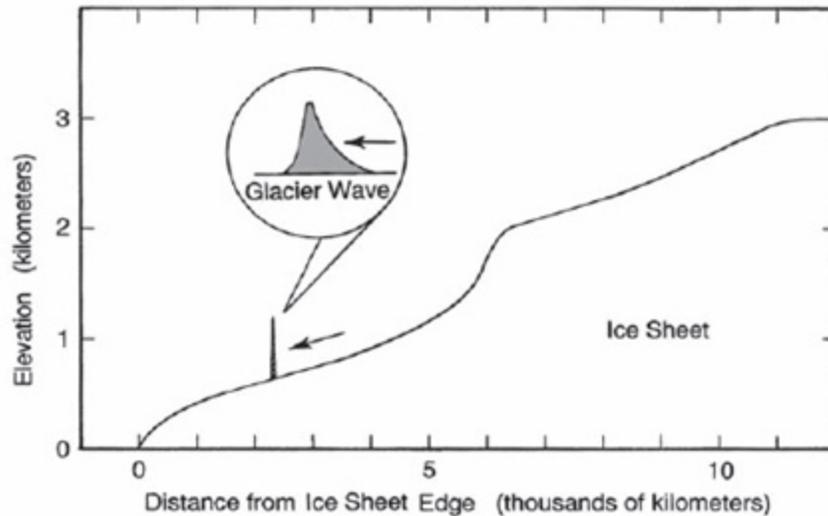


Figure 7.6. A glacier wave propagating down the surface of the North American ice sheet. Ice sheet profile has been drawn with a vertical exaggeration of 2000:1.

The most formidable of naturally occurring soliton phenomena are the tsunamis, or tidal waves as they are sometimes mistakenly called. For example, the tsunami that struck Indonesia and surrounding regions in 2004 drowned as many as 240,000 people. These powerful waves are produced when a strong shock is imparted to the ocean, by either an explosive volcanic eruption, a seismic quake, or a submarine avalanche. It is not obvious in the open ocean, where it appears as a one or two foot rise and fall in ocean level over a stretch of hundreds of kilometers. However, upon reaching increasingly shallow coastal waters, the wave progressively shortens its crest-to-crest wavelength and grows considerably in height. In these shallow waters, nonlinear forces begin to control the water's movement, transforming the wave into a nondispersing soliton. Tsunamis have been known to reach heights of 60 meters and have forward velocities exceeding 100 kilometers per hour as they advance upon the shore.¹⁷ In a similar fashion, nonlinear effects would have caused the glacier wave to maintain itself as a powerful solitary wave as it advanced down the ice sheet and over the surrounding continental terrain.

One interesting feature of solitons is that waves of greater height travel faster. Accordingly, as a glacier wave proceeded across an ice sheet to lower

altitudes, gaining in height and kinetic energy, it would have accelerated to higher speeds. By the time it had journeyed thousands of kilometers to the edge of the ice sheet, it could have attained heights of 600 meters or more, a cross-sectional breadth of as much as 40 kilometers, and a forward speed of several hundred kilometers per hour. Such a wave could have extended thousands of kilometers along the ice sheet. A single kilometer length of this wave front would have transported meltwater forward at rates approaching one cubic kilometer per second, more than 20,000 times the discharge rate of the worst Grimsvötn glacier flood! Each *meter* along this front would have packed a kinetic energy punch equal to as much as one Hiroshima A-bomb explosion. The 1883 volcanic explosion that devastated the Krakatoa Islands leaving a crater 6 kilometers in diameter and thousands of people dead had an explosive force of 100 megatons of TNT. By comparison, a 700-kilometer frontal length of a glacier wave would have carried a kinetic energy equal to 100 Krakatau explosions.

Glacier waves issuing from the surface of ice sheets in North America, Europe, Siberia, and South America would have had sufficient kinetic energy to travel thousands of kilometers over land to devastate regions far removed from the ice sheet's boundary. Upon entering the ocean, the wave would have continued forward as a tsunami to cause considerable damage on the shores of distant continents. Because of its immense energy, a glacier-wave tsunami would be far more destructive than any tidal wave observed in modern times.

Geologists report that the edges of the melting ice sheets were bordered by vast lakes of glacial meltwater called *proglacial* lakes. A glacier wave would have had sufficient momentum to propel such lakes over their retaining banks of glacial drift. For example, a 200-kilometer-long section of glacier wave, of the size proposed above, would have carried about 2000 cubic kilometers of meltwater, equivalent to the volume of water that once was impounded in Lake Missoula, a proglacial lake in northern Montana. Such a wave could easily have jettisoned the entire lake, thereby greatly augmenting the total amount of released meltwater.

The glacier wave idea was first developed in connection with early research on Galactic superwaves, and hence was conceived with a full awareness of details about global warming and flooding recorded in ancient

myths.¹⁸ It was a novel concept that had not previously been suggested. That same year, in 1983, the geologists Alan Kehew and Lee Clayton also proposed a domino theory in which a catastrophic flood triggers lakes to sequentially discharge their contents.¹⁹ However, their theory concerned the successive emptying of proglacial lakes situated at the foot of the ice sheet, rather than on its surface. They suggested that, during the time of the retreat of the North American ice sheet, proglacial Lake Regina, which once resided in southern Saskatchewan, suddenly emptied and created a catastrophic flood that moved southeastward to trigger in domino fashion the emptying of a series of interconnected proglacial lakes in Manitoba, North Dakota, and Minnesota (Lake Hind, Lake Souris, and Lake Agassiz). Their theory deals with relatively local, small-scale catastrophic floods, with discharge rates comparable to the present-day Grimsvötn floods, but of somewhat longer duration, lasting one to two weeks rather than a few days. The glacier wave theory proposes a similar domino mechanism, but one taking place on the ice sheet surface and producing floods far more extensive and destructive.

A study made of a relatively small-scale glacier burst, issuing in 1981 from the glacier de Tsidjiore Nouvé in Switzerland, has yielded some interesting information about the amount of sediment that can be transported by glacier floods. The 1981 burst released a total of only 183,000 cubic meters of meltwater, (50,000 times less than at Grimsvötn) and yielded a peak discharge rate of only two cubic meters per second (about 20,000 times less than at Grimsvötn). Moreover, since the water source was either englacial or subglacial, the total drop in elevation from the point of the water's release to its final destination was only a few hundred meters, as opposed to 1500 meters at Grimsvötn. However, even this small-scale flood was observed to transport considerable quantities of soil as it advanced across the land. As seen in figure 7.7, sediment transport reached a peak at the front of the glacier flood. Frontal turbidity currents suspended a mass of sediment equaling 7 percent of the water's own weight!

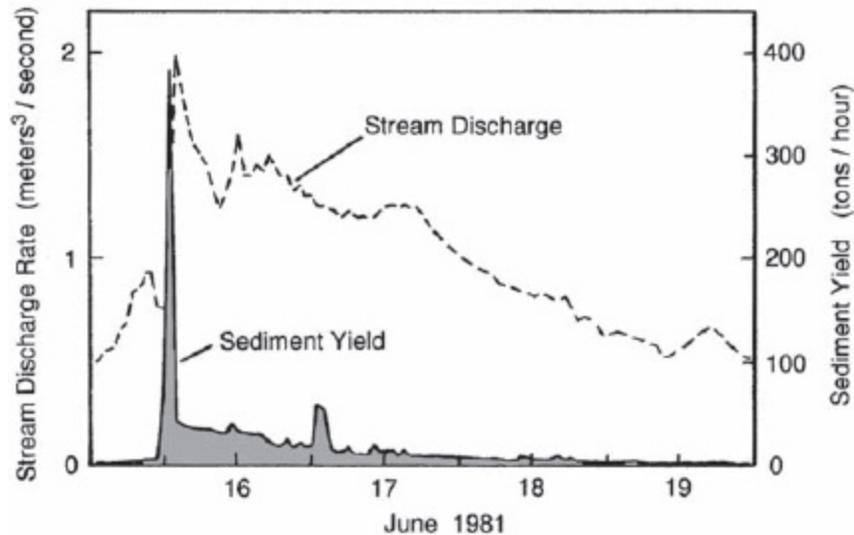


Figure 7.7. Hydrograph for the June 1981 outburst from glacier de Tsidjiore Nouvé in Switzerland (after Beecroft, *Journal of Glaciology*, p. 188).

Immense discharges of meltwater issuing from ice-age glaciers would have reshaped the land surface in a much more dramatic fashion. Such floods could explain the widespread presence of fields scattered with oval-shaped hills of glacial deposits, called *drumlins*. Drumlins are usually 1200 to 1800 feet wide and can range in length from less than half a mile to several miles. They are typically 60 to 100 feet high, although some have been found to attain heights of more than 200 feet. While the majority consist of graded clay-rich till, some are composed of sandy till and others primarily of rocks. Drumlin fields are found widely distributed in both North America and Europe. In North America, conspicuous fields are present in regions that once lay at the edge of the ice sheet, such as those found in central-western New York (about 10,000 drumlins), east-central Wisconsin (about 5000 drumlins), south-central New England (about 3000 drumlins), and southwestern Nova Scotia (2300 drumlins). Other fields are believed to be present in intervening districts but to have escaped detection because they do not conform to the more easily recognized oval drumlin shape.²⁰

Ever since the theory was first put forth in 1895, geologists have favored the hypothesis that drumlins were shaped by the action of glaciers slowly advancing over subglacial till. However, the geologist John Shaw points out that a meltwater flood origin is much more likely, as drumlins

have a shape similar to erosional forms produced by turbulent flows and are associated with landforms normally ascribed to glaciofluvial action.²¹ He notes that the floodwaters forming these drumlin fields must have been at least as wide as the fields themselves (20 to 150 kilometers) and must have been sufficiently deep to submerge the drumlin tops (in some cases a minimum of hundreds of feet deep). Shaw and his coworkers estimate that at least 84,000 cubic kilometers of meltwater discharging at rates as high as 60 million cubic meters per second were involved in forming the Livingstone Lake drumlin field in northern Saskatchewan, an amount sufficient to have produced a 23 centimeter rise in global sea level!²² They suggest that these floodwaters issued from lakes of meltwater impounded beneath the North American ice sheet. However, it is also possible that the tens of thousands of drumlins found at locations that once bordered the ice sheets were instead produced by glacier waves. Meltwater issuing from the ice sheet surface would have possessed far more kinetic energy than subglacial floods.

Glacier waves could also explain how isolated stones and boulders came to rest anywhere from a few miles to 700 miles from their source localities. Some of these “erratics” can be enormous, such as the 10,000-ton block found near Conway, New Hampshire.²³ Although geologists have long taught that they were transported by slowly advancing ice sheets, it seems more likely that many were instead rapidly relocated by glacier wave action. A mixture of glacial meltwater and ice chunks forcefully surging forth could have easily exerted pressure sufficient to buoy these immense boulders and carry them great distances. One 13,500-ton slab of limestone found in Warren County, Ohio, has an area of more than 20,000 square feet but averages only 5 feet in thickness. How glaciers could have transported this monolith 50 miles without breaking it to pieces has never been explained.²⁴ Perhaps this transport problem may be resolved if we conceive the mechanism to be one of flotation within a rapidly advancing ice slurry.

In some cases, material from a single source has been found to litter the landscape for up to hundreds of miles, forming either linear or fan-shaped boulder trains. One famous boulder train originating from an island off the southwestern coast of Scotland fans out over an angle of 150 degrees and

extends over a distance of up to 300 miles, some of its stones being deposited as high as 250 feet above their point of origin. Attempts have been made to explain these wide-ranging deposits as being laid down by a slowly meandering glacier that radically changed its direction of advance.²⁵ However, it is more plausible to suppose that these stones were dispersed by the onrushing, turbulent waters of a glacier wave.

The nineteenth-century geologist James Dana opted for a water transport mechanism when he sought to account for the occasional presence in the Mississippi River Valley of erratic stones weighing ten to one hundred pounds. Noting that they appeared to have been transported from the North, he stated: “The facts prove that there was a vast and violent flow of water down the Mississippi valley, bearing an immense amount of coarse detritus.”²⁶

Flood deposits found at great elevations present other examples indicating that glacier waves of great height and force once coursed across the continents. For instance, shelves and terraces of gravel, sometimes containing stratified layers of clay and silt, are found in Scotland on the sides of valleys or on the flanks of hills. They have been described to lie at elevations of 250 meters (above sea level) at Eaglesham, 380 meters in Nithsdale, 340 meters in Perthshire, and as high as 350 meters in Glen Roy.²⁷ In Yorkshire, stratified drift and transported boulders have been found at elevations exceeding 620 meters, indicating an almost total submersion of the country.²⁸ Similar terraces exist in North America, reaching heights of 750 meters in the White Mountains. These and other loamlike drift deposits observed in areas that once bordered the glacial ice sheets were most likely produced by a series of glacier waves issuing from the continental ice sheets at times of peak climatic warmth.

Even in recent times, there have been instances in which a tsunami devastated land areas at considerable elevations. One example is the calamity that befell Lituya Bay, a glacier-ringed fjord situated in southeastern Alaska not far from Juneau. One warm evening in July 1958, 40 million cubic meters of ice and rock weighing 90 million tons avalanched from the glaciated slopes of the Fairweather Range and fell 900 meters into one of the bay’s inlets. The resulting surge of water cut one

kilometer inland on the inlet's opposite slope, destroying ten square kilometers of forests to a height of 540 meters. It uprooted or snapped off trees, some with a diameter of more than four feet. It then continued down the bay at a speed of around 200 kilometers per hour, denuding the flanking slopes to a height of 35 meters as it moved out to sea.²⁹

Extensive deposits of lignite, carbonized fossil wood, have been found in various parts of the world buried beneath ice-age flood deposits. Often these contain the remains of Pleistocene mammals, as in the beds found in the northeastern Carpathians of central Europe.³⁰ Also, large beds located near Lake Zurich have been found to contain the bones of mammoth, hippopotamus, rhinoceros, bear, and other mammals.³¹ In northern Siberia, lignite has been found embedded together with mammoth bones.³²

Similar fossil wood deposits have been found throughout Canada and the northern United States. In Britain, the remains of large maples and coniferous trees have been found. Reviewing some of this evidence, D. Allan and J. Delair write:

At Wayne in Holderness, for example, drainage works last century exposed a buried forest, composed mainly of “gigantic pines,” while others, lying horizontally 9 ft (2.8 m) below ground level, in company with the bones of horse, hippopotamus, mammoth, red deer and bovids were found near Leeds in Yorkshire in 1852. Innumerable roots of enormous size and the prostrate trunks of giant fir, oak, alder and hazel trees—complete in some instances with leaves, berries and nuts—mixed with mammoth bones, were discovered under thick layers of peaty-earth at low tide level on the shore between Sutton and Cleethorpes last century.³³

All of this evidence points to the occurrence of vast glacial floods occurring at a time when the climate was mild enough to support the growth of luxuriant forests.

The Mystery of the Frozen Mammoths

Arctic regions are good places to look for evidence that Pleistocene mammals were exterminated en masse by immense glacial meltwater deluges. In places such as Alaska and northern Siberia, where the arctic cold has perennially frozen the soil, the flood deposits and their interred animals have been preserved almost as they were at the time they were buried. In Alaska, these glacier wave deposits are quite widespread. Almost all areas that lie below an altitude of 300 to 450 meters are covered with a loamy blanket of frozen silt that ranges in thickness from a few millimeters to more than 60 meters deep. The archaeologist Frank Hibben describes this permafrost layer:

The outwash plains of the local glaciations are likely points of origin for this loess material. These muck deposits are from four to one hundred feet thick and are especially well known in the vicinity of Fairbanks, Circle, and the other gold mining centers of the upper Yukon and the Tanana where the muck overlies auriferous gravels. Muck deposits of considerable thickness, however, are found in the lower reaches of the Yukon, on the Koyukuk River, on the Kuskokwim, and on several places along the Arctic Coast, and so may be considered to extend in greater or lesser thickness, over all unglaciated areas of the northern peninsula. The deposits are concentrated in creek or river valleys for the most part, and have been exposed in gold mining operations. In addition to amorphous bodies of loess material, the muck contains interbedded volcanic ash layers, lenses of clear ice and peat, and abundant animal and vegetal material, the whole frozen into a solid mass.³⁴

Of the several Alaskan silt formations that have been distinguished, the Goldstream Formation, formed close to the end of the last ice age, is of particular interest. It is the greatest depository of Pleistocene vertebrate remains in all of Alaska, and perhaps in all of North America. In the Fairbanks area alone, tens of thousands of specimens have been collected over a period of 30 years as a result of gold digging operations, with about 8000 specimens being collected in a typical year. This valley-bottom accumulation is present in almost all creek and small river valleys in central Alaska. Most of its fossils are found at the bottoms of the valleys, with the

greatest concentrations occurring at junctures where small tributaries join large creeks. [35](#), [36](#)

Both large-and small-animal remains have been found in these late-ice-age permafrost silts. Mammals include the shrew, bear, dire wolf, coyote, wolf, fox, badger, wolverine, saber-toothed tiger, lion, lynx, mammoth, mastodon, horse, camel, antelope, bison, caribou, moose, elk, giant elk, sheep, musk ox, bovid, ground sloth, beaver, ground squirrel, vole, lemming, collared lemming, porcupine, hare, and pika. Particularly unusual is the finding that the soft parts of the mammals—their skin, hair, tissue, and even entire carcasses—are often found preserved in the frozen ground along with their bones. It is generally agreed that the mammals died from asphyxia as might occur in drowning.

The same agent that formed the Alaskan muck deposits appears to have operated all across northern Siberia to form the so-called mammoth horizon or tundra horizon. In fact, the vertebrate remains found in this stratum are similar to those found in the Alaskan Goldstream Formation—mammoth, bison, and horse being most abundant in both regions. As seen in figure 7.8, during the glacial period when sea level was considerably lower, Siberia and Alaska formed a single landmass and animal habitat.

Russian geologists have determined that most of the mammoth remains date from the Kargin sky interstadial, which correlates with the Bölling-Alleröd interstadial. Hence, these remains date from a period of accelerated ice-sheet melting when glacier waves were most likely to develop. In fact, Russian scientists concluded that these mammoth-bearing silts were deposited by floodwaters originating from either a glacier or a lake.

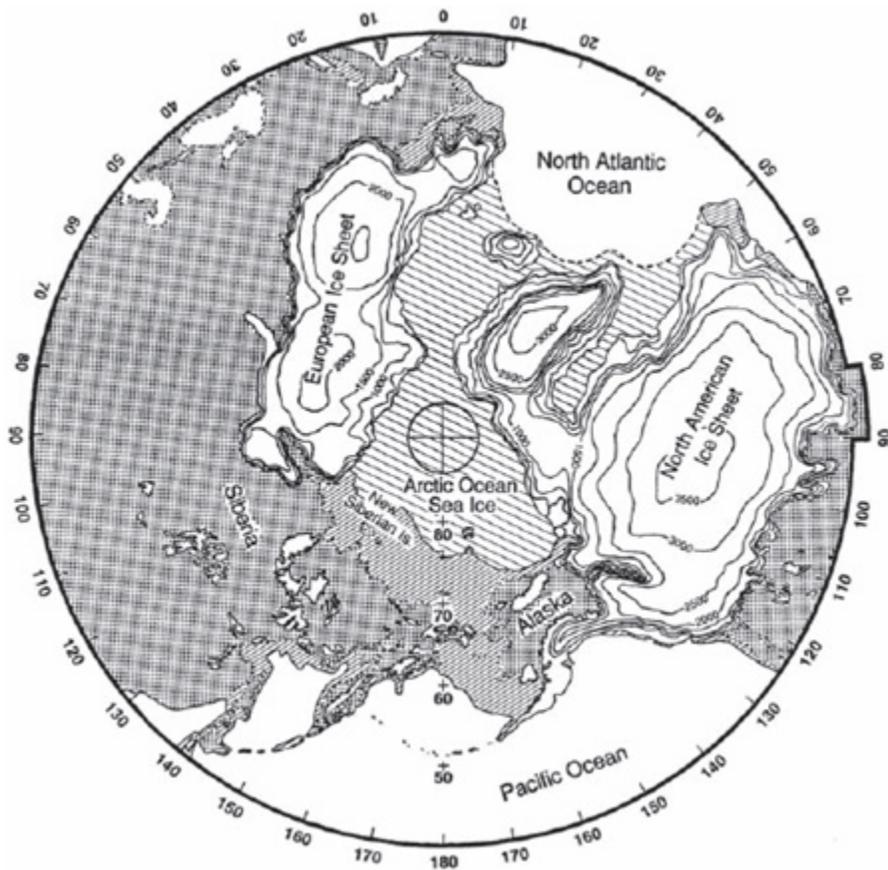


Figure 7.8. A polar view of the Arctic showing the positions of the ice sheets in relation to Siberia and Alaska at the peak of the last glacialiation (after the CLIMAP Project, 1981, map 7B). Shaded areas show the continents as they are at present (dots) and as they were during the last ice age when sea level was considerably lower (fine diagonal lines). The shaded polar cap region (coarse diagonal lines) indicates a permanently frozen sea ice cover.

The geographically widespread deposits that extend from eastern Siberia to Alaska could easily have been produced by continental glacier waves emanating from the nearby North American and European ice sheets. In particular, a divide ran between the main part of the North American ice sheet and the Cordilleran ice sheet, which extended from the Rocky Mountains to the West Coast. This valley would have channeled glacier waves northward onto Alaska's thickly forested central plains. The forested part of arctic Siberia also lay vulnerable to attack, being bordered to the west by the European ice sheet and to the north by the Arctic Ocean sea ice cover. Also, by way of the polar route, it lay within 2000 kilometers of the northern edge of the North American ice sheet. Thus, in the event of a

sudden climatic warming, it is easy to see how widespread flooding could have ravaged these territories.

The discovery that entire carcasses of mammoths and rhinoceros are preserved in these deposits in a frozen state has led to considerable speculation as to the cause of interment. One theory, which has received wide circulation in academic circles, proposes that the animals died due to isolated drowning incidents. It suggests that the animals perished either by accidentally breaking through a crust of river ice or by becoming entrapped in valleys filled with snow or sticky mud. This argument might have some degree of credibility if the deposits had been found to contain only large animals such as mammoths and rhinoceros, implying that their deaths were due to their clumsy physiques and inability to negotiate marshy ground or snowdrifts. But such is not the case. Carcasses of smaller, more agile animals, such as the lynx and ground squirrel, are also present in the deposits.

Moreover, as the Soviet paleontologist I. Tolmachoff pointed out in 1929, the mammoths found in northern Siberia were enclosed not within ice, but within frozen silt—in other words, within glacial flood sediments:

Mammoth-bearing drift deposits sometimes have a thickness of tens of feet, sometimes they are spread out in comparatively thin layers. In some localities, as in the one of Schmidt's mammoth, have been discovered, underneath these deposits, the sediments of the last Arctic transgression. In Northeastern Siberia they are usually underlain by layers of rock ice [solid transparent ice], and very often, in this case, are reduced to a thickness of only two or three feet. An inaccurate expression by Adams created the idea that his mammoth had been frozen within ice. But after the detailed consideration of this matter by Toll there is no more doubt that this mammoth like others had been frozen within the driftground underlain by rock ice. Theoretically, it is possible to imagine carcasses enclosed within ice, but as a matter of fact, neither mammoth nor rhinoceros was ever found in such conditions, as Howorth has already emphasized.^{[37](#)}

Floral studies have shown that the arctic climate at the time of that warm interstadial was much milder than it is today.[38](#), [39](#), [40](#) A pine forest grew in regions that today are so cold that they are devoid of arboreal vegetation. As seen in figure 7.3, forests grew as far north as 10 degrees from the North Pole in a vast region extending from central Siberia to eastern Alaska! Analysis of the vegetation frozen into the muck deposits confirms that the ground was not frozen during the era of the flood catastrophes. During this period, mammoths and other mammals quite possibly had migrated northward to these Arctic regions to escape the intense heat and dry conditions that prevailed farther south. However, in doing so, they apparently traded one danger for another.

We may surmise that whatever killed these beasts must have overtaken them quite unawares while they were in the process of grazing, for food has been found between their teeth and in their stomachs undigested. Moreover, whatever caused their death must also have been accompanied by a dramatic cooling of the arctic climate in order to save the carcasses from complete decay. In 1887, Henry Howorth presented a similar scenario:

The facts compel us to admit that, when the Mammoth was buried in Siberia, the ground was soft and the climate therefore comparatively mild and genial, and that immediately afterward the same ground became frozen, and the same climate became Arctic, and that they have remained so to this day, and this not gradually and in accordance with some slowly continuous astronomical or cosmical changes, but suddenly and per saltum . . . When we find such a series ranging so widely preserved in the same perfect way, and all evidencing a sudden change of climate from a comparatively mild temperature to one of great rigor, we cannot help concluding that they all bear witness to a common event. We cannot postulate a separate climatic cataclysm for each individual case and each individual locality, but we are forced to the conclusion that the now permanently frozen zone in Asia became frozen at the same time from the same causes.[41](#)

Radiocarbon dates obtained on wood and animal collagen in these frozen flood deposits have been found to range from about 11,000 carbon-

14 years B.P. (equivalent to 12,700 calendar years B.P.) to about 70,000 carbon-14 years B.P. or more (see appendix D for date conversions). The older dates in this range would be from remains that had been previously frozen in this periglacial region and had been reworked by the floodwaters to be mixed with more recent carcasses and debris. Hence, we may conclude that the final flood took place at the youngest end of this range, around 12,700 years B.P., about the time of the primary extinction peak seen in figure 7.2. The geologic record shows that the Earth's climate cooled on this date, as the warm Alleröd interstadial ended and the cold Younger Dryas stadial began, thereby supporting Howorth's statement that interment was followed by an abrupt climatic shift.

Glacier waves could account for many of the puzzling aspects of the deaths of these mammals. Not only would a glacier wave have taken the beasts by surprise, but it would have buried them alive as well. In addition, the meltwater would also have helped preserve their corpses. A glacier wave would have been composed of a mixture of near freezing meltwater and ice chunks. Fine silts saturated with this icy slush would have preserved the animal soft parts long enough until the cooling arctic climate would have caused the ground in Alaska and Siberia to become locked into a perennially frozen state. Ice chunks mixed in with the alluvial deposits would also have assisted the refrigeration process. When the Younger Dryas ended, the Earth's climate warmed to its present interglacial state. However, these arctic regions remained frozen, and never returned to the warmer, forested state they once enjoyed.

The geologist Stephen Taber also considered glacial floods a major cause of the burial of these Pleistocene faunae. His description of the fossil remains implicates either catastrophic dismemberment before burial or floodwater reworking of previously deposited remains:

Fossil bones are astonishingly abundant in the frozen ground of Alaska, but articulated bones are scarce, and complete skeletons . . . are almost unknown. Of several tons of bones of the larger mammals seen in 1935, four bison vertebrae were the only ones found in a position indicating original articulation. The dispersal of the bones is

as striking as their abundance and indicates general destruction of soft parts prior to burial.⁴²

Frank Hibben also emphasizes catastrophic burial for at least some portion of the Alaskan silts. He writes:

Although the formation of the deposits of muck is not clear, there is ample evidence that at least portions of this material were deposited under catastrophic conditions. Mammal remains are for the most part dismembered and disarticulated, even though some fragments yet retain, in this frozen state, portions of ligaments, skin, hair, and flesh. Twisted and torn trees are piled in splintered masses concentrated in what must be regarded as ephemeral canyons or arroyo cuts.⁴³

Stratified sediments are a key piece of evidence suggesting the occurrence of catastrophic deposition. Under the action of turbulent water flowing at a high velocity, large quantities of sediment become temporarily suspended and then rapidly deposited, the denser, coarser debris settling first, followed by less dense, finer sediments. Such grading is found in the Alaskan frozen muck. According to Taber, hard-part animal remains are found only in the basal gravels, whereas soft parts are found only in the overlying silts.⁴⁴

Although Taber had the evidence before him, he apparently failed to recognize the signature of catastrophic deposition, instead proposing that the gravel deposits and hard-part remains were laid down at a time prior to the soft parts, and that the former had a greater time in which to decay before freezing occurred.

Catastrophic deposition would also explain why gold-bearing gravel deposits, such as the Fox Gravel, are often found underlying valley-bottom silts, the gold usually being found immediately above the bedrock surface. Since gold is six times the density of rock, it would be the first to settle out from the floodwaters. Apparently unaware of the mechanism of catastrophic deposition, the geologist R. Boyle considered the stratigraphic placement of placer gold deposits an unresolved problem, stating: "One would suspect on casual examination that gold would be rather evenly

distributed throughout the gravels and sands rather than concentrated in well defined streaks.”⁴⁵ The mystery disappears when one realizes that these stratified gold deposits are a key piece of evidence indicating that catastrophic floods once swept through this region. A similar explanation would explain why auriferous gravels similarly underlie mammal-bearing drift deposits in northern Siberia, South America, Australia, and other parts of North America.^{46, 47} All the evidence together points to the fact that glacier waves swept the continents on a global scale.

Islands situated off the north shore of Siberia offer the most striking evidence that the large mammals of this region perished in a widespread catastrophe. One explorer describes the soil of the Bear Islands (71°N, 162°W) as consisting of sand and ice containing mammoth bones “in such quantities that they seemed to form the chief substance of the island.”⁴⁸ The Liachof Islands (74°N, 142°W) have been similarly described: “Such was the enormous quantity of mammoths’ remains that it seemed . . . that the island was actually composed of the bones and tusks of elephants, cemented together by icy sand.”⁴⁹ Hedenstrom and Sannikov, who in 1806 discovered the New Siberian Islands (75°N, 135°–150°W), were met with quite a surprise. From ten miles away they could see the remains of extensive ancient forests, whose tree trunks “were partly standing upright and partly lying horizontally buried in the frozen soil.” Wrangell quotes Hedenstrom describing the scene:

On the southern coast of New Siberia are found the remarkable wood hills. They are 30 fathoms [60 meters] high, and consist of horizontal strata of sandstone, alternating with strata of bituminous beams or trunks of trees. On ascending these hills, fossilized charcoal is everywhere met with, covered apparently with ashes; but on closer examination, this ash is also found to be a petrification, and so hard that it can scarcely be scraped off with a knife.⁵⁰

On the largest of these islands, Kotelnoi Island, mammoth remains have been found as high as 300 meters above sea level. The German scientist

Adolph Erman, who conducted geomagnetic research on the New Siberia Islands in 1829, described his impression:

It is only in the lower strata of the New Siberian wood-hills that the trunks have that position which they would assume in swimming or sinking undisturbed. On the summit of the hills they lie flung upon one another in the wildest disorder, forced upright in spite of gravitation, and with their tops broken off or crushed as if they had been thrown with great violence from the south on a bank, and there heaped up . . . So it is clear that at the time when the elephants and trunks of trees were heaped up together, one flood extended from the centre of the continent to the furthest barrier existing in the sea as it now is. That flood may have poured down from the high mountains through the rocky valleys. The animals and trees which it carried off from above could sink but slowly in the muddy and rapid waves, but must have been thrown upon the older parts of Kotelnoi and New Siberia in the greatest number and with the greatest force, because these islands opposed the last bar to the diffusion of the waters.[51](#)

Because the wood and mammal deposits are concentrated on the island's south side, Erman concluded that the flood must have come from the south. However, it is more likely that a forward-moving wave accumulated deposits preferentially on the leeward side of the islands. Because these deposits are found on the south-facing sides, this implies that the flood instead came from the north—that is, from the continental ice sheets. Waterborne debris impelled over the ridge of the island would have settled out there since the water velocity would have been lower on that side. In view of this evidence, it becomes difficult to defend a uniformitarian position suggesting that these vertebrates died of natural causes, their bones being gradually transported downhill to valley-bottom locations.

Remnants of this flood have been found at high altitudes also in Alaska. In the Fairbanks area, for example, silt, tens of centimeters thick, has been found on ridges situated 250 to 600 meters above the valley floor, thickening to as much as 25 meters on the tops of low hills located 15 to 50

meters above the valley floor.⁵² Clearly, normal fluvial action, such as that proposed by some theoreticians to explain the valley-bottom deposits, has considerable difficulty accounting for deposits perched at such altitudes.

Many theories have been put forth to account for the origin of the Alaskan upland silt. One of the most often quoted suggests that this material was deposited by high-velocity winds. However, the wind mechanism does not explain why the silt often overlies gold-bearing gravel deposits. For example, at the summit of Gold Hill, 75 meters above the floodplain floor, 50 meters of dry upland silt are found to overlie auriferous gravels.⁵³ The glacier wave theory, on the other hand, not only accounts for how silt and dense gravel became transported to these high elevations, but also accounts for their stratified placement relative to one another, material of lesser density overlying material of greater density. Apparently, the only difference evident in the upland silts and valley-bottom deposits is their relative altitude, silt in both cases being observed to overlie placer gold and the skeletal remains of extinct land mammals.^{54, 55} This similar morphology calls for a common agent of deposition such as glacier waves, and rules against differing agents such as wind and river runoff.

The geologist H. Eakin disagreed with the wind-transport theory. In 1918, he noted that mechanical analysis of the Alaskan upland silts indicated an *aqueous* rather than windblown origin.^{56, 57} He pointed out that only aqueous erosion could have shaped the landscape into plains situated at different elevations and connected by steep scarps running several miles in length. He wrote:

The most salient fact that is unmistakably indicated in the features described above is that the drainage level during the deposition of the uppermost silt beds was nearly 1000 feet above the present level of the Yukon at Ruby and still higher above the base-level that controlled the erosion of the preceding cycle. Transportation of detritus by wind is obviously incapable of producing such a result. Likewise the idea that such a change in the drainage level could be the result of overloading streams with material as fine as the silts is untenable. Through some agency apart from erosion itself the old base-level of erosion was

eliminated and a new base-level was established at a much greater elevation. The change of base-level apparently involved extensive inundation of the old land surface, a fact indicated by the character, structure, distribution, and topographic expression of the unconsolidated deposits and the bedrock beneath them.[58](#)

To explain these deposits, Eakin suggested that a 150,000- to 300,000-square-kilometer region in central Alaska had temporarily impounded glacial meltwater to a height of 350 meters, speculating that its drainage to the sea had been blocked by an ice dam. However, such an ice dam would necessarily have had a length of 800 kilometers to block the water's exit, and as the geologist Troy Péwé has pointed out, there is no evidence for the proposed barrier. Nor is there evidence of clay, aquatic life, or lake varves in the silt deposits. Also, the silt deposits do not have a definite limiting upper level as a lake would produce, some deposits being found as much as 600 meters above the valley floor.[59](#)

The glacier wave theory, however, avoids these difficulties. A forward-moving glacier wave would have transported sediments to high elevations, obviating the need of a water-impounding dam, and would have left deposits lying at varying heights, just as is observed. Moreover, since the inundation would have been transitory, there would have been insufficient time for clay and annual varve layers to form and for aquatic life forms to flourish and leave their remains.

The large-mammal deposits of the tundra regions are strikingly similar to the skeleton-bearing deposits found in Michigan and New York and in other, more temperate regions of the globe, with the exception that in the Arctic there are many places in which, along with skeletons, portions of carcasses or entire carcasses have become preserved from decay due to permafrost conditions. In his travelogue describing the mounds of skeletal remains found in New Siberia, Adolph Erman writes:

This is one of those phenomena which were formerly thought to be confined to a narrow locality, but are now found recurring in all parts of the globe. The attempt to explain them, however, is not thereby rendered more easy, for the explanations must apply equally to the

coasts of the Polar Sea, the region of the Ohio, and, besides, to all the valleys in the plains of Europe, Northern Asia, and America, with hardly any exception.⁶⁰

The Oreleton Farms excavation site in Madison County, Ohio, is one example of a place where flood deposits in a more temperate region have been found to bear large-mammal remains. The skeleton of a mastodon was found partially buried in a one-foot-thick layer of limy clay, its bones crushed and broken. The largest of the bones, the thighbones, were broken squarely across in places, indicating that considerable force had been exerted upon them.⁶¹ This mammoth-bearing clay was underlain by a layer of glacial till and overlain by a two foot layer of black muck or peaty material. The stratified arrangement of the sediments is similar to that found in central Alaska and northern Siberia, the less dense, peaty muck fraction being superimposed on the more dense clay and bones. Here, as in the Arctic, the grading indicates that the sediments were deposited suddenly by a catastrophic flood, turbulent waters powerful enough to shatter the bones of the animals it took unawares.

Regarding the extinction of the mammoth in Siberia and Europe, Howarth wrote:

We must next inquire what the nature of this catastrophe was . . . We want a cause that should kill the animals, and yet not break to pieces their bodies, or even mutilate them, a cause which would in some cases disintegrate the skeletons without weathering the bones. We want a cause that would not merely do this as a wide-spread murrain or plague might, but one which would bury the bodies as well as kill the animals, which could take up gravel and clay and lay them down again, and which could sweep together animals of different sizes and species, and mix them with trees and other debris of vegetation. What cause competent to do this is known to us, except rushing water on a great scale.

Water would drown the animals, and yet would not mutilate the bodies. It would kill them all with complete impartiality, irrespective of their strength, age, or size. It would take up clay and earth, and

cover the bodies with it. This is the very work it is doing daily on a small scale. Not only could it do this, but it is the only cause known to me [to be] capable of doing the work on a scale commensurate with the effects we see in Siberia.⁶²

On the extinction of the large animals in North America, he said:

In America, as in Europe, the number of the remains and their universal distribution, contrast notably with the scarcity and local character of the debris of mammals in other sub-aerial beds, on other geological horizons, and point, there, as here to their having been the victims of a catastrophe. The unweathered bones, the intact skeletons, the crowds of animals of different species found together, the similarity in condition of the remains, all converge upon one conclusion, namely, the existence of a great and sudden hecatomb . . .

If we are to meet the facts, we need a cause which not only destroyed animals old and young, great and small, aggressive and helpless, in a common doom, and in many cases in herds or schools of Mammoths and mastodons, but also buried them deeply in such tough material as gravel and clay while still intact, and buried them occasionally very deeply . . . and buried them with shells, both land and fresh-water; and under deposits which form . . . continuous strata, unbroken and undisturbed, over many miles of country. It seems to me there is no other agency available to produce this result save a flood of water.⁶³

Howorth, however, proposed that the flooding was caused by an immense translatory wave of marine water, set in motion by the sudden emergence of one of the world's largest mountain ranges—the Rocky Mountains, for example, or the South American Cordilleras. But, the scarcity of marine animals in the majority of the deposits rules out an incursion of this sort. If shells are found, they are more often from freshwater animals. Howorth was aware that other nineteenth-century geologists, such as James Dana, had proposed that the floods might have

been glacial in origin, but he felt that the glaciers would have melted too slowly to produce the required volumes of water. He wrote:

If the glacial climate was so severe that it was possible to accumulate enormous sheets of ice and ice caps, I cannot understand how the summer melting of this ice, on any great scale, can be admitted . . . If . . . floods were due to the melting of the ice, at the close of the glacial age, the change of climate involved must have been very sudden, or very rapid, much more sudden and rapid than is consistent with any uniformitarian theory.

Again, it seems impossible by an appeal to the subglacial streams to explain the facts as we find them. The water flowing from a glacier either originates along its surface and is due to surface melting, or is due to the melting of the ice foot by friction. In either case, as we see it in the greatest glaciers, it runs from underneath the ice in separate streams. These separate streams could not deposit widespread sheets of debris in a continuous way, nor can we understand how they could be made to flow at the heights at which the stratified drift occurs. [64](#)

Perhaps Howorth would have come to a different conclusion had he been aware that a period of substantial climatic warming had occurred at the time of this ice-age catastrophe, causing the ice sheets to discharge meltwater at a very high rate and releasing it in the form of immense high-velocity waves. Clearly, geological evidence leaves us no other choice but to conclude that the Pleistocene mammals perished in a series of flood catastrophes produced by glacier waves at a time when the global climate had grown unbearably warm. As suggested earlier, this anomalous warming occurred when a superwave-induced cosmic dust incursion caused the Sun to become unusually active. Glacier wave flooding could have been triggered during this warm interval if the Earth either had been exposed to a period of extremely violent solar storms or had been engulfed by a very large and very intense solar-flare coronal mass ejection.

EIGHT

FLOOD LEGENDS AND CIPHERS

Atlantis and the Flood

Virtually every ancient culture has a story about a great flood that once covered the world, causing a mass destruction of mankind. One compilation shows that there are more than 500 deluge myths belonging to more than 250 peoples or tribes. Table 8.1 lists some of the cultures that have a distinct and well-authenticated story of the Deluge.^{1, 2} Some legends say the Flood was caused by heavy rain. Others speak of a tidal wave that swept over the land. Many stories describe the Deluge as following on the heels of a worldwide blaze, saving the Earth from incineration. Other accounts refer to the Flood as a solitary catastrophic event.

Some legends do not speak of an antediluvian race, or of any person or family managing to escape the destruction. The oldest Sanskrit legend of the Flood, the *Zatapatha Brahmana*, relates that Manu, the first man to walk the Earth, arose after the Flood to autonomously create offspring. Thus, the Hindus regarded Manu as both their Adam and their Noah. The English word *man*, in fact, derives from this Sanskrit word. The Botocudos of Brazil and the Nicaraguans similarly believed in the post-Flood arrival of mankind, as did the Dakota Indians. Although the Dakotas were firm in their belief that the planet had once been destroyed by a flood, they did not suppose that any people had escaped the disaster.

TABLE 8.1. SOME SOCIETIES POSSESSING FLOOD TRADITIONS

North America	Central and South America	Indonesia and Polynesia	Europe	Africa	Asia and Middle East
Algonkins	Achaguas	Aborigines	Druids	Bermegai	Andamanese
Arapahoes	Araucanians	Bataks	Germans	Carthaginians	Armenians
Apaches	Arawaks	Dyaks	Greeks	Egyptians	Assyrians
Athabascans	Cauras	Fijians	Gypsies	Hottentots	Babylonians
Aztecs	Darien Natives	Hawaiians	Icelanders	Sudanese	Chaldeans
Cherokees	Haitians	Melanesians	Laplanders		Dravidians
Chickasaws	Incas	Menankabans	Lithuanians		Hebrews
Crees	Maya	Micronesians	Norse		Indo-Aryans
Dakotas	Maypures	New Hebridese	Romans		Japanese
Eskimos	Mechoacans	S. Polynesians	Slavs		Kyrnai
Iroquois	Mixtecs	Toradjas	Voguls		Mongols
Klamaths	Nahuatl		Welsh		Persians
Kolushes	Quiches				Phoenicians
Kwakiutls	Tamanacs				Phrygians
Lenni-Lanapes	Tlascalans				Syrians
Mandans	Toltecs				Tatars
Natchez	Zapotecs				
Navajos					
Papagos					
Pimas					
Pueblo Indians					
Snoqualmies					
Texpi					
Tlingits					
Yakima					

However, most legends, like Plato's myth of Atlantis, speak of the existence of an earlier race that was destroyed by a deluge with only a few people managing to escape. The legend of Atlantis and the Flood is to be found in Plato's *Timaeus* dialogue. As mentioned earlier, Solon, the ruler of ancient Athens, had journeyed to the Egyptian city of Sais, and while he was there urged the priests to tell him what they knew about the Great Flood. The elder priest responded by first referring to the occurrence of a conflagration and its metaphorical description in the story of Phaethon and

the sun chariot (see chapter 6). He explained that because of its mountainous terrain, Greece was particularly prone to the hazards of fire and flood, which explains why the Greeks were unable to preserve a written record of these cataclysms:

. . . at such times [times of conflagration] those who live upon the mountains and in dry and lofty places are more liable to destruction than those who dwell by rivers or on the seashore. And from this calamity we are preserved by the liberation of the Nile, who is our never-failing savior. When on the other hand, the gods purge the earth with a deluge of water, the survivors in your country are herdsmen and shepherds who dwell on the mountains, but those who, like you, live in cities are carried by the rivers into the sea. Whereas in this land, neither then nor at any other time, does the water come down from above on the fields, having always a tendency to come up from below, for which reason the traditions preserved here are the most ancient. The fact is that wherever the extremity of winter frost or of summer sun does not prevent, mankind exists, sometimes in greater, sometimes in lesser numbers. And whatever happened either in your country or in ours, or in any other region of which we are informed—if there were any actions noble or great or in any other way remarkable, they have all been written down by us of old and are preserved in our temples. Whereas just when you and other nations are beginning to be provided with letters and the other requisites of civilized life, after the usual interval, the stream from heaven, like a pestilence, comes pouring down and leaves only those of you who are destitute of letters and education, and so you have to begin all over again like children and know nothing of what happened in ancient times, either among us or among yourselves.

As for those genealogies of yours which you just now recounted to us, Solon, they are no better than the tales of children. In the first place you remember a single deluge only, but there were many previous ones; in the next place, you do not know that there formerly dwelt in your land the fairest and noblest race of men which ever lived, and that you and your whole city are descended from a small seed or remnant of them which survived. And this was unknown to you, because, for

many generations, the survivors of that destruction died, leaving no written word. For there was a time, Solon, before the great deluge of all, when the city which now is Athens was first in war and in every way the best governed of all cities, and is said to have performed the noblest deeds and to have had the fairest constitution of any of which tradition tells, under the face of heaven.³

The priest eventually began to tell the story of how in prehistoric times the island empire of Atlantis launched a deadly attack upon Europe and Asia. Like many of the ancient myths, the story of Atlantis was intended to be taken allegorically. The priest tells Solon:

Many great and wonderful deeds are recorded of your state in our histories. But one of them exceeds all the rest in greatness and valor. For these histories tell of a mighty power which unprovoked made an expedition against the whole of Europe and Asia, and to which your city put an end. This power came forth out of the Atlantic Ocean, for in those days the Atlantic was navigable, and there was an island situated in front of the straits which are by you called the Pillars of Hercules. The island was larger than Libya and Asia put together, and was the way to other islands, and from these you might pass to the whole of the opposite continent which surrounded the true ocean, for this sea which is within the Straits of Hercules is only a harbor, having a narrow entrance, but that other is a real sea, and the land surrounding it on every side may be most truly called a boundless continent. Now in this island of Atlantis there was a great and wonderful empire which had rule over the whole island and several others, and over parts of the continent, and, furthermore, the men of Atlantis had subjected the parts of Libya within the columns of Hercules as far as Egypt, and of Europe as far as Tyrrhenia.⁴

Atlantis enthusiasts have consistently interpreted Plato's story literally, imagining that Atlantis was an island continent peopled by a technically advanced civilization that one day sank beneath the ocean's surface. Taking this to its extreme, some have sought to identify Atlantis with the Aegean

island of Thera and to attribute its “subsidence” to the massive eruption that occurred there around 1400 B.C.E.⁵ Such an interpretation, however, departs substantially from the details given in *Timaeus* concerning the size and location of Atlantis and the date of its demise. Other claims that Atlantis was a large continent located in the midst of the Atlantic blatantly contradict geologic evidence. Oceanographers have thoroughly studied the Atlantic sea floor, and nowhere do they find any trace of a submerged islandlike continent. One other theory, which identifies Atlantis with the frozen continent of Antarctica, maintains that Antarctica was partially deglaciated during the last ice age and became displaced by about 30 degrees of latitude to its present South Pole position as a result of a sudden crustal shift.⁶ Such a claim, however, conflicts with glaciological evidence that shows no evidence of Antarctica having moved from its present position or having been deglaciated during the ice-age period (see chapter 12).

To understand the story of Atlantis, we must first realize that the legend was meant to be taken metaphorically, not literally. Egyptian priests were bound by oath to convey their knowledge to outsiders only indirectly through fable and parable. The priest of Sais hinted at this when he informed Solon about the symbolic nature of the myth of Phaethon, and told him it actually refers to astronomical events affecting the Earth at periodic intervals.

The allegorical meaning of the Atlantis myth is not readily apparent in the *Timaeus* account. However, a clue to its riddle may be found in Plato’s *Critias* dialogue, which describes the creation of Atlantis. The *Critias* states that after the Olympian gods had defeated Cronus and the Titans and were apportioning the universe, Poseidon (Neptune) received rulership over the seas, and as his *only* land territory was given Atlantis. It also says that the Atlantean civilization was spawned through Poseidon’s union with Clito, a mortal maiden who lived within the Earth—that is, through the union of the water and earth elements. Water becomes earthlike when it solidifies to form ice, and it forms continent-sized masses when it forms an ice sheet. One might then speculate that Atlantis is none other than the ice sheet that once covered North America.

Of all the continental ice sheets, the North American one was the largest. Like the mythical Atlantis, it resembled an island of continental proportions (see figure 7.8). Moreover, a substantial part of this ice sheet's circumference did border on the Atlantic Ocean. Although it did not lie immediately "in front of" the Straits of Hercules (Straits of Gibraltar), it did lie beyond them to the west and slightly to the north. Just as the myth relates, this "island" (of ice) was larger than the combined area of ancient Asia (i.e., Asia Minor) and ancient Libya (the northern part of Africa west of Egypt).^{*29} Just as in the myth, which claims that Atlantis held dominion over Europe as far east as Tyrrhenia, so too, at its outer margin, the North American ice sheet developed into the European ice sheet, which held "dominion" over northern Europe and western Siberia. In addition, the Alps, one of Europe's southernmost glaciated regions, lie just north of the Tyrrhenian Sea, that part of the Mediterranean enclosed between the west coast of Italy and the nearby islands of Corsica, Sardinia, and Sicily. There is no evidence of glaciation in North Africa (ancient Libya), but ice sheets did prevail in many other parts of the world, covering parts of South America, South Africa, and Australia, and all of Antarctica. These diaspora could correctly be termed "remote colonies" of Atlantis.

Having described the civilization of the ancient Egyptians and Hellenes, the priest then went on to tell of how the island of Atlantis unleashed a vicious attack on these unsuspecting peoples and afterward disappeared into the ocean with the occurrence of an enormous flood:

This vast power, gathered into one, endeavored to subdue with a blow our country and yours and the whole of the region within the straits, and then, Solon, your country shone forth, in the excellence of her virtue and strength among all mankind. She was preeminent in courage and military skill, and was the leader of the Hellenes. And when the rest fell off from her, being compelled to stand alone, after having undergone the very extremity of danger, she defeated and triumphed over the invaders, and preserved from slavery those who were not yet subjugated, and generously liberated all the rest of us who dwell within the Pillars. But afterward there occurred violent earthquakes and floods, and in a single day and night of misfortune all your warlike

men in a body sank into the earth, and the island of Atlantis in like manner disappeared in the depths of the sea. For which reason the sea in those parts is impassable and impenetrable, because there is a shoal of mud in the way, and this was caused by the subsidence of the island.⁷

Atlantis's attacks were the floods of glacial meltwater that the ice sheets released periodically from their surfaces. Such deluges would have raised havoc as they swept southward across populated regions. The destructive flood that collectively sank the ancient Hellenes in a single day and night may have been a particularly intense meltwater flood event. The concurrent "sinking" of Atlantis simply refers to the melting and ultimate wasting of the continental ice sheets at the time these meltwater floods were produced. Like Atlantis in the myth, the ice sheets eventually "disappeared in the depths of the sea" as their meltwater coursed to the oceans, and with their wasting, they left behind a shoal of mud and rock, or what some geologists call *the drift*.

In effect, the Atlantis myth, which was related as an answer to Solon's request for information about the legendary Flood, is a metaphorical account of how the melting ice sheets spawned a foray of destructive glacier wave floods. Although the priest made no attempt to connect the myth of Phaethon with the Atlantis myth, we see that his citation of this myth was not entirely irrelevant: It was the global conflagration, the warming of the Earth's climate by the T Tauri Sun, that induced the melting and sinking of Atlantis and precipitated its flood attacks on the societies of the prehistoric-ice-age era. Also, recall that near the end of the Phaethon myth, Zeus quenches the burning world by sending a flood of water, hence establishing the Sun-climate-flood connection.

Plato's dialogue, as well as other ancient writings, refers to key prehistoric dates that turn out to be quite significant from a climatic standpoint. One example is the date given in the *Critias* for the attack of Atlantis and the sinking of its island empire.⁸ According to Critias, the priest of Sais told Solon that the sinking occurred about nine millennia earlier. Since Solon would have heard this story around 600 B.C.E., this would date the "sinking of Atlantis" at around 9600 B.C.E. (or 11,550 years

B.P.). Consulting figures 5.7 and 6.9 (chapters 5 and 6), we see that this date coincides with the onset of the Preboreal climatic warming at the end of the Younger Dryas cold period, a time when the rate of glacial meltwater discharge had reached a peak. The climatic warming at this boundary transpired within the space of just one decade and marked the final termination of the last ice age.

Today, all that is left of Atlantis's vast empire are the ice sheets covering Greenland and Antarctica, along with a number of alpine glaciers scattered throughout the world. As the continental ice sheets slowly melted during the thousands of years following the close of the last ice age, sea level gradually rose by 120 meters to eventually reach its present level.⁹ The map presented in figure 7.3 shows how the coastlines would have appeared around 12,500 years B.P., when sea level was 85 meters lower. Given these dramatic coastal changes, it is conceivable that dwellings, at one time situated near the coast, should now lie submerged in coastal waters. Undersea ruins reported from time to time, and sometimes claimed as evidence of a "lost continent," could be the globally scattered remains of a once great ice-age civilization. In particular, the low sea level that prevailed during the ice age allowed Southeast Asia to extend southward into the Indonesian island vicinity and almost come into direct contact with Australia. The disappearance of this territory could be the source of Asian legends attesting to the ancient submergence of a continent and its civilized inhabitants.

In his book *Underworld*, Graham Hancock documents the presence of underwater structures found off coast all over the world that were submerged by the global rise in sea level. One interesting find is a large U-shaped wall structure under 23 meters of water off the southeast coast of India, five kilometers from the shore of Chinnavanagiri. He cites model calculations made by British geologist Glenn Milne that take into account both the history of sea level rise and eustatic land subsidence and that indicate that a structure at that depth would have to be 11,000 years old or older.¹⁰

One is left to wonder about the Mediterranean temple remains located off the Sliema coast in Malta and found under a similar depth of water (25

meters).¹¹ Could these similarly date back to ice age times, as some have suggested, and be evidence of a fragment of the antediluvian Hellenic civilization that Plato spoke of? Hancock reports finding, at a similar depth, three large right-angled steps cut into the interior of an underwater cave situated off Marfa Point eighteen kilometers to the northwest. Also ten kilometers further to the northwest one encounters the megalithic temple of Gigantija. Its cyclopean stones, ranging up to five meters in height and weighing over 15 tons, begin to approach in size the blocks found in the imposing stone structures at Baalbek in Lebanon and Tiahuanaco in Peru. Some speculate that these and other Maltese megalithic temples may all have been created by the same builders. But conventional dating, which places Gigantija at no more than 5600 years old, leaves open the question of how Neolithic island settlers could have managed this task. It seems more plausible that these structures were built by a much more extensive ice age civilization that populated the mainland and that would have access to this region since at that time it was joined to Sicily and Italy by a continuous peninsular land bridge. These stone structures may be all that remains from these earlier inhabitants after their land had been inundated by immense meltwater floods.

At times of very rapid glacial melting, civilizations along the Mediterranean coast may have experienced a disproportionately large change in sea level. This glacial meltwater would have entered the Mediterranean much more rapidly than it could escape through the Straits of Gibraltar, and, as a result, the temporary rise in Mediterranean sea level would have been much greater than in the surrounding oceans. According to one estimate, this meltwater surge could have temporarily raised the Mediterranean by some 60 meters, flooding all coastal civilizations.^{*30} Then, over a period of a month or so, as the excess water drained through the Straits, the sea's level would have subsided to about 15 meters above its pre-flood level.

Other details related in Plato's *Critias* dialogue testify to the historical authenticity of the Atlantis legend. For example, in his conversation with Socrates, Critias describes the territory of antediluvian Greece:

By comparison with the original territory, what is left now is so to say, the skeleton of a body wasted by disease; the rich, soft soil has been carried off and only the bare framework of the district left. At the time we are speaking of these ravages had not begun. Our present mountains were high crests, what we now call the plains of Phelleus were covered with rich soil, and there was abundant timber on the mountains, of which traces may still be seen . . . but not so very long ago trees fit for the roofs of vast buildings were felled there and the rafters are still in existence.¹²

Confirmation for this comes from the results of modern studies of fossil pollen indicating that Greece was covered by lush forests during the last ice age. Apparently, during the cool ice-age period, Greece received much more rainfall than it does today and hence was able to support a more luxuriant growth of vegetation.

Continuing his story, Critias mentions that there were a total of three deluges, of which the earliest severely affected the Athenian valley:

. . . the Acropolis was not then as it is now. At present it has been washed bare of soil by one night of extraordinary floods in which an earthquake and the third terrible deluge before that of Deucalion befell together. But in other and earlier days it was so large that it reached to the Eridanus and Ilissus, enclosing the Pnyx and bounded on the side facing it by Lycabettus; the whole was covered with soil and, save here and there, the surface was level.¹³

The two earlier floods that Critias refers to would represent attacks that Atlantis had earlier launched upon the antediluvian Hellene race. They probably correspond to glacier wave flooding episodes associated with the 12,700 and 14,000 years B.P. megafaunal extinction peaks. Critias appears to suggest that these earlier floods were more destructive than the Atlantean Flood.

On his visit to Egypt, toward the end of the fifth century B.C.E., Herodotus learned from Egyptian priests that 341 generations had elapsed since the time of the first Egyptian king.¹⁴ Figuring three generations to a

century, he calculated an elapsed time of 11,340 years, which translates into a date of about 13,800 years before our present time. Interestingly, this falls close to the date of the earlier extinction episode.

Perhaps future geological investigations will be able to determine whether, in fact, the Athens vicinity was once inundated by vast deluges. However, geological evidence present in various parts of the country suggests that powerful floods did once pass over Greece's rugged terrain. For example, the northern slope of the Peloponnesian coastal range that faces the Gulf of Corinth between Corinth and Patras is covered with flood deposits to a height of several hundred meters. In addition, flood deposits containing large amounts of carbonized peat fill major mountain-ringed valleys in both central Peloponnesus and northern Greece.

The Peloponnesian town of Megalopolis is situated within one such basin, which is elongated in a north-south direction and encircled by mountains that rise to elevations of 1,250 to 1,500 meters (4,000 to 4,500 feet). The basin floor lies about 400 meters above sea level and at its center holds an extensive deposit of carbonized peat measuring some 30 square kilometers, in places reaching a depth of as much as 70 meters. Upon close examination, this material is found to consist of a conglomeration of wood pulp, tiny bits of organic matter, and wood chips ranging in size from a few millimeters to several centimeters, all turned dark brown. The condition of the material gives the impression that the wood and vegetable matter had been violently shredded by floodwaters and interred while still in a fresh state. Moreover, the stratified appearance of the deposit, with its interleaved horizontal zones of clay and gravel, indicates that this material had been deposited catastrophically, as if having precipitated from a temporary floodwater suspension.

We are presented with the image of a forceful glacier wave advancing over the land surface, scouring it clean of its thick vegetation, and still possessing sufficient kinetic energy to surmount the high mountain peaks that ring the Megalopolis valley. As the wave washes over this basin, its waters unburden themselves of their load of clay and organic matter, forming the deposits that today are mined for their fuel value. These floods must have occurred prior to the terminal Pleistocene floods described in

Plato's dialogues, as these deposits have ages beyond the radiocarbon dating limit—that is, ages greater than 45,000 years.¹⁵

Thus Spake Zeus

The story of Atlantis is divided between the two Platonic dialogues — *Critias* and *Timaeus*. Whereas the *Timaeus* deals mainly with the sinking of Atlantis and the deluge that accompanied it, the *Critias* concerns itself primarily with the creation of Atlantis and with the culture of its inhabitants. However, in the *Critias*, Atlantis takes on a very different metaphorical role. Instead of symbolizing the glacial ice sheet, Atlantis here represents the first particle of matter that arose at the dawn of creation. As explained in *Genesis of the Cosmos*,¹⁶ the Atlantis myth of the *Critias* presents a highly sophisticated theory about the nature of subatomic matter and how it first came into being out of the primordial ether. This same physics of physical genesis is encoded in the story of Zeus and certain other creation myths as well as in the lore of astrology and the Tarot.

Interpreted in the context of this physics, Poseidon and his consort, the earth maiden Clito, represent the two primary ether transmutation pathways at whose intersection our 3-D physical universe is generated. The wavelike land contour that rises from the initially uniform Atlantean plain as a result of the union of Poseidon and Clito represents the first particle of matter (a proton) that spontaneously emerged from the ether. The concentric moat-and-dike wave pattern that makes up the profile of “subatomic Atlantis” (figure 8.1) ingeniously portrays the wave character of subatomic matter, something that modern science did not discover until early in the twentieth century.

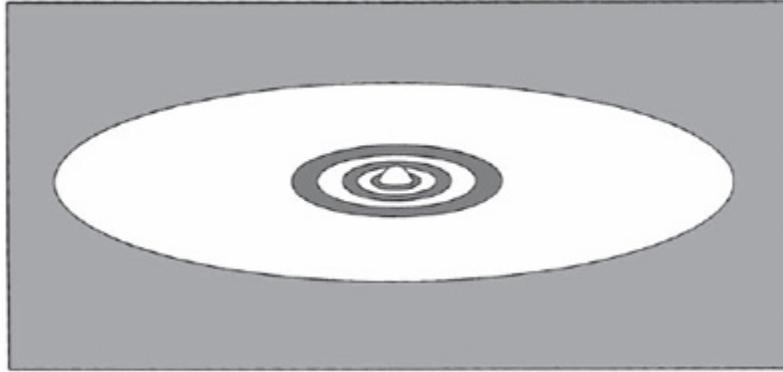


Figure 8.1. A map of Atlantis reconstructed from the description given in Plato's Critias. Shaded regions indicate water.

To emphasize this subatomic physics metaphor, the ancient authors of the Atlantis creation myth linked the story of Atlantis's creation with that of the Olympian creation myth through the personages of Poseidon and Atlas (figure 8.2). Poseidon, who in the Atlantis myth is co-creator of Atlantis, is also one of Zeus's five siblings who, in the Olympian creation myth, assists Zeus in bringing the ordered universe into existence from the preceding state of chaos. Thus, together with Zeus, Poseidon symbolizes the principle of matter creation. This physical creation theme is reenacted when Poseidon generates the Atlantean island empire.

Atlas also serves as a connective literary device. Atlas is the leader of the defeated Titans (the principal chaotic ether fluctuation), who in the Olympian creation myth was condemned by Zeus to bear upon his shoulders the pillar that holds heaven apart from Earth. Hence, the subservient Atlas signifies the order-creating processes that continually sustain all physical form, keeping the primordial subatomic particle and all of its progeny in a materialized state.¹⁷ In the Atlantis creation myth, we again meet up with Atlas, or at least his namesake, here depicted as the eldest son of Poseidon and Clito, the co-creator of Atlantis's progeny, ruler of its citizenry, and bestower of the Atlantis name. With the linking element of Atlas, it is apparent that Atlantis is one and the same with the Olympian subatomic particle created by Zeus and his progeny and sustained in the metaphor of Atlas separating heaven and Earth. Thus, by ruling Atlantis and maintaining its ordered state of commerce, Atlas performs a function very

much like that of his Titan counterpart, who labors to “prop up” the ordered universe.

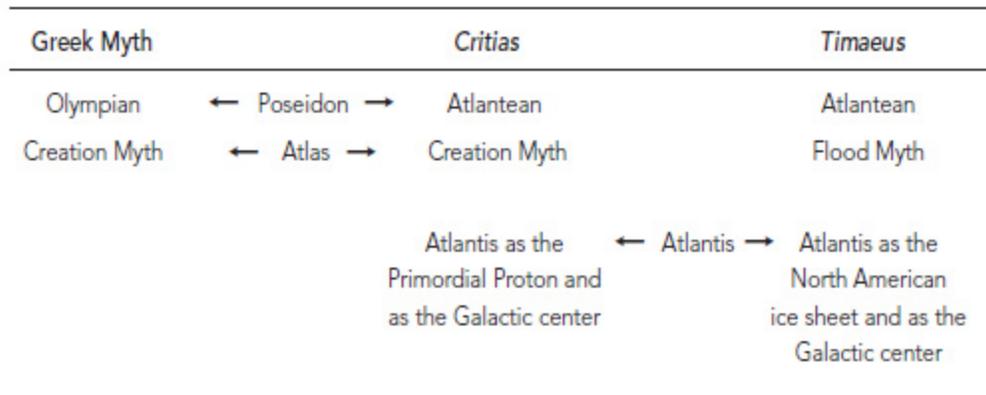


Figure 8.2. Linkages among the Olympian creation myth and the two stories about Atlantis.

As we approach the end of the *Critias* Atlantean myth, we find that the progeny of Atlas and his nine brothers have multiplied and now populate surrounding territories. In other words, “subatomic Atlantis” has now grown into “Galactic core Atlantis” and surrounded itself with outlying colonies of stars. The myth also relates that after many generations of growth, Atlantis turned wicked and hungry for power. That is, as the Galaxy’s core grew more massive, what was formerly a slow peaceful process of matter-energy creation now began to escalate exponentially to the point that it became a threat to the rest of the Galaxy.

Zeus, lord of the gods, creator of the cosmos, and the Olympian metaphor for matter-energy generation, intervened to redress this situation. Seeking to bring the Atlanteans back to their former state of “god-like” behavior, he decided to lay a judgment upon them. To do this he “gathered all the gods in his most honorable residence . . . *that stands at the world’s center and overlooks all that has part in becoming. . .*” At this point, just as Zeus is about to pronounce his judgment from this central location (the Galactic center), the story abruptly discontinues in midsentence, and probably for a good reason: Zeus must have unleashed from Galactic core Atlantis an explosive force of such awesome proportions as to send even the scribes of the gods running to their shelters.

Consequently, the Atlantis myths of *Critias* and *Timaeus*, in conjunction, describe how the explosion of extraterrestrial Atlantis (the

Galactic center) caused terrestrial Atlantis (the glacial ice sheet) to launch a devastating flood attack upon our ancient ancestors. Again, in the ancient Greek Deucalion flood myth, we find Zeus initiating a similar global catastrophe by letting loose a great flood on the Earth to punish mankind for his wrongdoings. This is probably the same flood sent by Zeus in the Phaethon myth to quench the burning world.

The ancient Greek myth about how Zeus gave birth to the goddess Pallas Athena could also be interpreted as a metaphorical account of a prehistoric Galactic core explosion. According to this tale, Zeus had an affair with the Titaness Metis, who conceived by him a girl. Afterward, an oracle warned Zeus that if Metis conceived again, she would bear a son who was destined to depose him, just as Zeus himself had once deposed his father, Cronus. To prevent this from coming about, Zeus one day lured Metis to his side and swallowed her. But after a time he was seized by a raging headache, so severe that it seemed his skull would burst. He emitted such a terrible howl that the whole firmament echoed. Hermes, divining the cause of Zeus's discomfort, persuaded Hephaestus (Vulcan) to use his hammer and wedge to breach Zeus's head. (Some versions say that the surgery was performed by Prometheus, the Titan who brought fire to mankind.) From the fissure that was opened in his head, Athena, fully armed, sprang forth with a mighty shout.

Like her brother Titans in the ancient Greek creation myth, Metis represents an emerging chaos-producing energy pulse. By swallowing Metis, Zeus did not suppress this energy pulse; he merely internalized it. With his head nearly bursting, Zeus signifies the Galactic core, Sagittarius A*, at a point when its energy-creation process has soared to the critical point. The splitting of his head by Hephaestus, the god of fire, suggests an explosive conclusion. Athena, who springs forth from Zeus fully armed with shield and spear, would then signify the outburst of cosmic rays violently emitted from the Galactic center.

Athena's title, Pallas, which translates as "maiden" or "virgin," was also a name for Typhon, the vicious monster whom Zeus battled after his victory over Cronus. Nevertheless, ancient Greek mythology does not portray Athena as violent by nature. As goddess of wisdom and patroness of Athens, she was generally known for her good deeds to mankind. There is

no association between Athena's birth and terrestrial catastrophes. Thus, it is unwise to pursue this astronomical analogy much beyond this point. However, it is interesting that Solon learned about these ancient catastrophes during his visit to Sais, a sister city that also had Athena as its patroness. In an indirect way, then, Athena, goddess of wisdom, was involved in bringing forth this long preserved knowledge.

To draw inferences from ancient myths about past astronomical events is indeed a risky business, as may be gathered from considering the theory that Immanuel Velikovsky expounded in his book *Worlds in Collision*. Velikovsky interpreted the above story of Athena's birth in quite a different manner. He assumed that Zeus (Jupiter) literally represented the planet Jupiter and that the goddess Athena, whom he associated with Aphrodite (Venus), literally represented the planet Venus. On this basis, he concluded that just as Athena leapt forth from Zeus's head, so too the planet Venus actually burst forth from the red spot of the planet Jupiter to enter the solar system as a giant comet. He proposed that Venus catapulted toward the inner part of the solar system just 3500 years ago and that its eccentric path periodically brought it close to the Earth, where it triggered major terrestrial cataclysms— seismic upheavals, spells of darkness, droughts, and floods— until it finally settled into its present circular orbit.

Velikovsky's theory, however, contained several flaws. For one thing, even if it were possible that Jupiter's red spot could eject a mass the size of Venus, the amount of energy required to overcome Jupiter's gravitational pull would be so great that the ejected planet would have been vaporized in the process. Moreover, judging from the shape of its orbit, Venus is the least likely to have had such a turbulent history: Of all the planets in the solar system, its orbit is the most circular. Its orbital eccentricity is only 0.007, as compared with 0.017 for the eccentricity of the Earth's orbit.^{*31} Finally, it is highly unlikely that a comet or planet, initially following an elliptical orbit, should settle into a nearly circular orbit, which would require it to drastically change its kinetic energy. Any gravitational interactions with other planets would more likely increase its orbital eccentricity, rather than reduce it. Thus, there is no need to theorize that Venus had such an unusual origin and orbital history.

Sophisticated anticryptographic symbologies such as the astrological zodiac hopefully reduce the range of uncertainty involved in interpreting the meanings of ancient myths. Even so, in inferring the occurrence of past astronomical and geological events, it is important to use such myths and lores merely as guides and not as factual proof. Scientific theories should be judged ultimately on the basis of observational data. Given the evidence that high energy activity has taken place relatively recently in the core of our Galaxy, our Galactic interpretation of the Zeus-Athena myth appears to be quite plausible.

Asgard and the Bifrost Bridge

The Norse legend of Asgard resembles in many ways Plato's legend of Atlantis. The *Younger Edda* tells us that Asgard is an island surrounded by ocean that lies west of Europe and which is accessed by means of the rainbow bridge, Bifrost. Hence Asgard, like Atlantis, represents the North American ice sheet. Like Atlantis, Asgard has outlying colonies that lie "along the outer strand of that sea." The Bifrost bridge most likely signifies the ice sheet bridge that spanned Baffin Bay and the North Sea to connect the North American and Greenland ice sheets with the European ice sheet. It calls to mind the ice-filled Ginungagap described in the *Younger Edda*.

Like Atlantis in Plato's dialogues, Asgard is presented with a dual meaning. In the *Elder Edda*, it is a place in the heavens—that is, out in space—whereas in the *Younger Edda*, it is a high island on Earth lying to the west—that is, the North American ice sheet. The former symbolism strikingly parallels that of Plato's *Critias*, whereas the latter parallels that of the *Timaeus*. This division is consistent with the different emphasis of each of the Eddas, the *Elder Edda* dealing more with a celestial battle, the *Younger Edda* dealing more with the effect of the catastrophe on Earth.

Reminiscent of the *Timaeus*, the *Younger Edda* legend tells of an ancient Swedish king named Gylfe who journeys to Asgard, where he assumes the name Ganglere (the wanderer). There he beholds a land of temples, golden palaces, and plowed fields populated by a mighty and noble race called the Asas. Just as the Egyptian priests relate to Solon, king of Athens, the tale of Atlantis and of the great flood that befell his ancestors, the Asas tell Ganglere the tale of Ragnarok. Asas comes from the Norse word *aas*, which

means a “ridge of high land.” Thus, the Asas, like the Atlanteans, would appear to be a fictitious race that once dwelt high up on the ice sheet’s glistening paradise of ice.

Ganglere asks what path one takes to journey from Earth to heaven—that is, from Europe to Asgard, the ice sheet. Har, one of their learned, answers:

Foolishly do you now ask. Have you not been told that the gods made a bridge from earth to heaven which is called Bifrost? You must have seen it. It may be that you call it the rainbow. It has three colors, is very strong, and is made with more craft and skill than other structures. Still, however strong it is, it will break when the sons of Muspel come to ride over it, and then they will have to swim their horses over great rivers in order to get on.[18](#)

The breaking of Bifrost, like the sinking of Atlantis, signifies the melting of the ice sheet, in this case the ice bridge connecting the two continents. This occurs when the “sons of Muspel,” led by Surt, come riding over it—that is, during the period of intense climatic heating.

A Zodiacal Date for the Flood

As noted earlier, certain myths associate the Scorpius constellation with the occurrence of an ancient cosmic catastrophe. One example is the ancient Egyptian myth describing how darkness came to the world when the Scorpion stung Horus and brought him very close to death. Another example is the ancient Greek myth about Phaethon and the sun chariot, in which the sight of the celestial Scorpion’s stinger caused Helios’s steeds to begin a stampede that ended with the burning of the Earth.

In addition, the ancient Greeks associated the constellation of Aquarius with the Flood of Deucalion. According to this story, Zeus had become angered with Lycaon, who had sacrificed a boy to him. In disgust he sent a great deluge to destroy the world. Warned by his father, Prometheus, Deucalion built an ark, stocked it with victuals, and boarded it together with his wife, Pyrrha. A torrential rain fell, causing the rivers to roar and the sea to rise with astonishing speed, washing away every city of the coast and

plain until the entire world was flooded except for a few mountain peaks. The ark floated about nine days before the waters at last subsided, leaving the ark to rest on Mount Parnassus, a mountain that today towers over Delphi, northwest of Athens. Some say that Aquarius was placed in the heavens to commemorate Deucalion's safe passage. Others say that Aquarius was made to depict the creator god Zeus, who, in his disgust with mankind, poured forth the Great Flood.

Another ancient Greek myth about the Flood concerns the star maiden goddess Astraea, who is depicted by the constellation of Virgo. According to this myth, Earth once enjoyed an Eden-like Golden Age in the distant past, during which humanity lived in peace and coexisted with the gods. But as time passed, mankind became increasingly brutish and, as a result, civilization slipped from the Golden Age into the Silver Age, then into the Bronze Age, and finally into the Iron Age. As they fell from their grace, the gods, one by one, began to leave Earth and take up residence in the heavens. The goddess Astraea was the last to leave. Immediately following her departure, the Earth was subjected to the Deluge.



Figure 8.3. The constellation of Aquarius (Hevelius, 1690). The stream of water that the Water Bearer pours down from the stars above may have been intended to signify the particles of interstellar dust and ice that once “poured” into the solar system. As a celestial symbol of the Deluge, it informs us that this terrible ancient disaster was initiated by events that took place in the heavens.

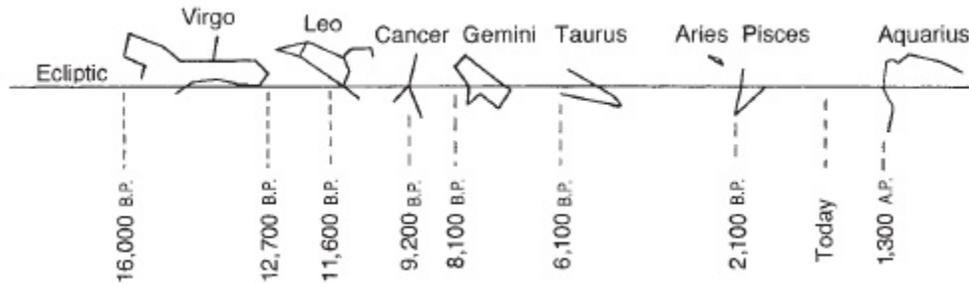


Figure 8.4. Zodiac constellations and the dates of the Ages they delineate. Dates are based on the precessional equations of A. Berger (Celestial Mechanics, table 5) and should be accurate to within ± 100 years.

Interestingly, this myth metaphorically encodes the date of the Deluge. The time of this event may be surmised by thinking of the zodiac as a gigantic celestial clock. Like the hours marking the face of a clock, the zodiac constellations mark out 12 subdivisions along the ecliptic. The vernal equinox serves as the pointing hand on this celestial timepiece, marking the Sun’s position against the background constellations on the first day of spring. The vernal equinox slowly precesses backward through the signs of the zodiac, taking about 26,000 years to make a complete circuit of the ecliptic. Each such Great Cycle is made up of twelve Ages, one for each sign that the vernal equinox traverses. Since the signs are spaced unequally around the ecliptic, it can take anywhere from 1500 to 3300 years to pass from one Age to the next.

Figure 8.4 gives dates when the vernal equinox was located in various zodiac constellations. Presently, the vernal equinox is nearing the end of its transit through the constellation of Pisces and will be crossing the boundary into Aquarius in about six hundred years, although astrologers claim that we have already entered the Aquarian Age, at least in spirit. Looking further back in time, we see that the Age of Virgo began around 14,000 B.C.E., close to the time indicated by the heart-piercing trajectory of Sagittarius’s arrow. It ended over three millennia later, around 10,700 B.C.E., when the equinox left Virgo to pass into Leo. The departure of

Virgo from Earth, as related in the Astraea myth, probably signifies this date of the ending of the Age of Virgo. Consequently, by means of allegory, the Astraea myth seems to be reporting that the Deluge occurred about 12,650 years B.P. This date coincides with the time of the final episode of large-land-mammal extinction in the southwestern United States and the time when a major glacier wave drowned and froze the large mammals grazing in the Arctic (chapter 7). It also marks the time when land mammals in North America were becoming extinct at their highest rate (figure 7.2).^{*32}

Additional clues about this Virgo-Leo date may be uncovered by studying the physics encoded in these zodiac signs. As mentioned earlier, to understand the zodiac's physics, the signs must be placed in an order different from the sequence they have in the heavens (figure 1.2b). The last portion of this rearranged order requires that we proceed from Libra to Virgo and then over to Aquarius. The passage from Virgo to Aquarius is unique in that it requires an almost 180-degree flip from one side of the zodiac to the other. Consequently, whereas the precession of the vernal equinox would normally take us from Virgo into Leo, in the deciphered zodiac sequence it catapults us into Aquarius. Interestingly, Aquarius is the one sign of the zodiac sequence that specifically denotes the Great Flood. This sudden flip from the end of Virgo over to Aquarius could have been intended to emphasize the uniqueness and abruptness of this catastrophic event.

Recall that Virgo and Leo signify extreme warmth whereas the opposing signs, Pisces and Aquarius, denote extreme cold, a polarity that the ancients painstakingly spelled out by associating specific planets and human body parts to the zodiac signs. By linking Leo with Aquarius, warm with cold, the zodiac may also be indicating that the warmth of the Sun (Leo's ruling planet) was responsible for causing the glacial melting and meltwater flooding (Aquarius). The 12,650-years B.P. flip may be recording one of several periods when the Sun became unusually hot and caused one of the legendary deluges.

This warm-to-cold zodiac flip coincides with the date of $12,700 \pm 100$ years B.P. when the unusually warm Alleröd interstadial ended and the Earth's climate entered an interval of glacial temperatures with the onset of

the cold Younger Dryas. The Gulf of Mexico meltwater discharge profile (figure 6.11) confirms that there was a period just before the beginning of the Younger Dryas when the meltwater discharge rate was particularly high. This corresponds to a 150-year-long interval of warm climate and low atmospheric dustiness that is evident in the ice core conductivity profile (figure 6.9). Probably because of its brevity, the temporary sea level rise, associated with the 12,700-years-B.P. flood, is not evident in the Barbados coral reef profile (figure 6.12). Any rise in sea level resulting from this major influx of glacial meltwater would soon after have been negated by the fall in sea level associated with the subsequent period of glacial growth.



Figure 8.5. The zodiac panel appearing in the floor mosaic of the Beth Alpha Synagogue. (Courtesy of the Hebrew University of Jerusalem, Department of Archaeology, BS XXXVII, vol. 3.)

The Virgo–Leo boundary date emerges as an important time marker in several ancient esoteric traditions. For example, ancient Greek and Egyptian sources set the beginning of the equinoctial Great Cycle at this demarcation point.¹⁹ This same 12,650-years-B.P. demarcation is also indicated in the

zodiac displayed on the floor of the sixth-century A.D. Beth Alpha Synagogue excavated near Galilee (see figure 8.5). The angels positioned at the four corners of the zodiac panel depict the four seasons, and hence mark the equinoxes and solstices. The mosaic positions the zodiac wheel so that the spring equinox, indicated by the angel in the upper left corner, aligns with the Virgo–Leo boundary, a position it would have had around 12,650 years B.P. In his discussion of this mosaic, the myth historian Joseph Campbell noted this orientation and remarked that the signs are grossly displaced from the seasonal correlations they should have had at the time the synagogue was built. He surmised that this may have been an error due to ancient iconographers’ ignorance of Greek astronomical knowledge.²⁰ However, it is more likely that these ancient masons knew what they were doing and purposely set their zodiacal chronometer to this particular celestial position in remembrance of this all-important 12,700-years-B.P. date. As we have seen, the Giza pyramid complex also memorializes this important catastrophe date.

Campbell was also perplexed by the religious significance of the icon at the zodiac’s center, which displays the sun god Helios driving his four-horse chariot. Was it placed there to denote a Sun-centered zodiac? Or was it intended to call to mind the ancient Greek myth of Phaethon, which tells how the Sun burned the Earth in prehistoric times and caused its ice sheets to flood the land’s surface? Since tales of such cataclysmic events are woven throughout the Old Testament, it does not seem so unusual that a memorial to them should appear on the synagogue floor.

By the time the Younger Dryas ended and the Earth’s climate suddenly warmed, bringing the ice age to an abrupt end, the vernal equinox had precessed to a point midway through the Leo constellation. By 10,850 years B.P., when the continental ice sheets had begun to reduce their rate of meltwater discharge, the vernal equinox had finished transiting the star Regulus and was just beginning to emerge from Leo’s breast. In the context of ancient Egyptian mythology, the “rising” of the vernal equinox through Leo’s breast would connote the Sun’s reemergence from the underworld to bring light to the Earth. Leo’s posture calls to mind the mythical Aker sphinx, a Siamese-twin-like beast having the body of a lion and heads of a man (figure 8.6). Like Leo and the Great Sphinx, it sat in a crouched

position with paws extended and head erect. Its symmetrical halves were believed to lie at the eastern and western horizons, where they guarded the gates to the underworld. At dusk the Sun was believed to enter into the underworld by passing through the breast of the western Aker and at dawn to reemerge by passing out through the breast of the eastern Aker, there rising from between its outstretched paws.

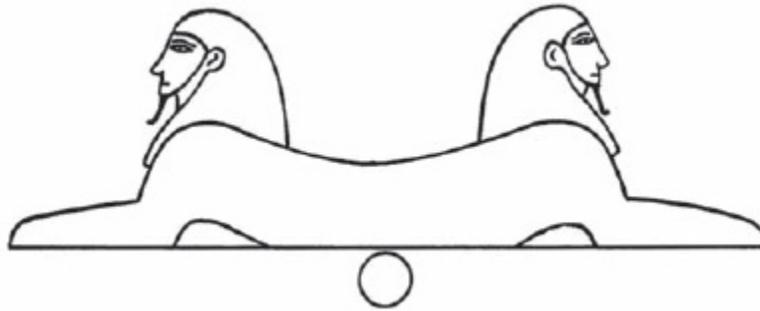


Figure 8.6. The Aker, guardian of the gates of the underworld. From the Book of Caverns. (Adapted from Rundle Clark, Myth and Symbol, figure 23).

As he is stationed in the sky with the ecliptic angling upward past his breast, Leo depicts the eastern Aker gate, conjuring the image of the Sun rising from between his paws. However, the Sun instead transits the ecliptic from west to east (right to left).^{*33} Only the slowly precessing vernal equinox, which travels through the signs from east to west as it marks off the passage of successive zodiacal ages, would have properly “risen” through Leo’s breast. Its ecliptic journey upward into the “day world” would signify Earth’s departure from the murky ice-age period and passage into the sunny warmth of the present interglacial. In ancient Egyptian cosmology, the rising-sun metaphor signified the auspicious moment when light and order overcame the dark forces of chaos to become born into the world. Leo presents this same idea to celebrate Earth’s emergence from its climatological dark age.

The ancient Egyptian Magi placed great importance on preserving knowledge about this ancient conflagration and flood cataclysm, for they apparently indoctrinated the new members of their secret sect into its particulars. According to Iamblichus,²¹ the Magi carried out their initiation ceremonies at Giza in subterranean chambers supposedly accessed from between the forepaws of the Great Sphinx. After first passing through a

treacherous underground maze that tested his powers of reason and intuition, the novice would enter a long gallery whose walls were adorned with 22 frescoes, the forerunners of the tarot major arcana. There, a priest would inform him of the science of creation metaphorically encoded in the images and would afterward instruct him to leave through a door at the gallery's far end. At this point, the novice would enter a long narrow hallway whose exit was impeded by flames rising from an iron grille in the floor. These were made to flare up into a wall of fire as he crossed over the grille inducing him to seek safety by leaping into a shoulder-deep pool of water on the far side. After he had waded through this water and ascended a flight of steps leading to a brass door, the flames were extinguished and the chamber was plunged into darkness. So, in this brief period, the novice symbolically experienced conflagration, flooding, and darkness, the ordeals that once plagued our prehistoric ancestors. Having completed this important phase of his initiatory passage, his next test was to open the brass door, whereupon he was greeted on the other side by an escort of 12 sanctuary guardians holding lamps. Blindfolding him, they would escort him through a passage leading to the Great Pyramid, where the final stages of the initiation into the Magi order would take place.

It is fitting that these ceremonies were symbolically conducted within the bowels of the Great Sphinx. Besides portraying the temperature axis of the cosmic microwave background dipole and the principle of matter-energy creation, this Leo-Aquarius hieroglyph records the occurrence of the conflagration and flood catastrophe at the end of the ice age as well as the joyous onset of the present period of interglacial warmth. How ingeniously and succinctly the Sphinx's symbolism conveys these important facts, and how clever of the zodiac's inventors to make the Sphinx the key to their astrological cipher.

Flood Legends from Asia, Oceania, and the Near East

Tropical regions apparently were not immune to the effects of glacier waves despite being far removed from the ice sheets. For example, the Ahoms of Burma tell of how their hero escaped from the Flood by floating in a gigantic gourd that magically grew out of a little seed.²² Island cultures also preserve legends of a catastrophic flood. The Hawaiians say their land

had once been inundated by the sea, except for a small peak on Maunakea Island, where two people were preserved from the destruction.

According to the Tahitians, long ago the islands of Tahiti-nui and Tahiti-iki were submerged. Except for the birds and insects, only a single couple survived. The woman presciently directed their way to Pito-hiti, which turned out to be the only land remaining above water. They remained in a cave within the mountain for ten nights, after which the rain ceased and the heavens cleared. Nothing but bare earth remained on the land. But soon things returned to normal and these two repopled the islands.²³

The Murinbata Aboriginal people of Australia tell of a disastrous flood that occurred long ago in a Dreamtime called Kardoorair when all the animals were bird-men. The legend says that a big rain began to fall for many days and nights. Soon it swelled the creek and covered all the land, until finally there was only water. The water rose higher and higher, leaving the bird-men to take refuge on Doothawa, also known as Table Hill. Finally the waters slowly subsided and the bird-men flew back to their own tribal countries.²⁴

Legends handed down by native Siberians tell of the past occurrence of a cataclysmic fire and flood. For example, the nomadic Voguls of the northern Urals have an ancient legend about how a holy fire-flood swept over the Earth for seven years, consuming almost everything: “Already for seven winters and summers the fire has raged, already for seven winters and summers it has burnt up the earth.”²⁵ They say that God sent this sea of fire upon the Earth to destroy the devil and that only the gods and a few mortals succeeded in saving themselves. The former embarked in an “iron ship,” the latter on a “seven-bottomed beech-raft,” which was provided with a fireproof, sevenfold sturgeon skin. During the ice age, the Urals were completely covered by the eastern edge of the European ice sheet, so this region would have been particularly susceptible to floods.

The Tungus of eastern Siberia also have a legend of a fire and flood cataclysm. Like the Voguls, they said it lasted seven years:

In the beginning was the earth, but then a great fire raged for seven years and the earth was burned up. Everything became sea. All the

Tungus were consumed except a boy and a girl who rose up with an eagle into the sky. Having wandered for a time in the air, they descended to a place where the water had dried up.^{[26](#)}

The Chinese emperor Yahou, who is believed to have lived at a time shortly after the last great cataclysm, is said to have recorded the following about cosmic events that culminated in a great deluge:

At that time the miracle is said to have happened that the sun during a span of ten days did not set, the forests were ignited, and a multitude of abominable vermin were brought forth. In the lifetime of Yao (Yahou) the sun did not set for ten full days and the entire land was flooded.

An immense wave “that reached the sky” fell down on the land of China. The water was well up on the high mountains, and the foothills could not be seen at all . . .

“Destructive in their overflow are the waters of the inundation,” said the emperor. “In their vast extent they embrace the hills and overtop the great heights, threatening the heavens with their floods.”^{[27](#)}

The flood myth in the Hindu *Zatapatha-Brahmana* describes how Manu one day went down to the water to wash his hands, whereupon a small fish jumped into his hands and warned him of the impending crisis. Following the fish’s instructions, he prepared a ship on the foretold year of the flood and boarded it with the flood’s arrival. The fish, now full grown, returned to assist him by towing the ship to the safety of a mountain.^{[28](#)}

The Sumerian *Epic of Gilgamesh* has a version that resembles both the myth of Deucalion and the biblical story. It relates that one day long ago the gods held a council in which they decided to send a flood to drown mankind. Ea, Lord of Waters and of Wisdom, who was present at the council, decided to warn one man named Utnapishtim. Being bound by oath not to speak of these plans to humans, Ea instead told Utnapishtim to listen carefully with his ear to a wall. Ea then stood on the other side and addressed his warnings to the wall.

Heeding Ea's advice to tell no one else about the impending flood, Utnapishtim constructed an ark with a six-story house rising from its deck, each story having nine rooms. He stocked it with livestock and seed and brought in his kinfolk and his handicraftsmen. When the appointed time came, "a black cloud came up from out of the horizon," and Adad, god of storm and rain, thundered within it. The anunnaki, the judges from the underworld, raised their flaming torches, "lighting up the land with their brightness; the raging of Adad reached unto heaven and turned into darkness all that was light, so that no man could see his fellow."²⁹ The wind blew and the rain fell in torrents, causing the waters to rise. The tempest raged for six days and on the seventh it ceased. As the flood slowly receded, the hilltops reappeared and the ship came to rest on Mount Nisir. Utnapishtim opened a window and released a dove, and after some time let go a swallow. But finding no dry land, both returned. He then released a raven, which did not return, indicating that it had found land and food. At this point, the survivors disembarked from the ark and offered a sacrifice to the gods.

Finally we come to the biblical story of Noah and the Flood. According to chapter 7 of the Book of Genesis, God is grieved of humanity's wickedness and violence and vows to eliminate man and beast from the face of the earth. He warns Noah, a just man, of his intention to bring a flood upon the earth. He instructs him to build an ark according to certain specifications, to stock it with food and animals, two of every kind, and to board it together with his family. On the appointed day, "the fountains of the great deep were broken open, and the windows of heaven were opened," causing a rain to fall for forty days and flood the land. The Flood bore the ark aloft and rose 15 cubits (7 meters) above the tops of all the high hills, so that everything that crept upon the earth died. The waters prevailed for an additional 150 days before they began to subside. By the middle of the seventh month, the waters had subsided enough to leave the ark perched on top of Mount Ararat. After a total of ten months had passed, other mountain tops became visible. Then Noah sent forth a raven, then three times sent forth a dove, which on its third journey did not return indicating that the waters had fully abated. Finally, by the thirteenth month the earth had dried. One month later Noah and his family disembarked and began a new life.

The version of the Noah legend told by the Jews holds that the Deluge occurred during a period of celestial darkness: “The sun was darkened, and the foundations of the earth trembled, and lightning flashed, and the thunder boomed, as never before. And yet the sinners remained impenitent. In naught did they change their wicked doings during those last seven days.”³⁰ Hot rains came down from the heavens, scalding the flesh of the sinners. The entire time the Deluge lasted, “the sun and the moon shed no light.”³¹

Although there is nothing in Genesis that implies that the Flood was due to a rapid melting of the ice sheets, there may be an allusion to this in the Book of Amos (9:5), which states:

And the Lord God of hosts is he that toucheth the land, *and it shall melt*, and all that dwell therein shall mourn: and it shall rise up wholly like a flood; and shall be drowned as by the flood of Egypt.

The story of the biblical Flood is related more extensively in chapters 6 through 9 of Genesis. It is preceded in chapter 5 by an account of the generations of Adam and is followed in chapter 11 and subsequent chapters by an account of the generations of Shem, Noah’s eldest son. These genealogies give the ages of the “patriarchs” at the time they first spawned children, as well as their ages at the time of death. Table 8.2 summarizes these statistics.

Interestingly, when these sets of ages are plotted vertically and sequenced consecutively at equal intervals along a horizontal time line, as shown in figure 8.7, they produce profiles that have a familiar appearance to climatologists. The ages at death appear to chart the global rise in temperature at the end of the ice age. For example, the upper profile in figure 8.7 bears a resemblance to the oxygen isotope climatic profile shown in figure 4.6, implying that the younger patriarch ages may be charting times when global temperature was warmer and ice sheet volume was less. In addition, the patriarchal ages at maturity could be charting the rate at which sea level was rising due to the melting of the ice sheets or, alternatively, the rate at which the ice sheets were discharging meltwater.

Noah was 500 years old before he had children, which gives him the greatest age at maturity of all the patriarchs. Thus, Noah's maturity age indicates a time when meltwater discharge had reached a peak. Quite appropriately, Genesis begins the story of the Flood just after it gives Noah's age at maturity, relating that Noah was 600 years old when the Flood came to pass. Finally, after completing the story of the Flood, the scripture gives Noah's age at death as 950 years. With the death of Noah comes the ending of the generations of Adam and the completion of the data tracing out the first half of the climatic profile. This is followed in chapter 11 by the generations of Shem, which encode data for the post-flood period. These age profiles are insufficiently detailed to allow the Noah peak to be matched with a specific flooding event. Nevertheless, we may surmise that the Noachian Flood most probably occurred about 12,700 years B.P. in coincidence with the mass extinction episode, whose abruptness and deluvian nature are most evident in the frozen arctic drift.

TABLE 8.2. THE GENERATIONS OF ADAM AND SHEM

Patriarch	Age at Maturity	Age at Death
Adam	130	930
Seth	105	912
Enos	90	905
Cainan	70	910
Mahaleleel	65	895
Jared	162	962
Enoch	65	(365) ^{*34}
Methusehluh	187	969
Lamech	182	777
Noah	500	950
Shem	100	600
Arphaxad	35	438
Salah	30	433

Eber	34	464
Peleg	30	239
Reu	32	239
Serug	30	230
Nahor	29	248
Terah	70	205
Abraham	86	175
Isaac	60	180
Jacob	—	147
Joseph	37	110

Just before giving the generations of Shem, chapter 11 of Genesis relates the story of Babel, which describes events in the aftermath of the Flood. According to this story, immediately after the Flood, Noah's descendants worked together to build a great monument, which the Lord later named the Tower of Babel. During this time, they spoke one language (antediluvian Greek?). But afterward they dispersed to various regions of the Earth and eventually began speaking languages that were not understandable to one another. In other words, we may surmise that the flood catastrophe decimated civilization and left only scattered pockets of people to repopulate the world. Being isolated from one another, these communities eventually forgot their former language and began developing their own characteristic dialects.

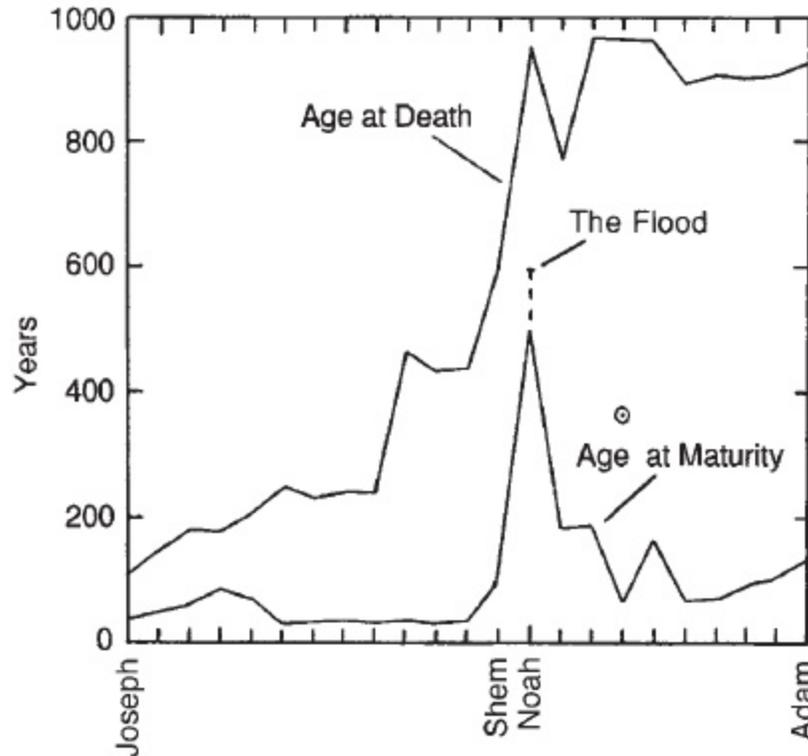


Figure 8.7. The ages of the generations of Adam and Shem at maturity (lower profile) and at death (upper profile).

If we are correct in our interpretation of the patriarchal ages in Genesis, these numbers should be one of the oldest known sets of numerical scientific data to survive to modern times. Like other information about the Flood metaphorically encoded in astrology and in the myth of Atlantis, this finding requires that we considerably revise our ideas about the level of technical sophistication that our prehistoric ancestors had achieved.

NINE

FLOOD LEGENDS FROM THE AMERICAS

American Indian Legends

Stories from a wide variety of North American Indian tribes tell of the existence of an antediluvian race that was subsequently destroyed by a deluge, the lucky few either climbing a mountain or tall tree, hiding in a cave, or taking refuge on a raft or canoe.¹ These Native American legends represent a valuable source of information, as they provide us with folklore accounts from a region in which glacial flooding and megafaunal extinctions had been particularly severe. Because the Americas were culturally isolated from the rest of the world for a long time, it is unlikely that their flood stories have been significantly influenced by European legends.

The Iroquois Indians of central New York have an interesting myth concerning the glacial ice sheets and their floods. It relates the story of a “gigantic frog” who had swallowed all the waters, which became “congealed” within it. Later, the beneficent Sun, known as the White One (Manibozho), killed the gigantic frog after first destroying a monster who covered the Earth with blood and stones. When the frog was killed, great and destructive torrents broke forth and devastated the land. But the White One later guided these waters into smooth streams and lakes.²

As Donnelly has explained, the frog represented the great ice fields that once squatted, froglike, on the face of the Earth, the cold-blooded frog

being a natural symbol of water and cold.³ The killing of the frog refers to the melting of the ice sheet, and the resulting liquefaction and bursting forth of its congealed waters signifies the destructive glacier waves that shot forth from the ice sheet surface.

Interestingly, this story resembles a frog myth handed down by east coast Aboriginal tribes living in the Victoria region of southeastern Australia:

Once upon a time there was no water, for a great frog had swallowed it all. At this the people were much distressed, and holding a council to determine what to do, they agreed that if only the frog could be made to laugh, he would disgorge the water. Accordingly several animals danced before him in ludicrous postures, but in vain, for the frog remained as solemn as before. Finally the eel tried, and at his wriggling and writhing the frog first smiled and then laughed; and as he opened his mouth, the waters burst forth and caused a great flood by which many were drowned. The few survivors, comprising two or three men and one woman, took refuge on a small island; and by and by a pelican, coming along in his canoe, carried the men to the mainland . . .⁴

This southeastern region was the only part of Australia that was covered by an ice sheet. Thus, as in the Iroquois legend, the frog in this myth would symbolize the glacial cover.

Another legend, handed down by the Navajo of northern New Mexico and Arizona, states that their ancestors survived the Flood underground in a cave in the heart of a mountain near the San Juan River. They shared this shelter with the Pueblos, Coyoters, and white people. As the legend has it:

Their only food was meat, which they had in abundance, for all kinds of game were closed up with them in their cave; but their light was dim, and only endured for a few hours each day . . . Then the Moth-worm [tribe] mounted into the breach, and bored till they found themselves suddenly on the outside of the mountain, and surrounded by water . . . [To] the north, south, east, and west, were found four

great arroyos, by which all the water flowed off, leaving only mud . . . And the wind began to rise, sweeping up the four great arroyos, and the mud was dried away. Then the men and the animals began to come up from their cave, and their coming up required several days. . . . The earth was at this time very small, and the light was quite as scanty as it had been down below; for there was as yet no heaven, nor sun, nor moon, nor stars.⁵

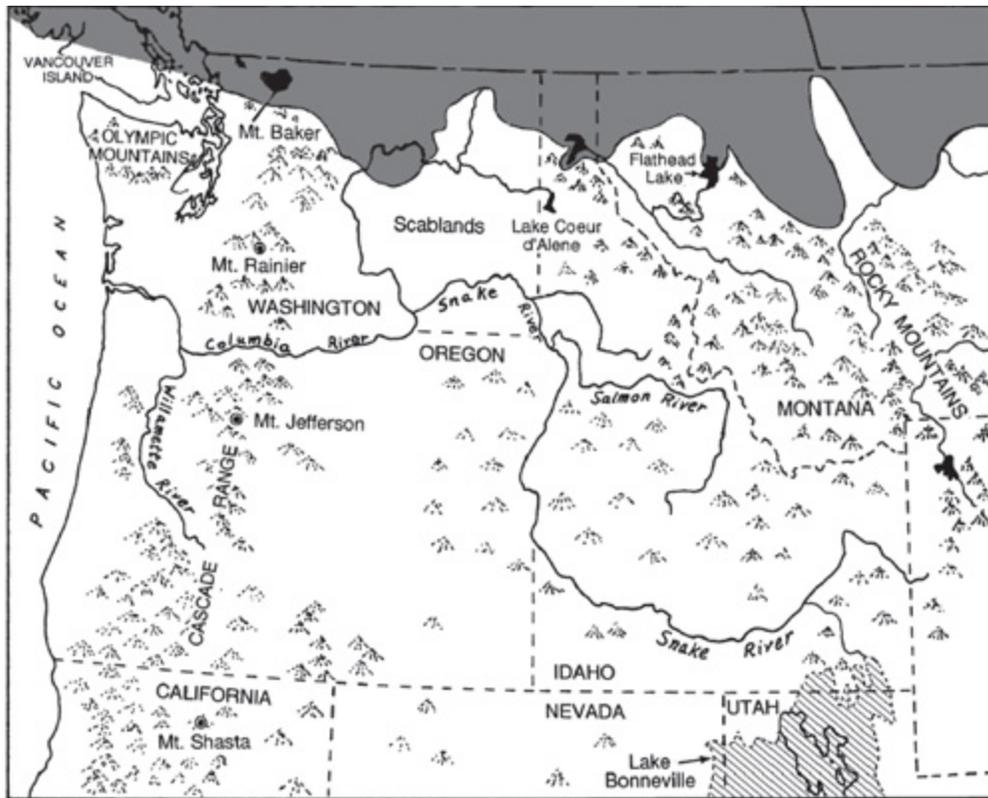


Figure 9.1. A map of the Pacific Northwest showing the southern fringe of the Cordilleran ice sheet (shaded region).

The Indians from the Mount Shasta region of northern California have a myth that tells of a great flood that occurred long ago when only “animal people” inhabited the world. The story centers on the cunning animal Coyote who was traveling with his bow and arrows. One day he encountered a water-dwelling evil spirit who caused the water to rise and overflow the land and cover him:

After a time, the water went down and the land dried off. Coyote sprang up, took his bow and an arrow, and shot the evil spirit. Then Coyote ran away. But the water followed him. Coyote ran to higher ground. The water followed him to higher ground. He started up Mount Shasta. The water followed him up Mount Shasta. He ran to the top of the mountain. The water followed him and became very deep, but it did not quite reach the top.

On top of Mount Shasta, Coyote made a fire, on the only ground left above water. Grizzly Bear saw the fire and swam to the top of the mountain. Deer saw the fire and swam to it. So did Elk, Black Bear, Gray Squirrel, Jack Rabbit, and Ground Squirrel . . . All the animal people stayed on top of Mount Shasta until the great flood was over. At last the water went down, leaving dry land in the midst of lakes and marshes. Then the animal people came down and made new homes for themselves. They scattered everywhere and became the ancestors of all the animal people on the earth.⁶

Mount Shasta rises over 3 kilometers above its foothills, so if we are to take this myth literally, the glacial floodwaters must have had enough force to rise to a height of several kilometers. Since Mount Shasta is a volcano with an active history, Coyote's signal fire may be a reference to an eruption occurring at that time.

There are numerous flood myths from the Pacific Northwest that tell of survivors taking refuge on other volcanic peaks in the Cascade range, such as Mount Jefferson in Oregon and Mount Rainier and Mount Baker in Washington (see figure 9.1). The Indians of Oregon tell the following story about Mount Jefferson, the second highest peak in Oregon (height: 3 kilometers):

A great flood covered the land. Then the waters flowed away, and the land became dry again. A second time a flood covered the land, and a second time the waters went away. Afraid that another and greater flood might come, the people cut the biggest cedar they could find and made the biggest canoe any of them had ever seen.

When they saw the flood coming the third time, they chose the bravest and finest of their young men and the fairest and choicest of their maidens. They put the young people in the canoe, with enough food for them for many days. Then a flood bigger and deeper than any before swallowed all the land and the people.

For many days and many nights rain fell, and the canoe floated over the water. Once the dark clouds opened up and the young men and young women saw blue sky, but the clouds closed again. A second time the dark clouds opened, and they saw blue sky. But again the dark clouds closed. When the clouds opened a third time, the people saw dry land. The men paddled the canoe toward it.

This time the clouds stayed open. The rain stopped. The flood waters went down, and the canoe rested on the top of the peak now called Mount Jefferson. When the valleys were dry again, the people left the canoe and made their new home at the foot of the mountain. All the Indians are their grandchildren and their grandchildren's grandchildren.⁷

Mount Rainier, the highest peak in the Cascade range, towers about 4 kilometers above sea level. It was known to the Indians of that region as Takhoma, and was considered to be the home of the Great Spirit. One legend relates that long, long ago the Great Spirit became very angry with the people and the animals of the world because they were mistreating each other. He decided that he would rid the Earth of all of them, except for the good animals and one good man and his family. He instructed the good man to shoot an arrow into a cloud hanging low over Takhoma, and to keep shooting arrows so that one would stick into the tail of the previous one to form a long rope of arrows reaching down to the ground. He then told the man to take his wife and children and climb the rope and to tell the animals to follow them. The myth continues:

When the Great Spirit saw that the good animals and the good people were safe around him, he caused a heavy rain to fall. It rained and rained and rained for many days and many nights. All the earth was under water. The water rose higher and higher on the sides of

Takhoma. At last it came up to the snow line, up to the high place where the snow leaves off in the summertime.

By that time all the bad people and all the bad animals were drowned. So the Great Spirit commanded the rain to stop. He and the good man and his family watched the waters slowly go down. The land became dry again . . . So they all climbed out of the cloud, and the good man led them down a mountain trail to the place where they were to build a new lodge . . . [T]hey found no bad animals or snakes, and there have been none on Takhoma to this day.⁸

The incessant rains, of which these and other flood legends speak, could have accompanied the southward-advancing floodwaters as warm humid air came in contact with the ice cold glacial waters.

The Squamish, who lived northwest of Mount Baker in British Columbia, have the following flood story:

When the Squamish people saw the great flood coming, they gathered on a spot above the reach of the water. There they held a big council. To save their tribe from destruction, they decided to build a giant canoe and tie it to a giant rock. Day and night the men worked, building a boat larger than any of them had ever seen.

The women made the rope for fastening it to the rock. They gathered cedar fiber, tore it into shreds, rolled it and chewed it and worked it into a larger rope than any of them had ever seen. Then they oiled it.

The people fastened one end of the giant rope to the giant canoe, and the other end to a huge rock. Then they put into the canoe every baby and every small child. They placed enough food and fresh water in the boat to last for many days.

Then they chose two guardians for the children—the mother of the youngest baby in the camp, and the bravest and best of their young men. They placed him in the stern of the canoe and seated the young mother, a girl of sixteen, with her baby, only two weeks old, in the bow. No one else tried to get into the boat. No one wailed or wept as

the water reached the hilltop where they had gathered. No one wept as the canoe floated away. The people left behind sank beneath the flood.

For days the children and their young guardians saw only a world of water and sky. But the rope held. One morning they saw, far to the south, a speck on top of the water. When the sun reached the middle of the sky, the speck was a big spot. By the time the sun reached the water, the spot was still larger.

When the moon came up, the man thought he saw a piece of land. All night he watched it. In the morning, when the sun came out of the water, the young man saw a mountain—Mount Baker it is called now. He cut the rope and paddled toward the south. By the time the canoe reached the mountain, the upper half of the peak was dry.

On the mountain the guardians helped the children out of the boat. When the waters had gone down and the land below was dry, they made a new camp. They built their lodges . . . The children lived and grew up. Through them the Squamish people were saved.⁹

The Skokomish Indians tell of a flood that inundated the Olympic Mountains west of Puget Sound.¹⁰ Their ancestors secured their canoes to a nearby mountain by means of ropes that they had fashioned from cedar limbs. As the world got flooded, their canoes floated higher and higher into the Olympic Mountains, until the Olympics became entirely flooded. Like the story told by the Squamish Indians from near Mount Baker, these could be actual accounts of valiant attempts made by our prehistoric ancestors to survive one of the most devastating natural catastrophes to occur in the history of the human race.

The Cowichan Indians of Vancouver Island in British Columbia have a flood legend, similar in many respects to the biblical legend:

The people who populated the earth long ago had wise men who could foretell the future. One time all the wise men were disturbed by recurring dreams which seemed to predict the destruction of the people. Greatly troubled by this, they shared their dreams with one another. One of them said, “I dreamed that so much rain fell that we were all drowned.” Another said, “I dreamed that the river rose and

flooded the place and that we were all destroyed.” The other two had similar dreams.

Unable to understand what these dreams meant, they called a council to decide what should be done. One of the speakers suggested that they should make a huge raft of many canoes tied together. Many agreed. But others laughed at him, believing that the dreams meant nothing. Those in agreement set to work to build the raft. After many months, it had been completed. It was set afloat in Cowichan Bay, connected by a huge rope made of cedar bark that was secured to a large stone residing on top of Mount Cowichan.

Not long after the work was completed, the rain began. The drops were as large as hailstones and so heavy that they killed babies. The rivers overflowed their banks, and all the valleys became covered with water. People who climbed up on Mount Cowichan to flee the waters, soon found it too to be under water.

When the rain began, the wise men and the people who had believed their warnings took their families and food on board the raft. Eventually the raft rose with the water. The people lived on the raft for many days, seeing nothing but each other and the great flood. Even the mountains had disappeared. Using cedar bark pails they bailed out the canoes which kept filling with the falling rain.

At last the rain stopped. Slowly the waters subsided and after a time the raft rested on the top of Mount Cowichan. Fortunately the cedar rope and stone anchor had held fast. From the top of the mountain the people watched the flood waters gradually disappear. When all had subsided a vast wasteland met their eyes. All their homes were gone. The valleys, once covered by a green forest, were brown with mud and fallen trees. Both sad and glad, they returned to the places where they had lived. There they began to rebuild their village and begin life over again. Their numbers multiplied, and once again they populated the earth.[11](#)

Even though some of these Indian legends are strikingly similar to the biblical story of Noah and the Flood, they did not originate from missionary teachings, but rather have roots in ancient religious ceremonies practiced

before the Indians had any contact with the white man. These various accounts together tell of a vast and deadly flood that stretched over 1000 kilometers from Mount Baker and Vancouver Island in the north to Mount Shasta in the south, inundating the entire Cascade range. These stories portray a flood that occurred on a scope much larger than present-day geologists have dared imagine.

Geologists have determined that around the beginning of the Bölling, 14,650±200 years B.P. (or 13,000±300 carbon-14 years B.P.), an immense flood (or series of floods) poured through the mountain gap at Spokane Falls, swept through eastern Washington, and continued westward through the Columbia River Gorge, finally to drain off into the Pacific. This has variously become known as the Scabland Flood or Missoula Flood. Scientists have concluded that it was produced by the sudden emptying of Lake Missoula, a large body of water that existed during the period of deglaciation and once stretched from western Montana to Spokane Falls in eastern Washington bordering a southern lobe of the Cordilleran ice sheet. The floodwaters are estimated to have reached depths of 100 meters and flow velocities as high as 110 kilometers per hour, with total discharge rates as high as 21 million cubic meters per second (1800 cubic kilometers per day).¹² The waters had sufficient force to carve out salient topographic features in the eastern Washington landscape, producing gravel bars 30 meters in height, prow-shaped streamlined hills of flood sediment, and channels cut deep into the basalt rock. Because of its strange topography, this region has become known as the Channeled Scabland. The flood also contributed to the erosion of the Columbia Gorge, where water has cut vertically down through hundreds of meters of basalt rock leaving cliffs and spires on either side of the gorge.

The Spokane Indians of eastern Washington have an ancient legend that provides valuable insights about the nature of the Missoula Flood. It goes as follows:

A long time ago the country around where Spokane Falls are now, and for many days' journey east of it, was a large and beautiful lake. In the lake were many islands and on its shores were many villages with many people. The Indians were well fed and happy, for there were

plenty of fish in the lake and plenty of deer and elk in the country around it.[13](#)

The legend must be speaking of Lake Missoula. As this lake disappeared shortly after the ice age ended, we are led to conclude that this story dates from a very early prehistoric time. The legend then tells of how this peaceful scene was one day interrupted by a great flood:

One summer morning the people were startled by a rumbling and a shaking of the earth. The waters of the lake rose. Soon the waves became mountains of water that broke with fury against the shore.

Then the sun was blotted out, and darkness covered the land and the water. Terrified, the people ran to the hills to get away from the pounding water. For two days the earth rumbled and quaked. Then a rain of ashes began to fall. It fell for several weeks.[14](#)

It is significant that the legend reports the flood occurring during the summer, for in that season meltwater would have been discharging from the ice sheet at a peak rate. Also at that time, there would have been a great risk that an ice dam could fail. The sudden darkness and falling ash described in the legend probably refer to the Mount St. Helens volcanic eruption that occurred shortly after the flood. Geologists have found that ash from this eruption immediately overlies the flood deposits, forming what is called the Set S pumice layer. Quite possibly, the flood waters triggered this eruption as they passed near Mount St. Helens on their way through the Columbia Gorge. The legend then concludes:

At last the ashes stopped falling, the waters of the lake became quiet, and the Indians came down from the hills. But soon the lake began to disappear. Dry land rose where the water had been. Many people died, for there was nothing to eat. The game animals had run away when the people fled to the hills, and no one dared go out on the lake to fish.

Some of the water was flowing westward from the lake that remained. The people followed it until they came to a waterfall. Soon they saw salmon coming up the new river from the big river west of

them. So they built a village beside the waterfall in the new river and made it their home.¹⁵

As the ice sheet melted and receded, Lake Missoula began to shrink and disappear, just as the legend states. The “lake that remained” is today known as Lake Coeur d’Alene; the “new river” is known as the Spokane River; and the “big river” to the west is most probably the Columbia River.

The Missoula Flood may also have inspired the tale told by the Yakima Indians, who live in south-central Washington.¹⁶ According to their story, the good among their ancestors were warned of the coming flood from the land of the spirits and were able to survive in a large canoe made from a hollowed-out cedar tree. The flood is said to have filled the valleys and covered the hills and the mountains. When the floodwaters receded, the canoe is said to have come to rest on the Toppenish Ridge, where it can still be seen today.

Geologists have presumed that the Missoula Flood resulted from the failure of a dam of ice debris that once blocked the exit of Lake Missoula. Nevertheless, the sudden discharge of the lake could also have been caused by the arrival of a glacier wave. In fact, a flood legend handed down by the Flathead Indians from northwestern Montana suggests that Lake Missoula, indeed, was inundated by a flood of water that came down from the north—that is, from the ice sheet surface. The legend concerns Flathead Lake, a lake that once formed the northern extremity of iceage Lake Missoula. The legend states:

The great water first came to the valley where Flathead Lake has remained until this day. The flood grew bigger and bigger spreading over all the lower lands [to the south]. Most of the people were drowned in the valleys, but others fled to the highest mountain. As they climbed the water followed them. At last all the land was covered except for the solitary peak where a few Indians had gone for refuge.¹⁷

The legend explains that their chief then tried to stop the advancing water by shooting arrows into the ground at the water’s edge. His third

arrow finally succeeded in stopping the rising waters. As the water gradually went down, the tops of mountains appeared, then hills, and finally valleys. The floodwaters that remained formed Flathead Lake.

A catastrophic flood also affected regions farther south. The Nez Percé Indians of central Idaho have a flood myth that may be a remembrance of this event. They say that their ancestors took refuge on Steptoe Butte, a mountain known to them as Yamustus, which means “holy mountain.” There is also a flood story about the people who once lived along the Clearwater River in southern Idaho. The legend claims they saved themselves by climbing a high mountain to the east. Those who did not reach the top were drowned.

Through the ages Indian tribes have venerated the locations where their ancestors took refuge from the flood, much the same way that the ancient Israelites honored Mount Ararat. Other sacred Indian flood refuges are the Cerro Naztarny on the Rio Grande, the peak of Old Zuni in New Mexico, the summit of Colhuacan on the Pacific Coast, Mount Apoala in Upper Misteca, Mount Neba in the province of Guaymi, and a Caddoe Indian site at the headwaters of the Red River in northeastern Louisiana.¹⁸

Some of the earthen pyramid mounds scattered around the world may have been built as memorials to these prehistoric events. For example, one legend told by Indians from the Cholula region of Mexico describes how one of the survivors of the deluge, named Xelhua, built a pyramid to memorialize the mountain that had sheltered his race from the raging waters:

At the time of the cataclysm, the country . . . was inhabited by giants. Some of these perished utterly; others were changed into fishes; while seven brothers of them found safety by closing themselves into certain caves in a mountain called Tlaloc. When the waters were assuaged, one of the giants, Zelhua, surnamed the Architect, went to Cholula and began to build an artificial mountain, as a monument and a memorial of the Tlaloc that had sheltered him and his when the angry waters swept through all the land. The bricks were made in Tlamanalco, at the foot of the Sierra de Cocotl, and passed to Cholula from hand to hand along a file of men—whence these came is not said—stretching

between the two places. Then were the jealousy and the anger of the gods aroused, as the huge pyramid rose slowly up, threatening to reach the clouds and the great heaven itself; and the gods launched their fire upon the builders and slew many, so that the work was stopped. But the half-finished structure, afterward dedicated by the Cholultecs to Quetzalcoatl, still remains to show how well Xelhua, the giant, deserved his surname of the Architect.¹⁹

One legend told by the Indians of the Lake Tahoe region of the Sierra Nevadas refers to a “great tower” that was erected by slave labor to shelter a ruling tribe from the recurrence of the Deluge:

There was a time, they say, when their tribe possessed the whole earth, and were strong, numerous, and rich; but a day came in which a people rose up stronger than they, and defeated and enslaved them. Afterward the Great Spirit sent an immense wave across the continent from the sea, and this wave engulfed both the oppressors and the oppressed, all but a very small remnant. Then the taskmasters made the remaining people raise up a great temple so that they, of the ruling caste, should have a refuge in case of another flood, and on the top of this temple the masters worshipped a column of perpetual fire.

Half a moon had not elapsed, however, before the earth was again troubled, this time with strong convulsions and thunderings, upon which the masters took refuge in their great tower, closing the people out. The poor slaves fled to the Humboldt River, and getting into canoes paddled for life from the awful sight behind them. For the land was tossing like a troubled sea, and casting up fire, smoke, and ashes . . . The Sierra was mounded up from the bosom of the earth; while the place where the great fort stood sank, leaving only the dome on the top exposed above the waters of Lake Tahoe. The inmates of the temple-tower clung to this dome to save themselves from drowning; but the Great Spirit walked upon the waters in his wrath, and took the oppressors one by one like pebbles, and threw them far into the recesses of a great cavern . . . where the waters shut them in.²⁰

South American civilizations would also have been imperiled by glacier waves, although in this case the deluges would have issued from the South American Cordilleran ice sheet that once covered Chile, Argentina, and part of Bolivia. The Chane Indians of Bolivia say that one of their ancestors survived a great flood by finding refuge in an earthenware pot that was able to float. The Bógota Indians of Colombia also report a flood. They say that when it ebbed, Zuhe—a tall, bearded divine messenger—appeared from the east to teach the survivors how again to till their soil, weave clothes, and honor their gods.

Another South American legend tells of a herder who was warned by his llama that for five days the sea would cover the whole earth, destroying everything. Under the guidance of the llama, the Indian took food and journeyed to the top of a high mountain called Villcacoto. There he found so many animals and birds assembled that there was barely enough room for all. The sea then began to rise, filling the valleys and covering all the hills except for Villcacoto. After five days the waters receded, as the llama had predicted.²¹ Andean lore pictures the llama in the Milky Way being chased by a fox, both identified with large dark clouds of cosmic dust situated in the Scorpius-Sagittarius region.

The Guarao Indians of Venezuela attribute the Flood to a torrential rain that continued for months without stopping.²² The waters flooded the forests and rose up over the tops of the trees. The water continued rising until it had even covered the tops of the hills. Only a few managed to stay above the water in their canoes. But as the rains continued to pour down, even the canoes sank, except for one. This contained a poor old man, his wife, their three daughters, and their daughters' husbands. They rowed with all their might, going around in circles. Finally they rowed toward what appeared to be the top of a tree. To their surprise, as they got closer they found it to be the top of a mountain. Upon disembarking, the family found that many animals had also taken refuge on the mountain peak—deer, cattle, rabbits, tapirs, and all kinds of game. They lived off the animals as long as the Flood endured and survived to eventually spawn the human race.

The Barasana Star Lore

The Barasana Indians preserve one of the most sophisticated and complex of all the South American cataclysm folklore. They even have an entire stellar cosmology based on it. The Barasana are a tribe of about 300 Colombian Indians who today live near the Brazilian border in the Vaupes River region of the northwestern Amazon. Through the generations they have preserved an elaborate star-constellation cosmology that accurately encodes important astronomical information concerning the global warming and flood catastrophes of the last ice age. They identify their constellations with various personages, animal forms, and artifacts, which are part of their oral mythology. The Barasana zodiac differs significantly from the astrological zodiac in that most of its constellations lie along the Milky Way, rather than along the ecliptic, the former being known to them as the Star Path and the latter as the Path of the Sun. The sky map in figure 9.2 shows the arrangement of their constellations in the heavens.²³

Table 9.1 lists the Star Path constellations along with their western stellar designations. The constellations are given in the order that the Barasana normally list them, which corresponds to the order in which the respective constellations become prominent in the sky from dusk to dawn. The Barasana begin their galactic zodiac with the Star Thing, their name for the Pleiades star cluster. As we shall see shortly, the Pleiades hold an honored place in their rituals. By beginning their zodiac with the Pleiades, the Barasana follow the same convention as the zodiac cryptogram that begins its message with the Taurus constellation. A line projected eastward from the Pleiades, parallel to the plane of the ecliptic, passes within five degrees of the Galactic anti-center (see figure 3.3). Consequently, the first Star Path constellation designates the direction of departure of the last superwave.

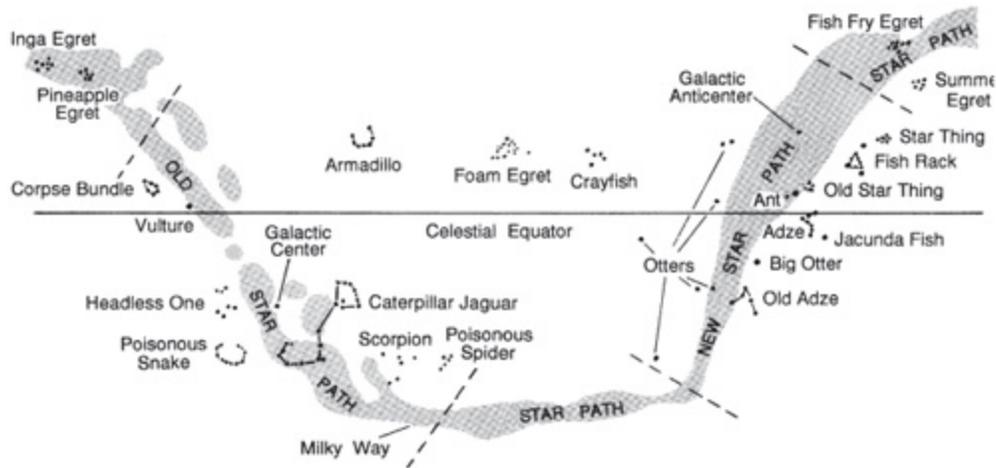


Figure 9.2. The Barasana zodiac (after Hugh-Jones, Annals New York Academy of Sciences, figure 1).

TABLE 9.1. THE BARASANA ZODIAC

A. The New Path (Galactic longitude $\ell = 160^\circ$–270°)	ℓ
1. The Star Thing [Star Woman] leader (Pleiades cluster, Taurus)	167°
2. The Small Umari Fruit Fence (the ν , κ , ω Tauri region)	174°
3. The Fish Smoking Rack (Hyades star cluster: face of Taurus)	178°
4. The Large Umari Fruit Fence (near π Tauri)	181°
5. The Old Star Thing (Orion's head: λ , ϕ_1 , ϕ_2 Orionis)	193°
6. The Leaf-Cutter Ant (red supergiant star Betelgeuse: α Orionis)	200°
7. The Adze (Orion's belt and sword)	208°
8. The Jacunda Fish (the blue supergiant star Rigel, β Orionis)	209°
9. The Big Otter (the star Sirius: α Canus Majori)	227°
10. The Old Adze (the δ , ϵ , η Canis Majori region)	240°
11. The Small Otters (various bright stars)	190°– 270°
12. [The Crayfish] ^{*35} (probably part of Leo)	190°– 270°
B. The Old Path (Galactic longitude $\ell = 310^\circ$–80°)	ℓ

13. The Poisonous Spider (stars in upper part of Centaurus)	310°– 315°
14. The Scorpion (Lupus)	330°
15. The Caterpillar Jaguar—leader (Scorpius)	350°
16. The Poisonous Snake (Corona Australis)	358°
17. The Headless One [the headless corpse of an eagle] (Sagittarius)	5°
18. The Vulture (the star Altair: α Aquila)	48°
19. The Corpse Bundle (Delphinus)	58°
20. [The Armadillo]* (Corona Borealis)	
C. Other Constellations (Galactic longitude $\ell = 80^\circ$–160°)	ℓ
21. [The Foam Egret]* (Coma Bernices)	
22. The Pineapple Egret (parts of Lacertae)	100°
23. The Fish Fry Egret (α Perseus and surrounding stars)	147°
24. The Summer Egret (β Perseus and surrounding stars)	149°
25. The Inga Fruit Egret (part of Casseopeia)	124°

The Star Path is divided into two segments: the New Path and the Old Path. The New Star Path constellations extend from 160° to 270° galactic longitude and mark out the Galaxy's outer spiral arm rim, whereas the Old Star Path constellations extend from 310° to 80° galactic longitude and mark out the Galaxy's central part. This demarcation of the Galaxy into an "old" central part and a "new" peripheral part is consistent with modern theories suggesting that the Galaxy was formed from the Galactic center outward as a result of matter being created in the core and explosively ejected along the Galaxy's equator. Consequently, the Galaxy's inner regions (the Old Star Path) would contain the oldest stars and the more newly formed spiral arms (the New Star Path) would contain a much younger population of stars.

The proximity of the Old Star Path constellations to the Galactic center may be seen in figure 9.3, which plots radio intensity contours for the galactic radio background emission. As described in the next chapter, this radio emission is cosmic ray synchrotron radiation reaching us from the

14,200-year-B.P. superwave event horizon. This radiation reaches its peak intensity near the Galactic center.

Significantly, the Barasana have assigned pleasant connotations to the constellations of the New Star Path and distinctly unpleasant ones to the constellations of the Old Star Path. Those forming the New Path refer either to food (the Leaf-Cutter Ant, the Jacunda Fish), or to items involved in the production of food (the Large Umari Fruit Fence, the Fish Smoking Rack, and the Adze). Those forming the Old Path refer to death, illness, and unusual astronomical events, such as lunar eclipses. The anthropologist Stephen Hugh-Jones comments on this dichotomy as follows:

If the connotations of the New Path are positive, those of the Old Path are equally negative. The first four constellations, Spider, Scorpion, Snake, and Caterpillar Jaguar, are all poisonous creatures. (Many of the caterpillars of Amazonia cause skin irritations and some can cause serious illness.) In addition to being poisonous, such creatures are also believed to be the vehicles of attacks by sorcery. The next four, the Headless One, Corpse Bundle, Vulture, and Armadillo, are all linked with death, graves, and putrefaction and the myths about them all concern tales of sorcery. It should be added here that, at lunar eclipses, the moon is said to come down to earth in the form of an armadillo that digs up graves and devours the bones of the dead—near the Armadillo constellation are three stars in a line that are called the “Armadillo’s Bone.” The Old Path is described as old, worn-out, and decayed and its stars as “bad.”²⁴

Thus, the Barasana have preserved a cosmology that not only maps out the Galaxy, but also assigns deadly connotations to parts lying toward the Galactic center and positive, nourishing connotations to parts lying in the opposite direction. Such a polarized pattern would suggest that the people who originated this cosmology had the misfortune of enduring a galactic superwave event. If so, this Star Path cosmology would be of considerable antiquity, dating from around the end of the last ice age!^{*36}

The Barasana assign a special status to the Star Thing and to the Caterpillar Jaguar, referring to them as the “leaders” of their respective star

paths. The other constellations are described as their “companions.” The Star Thing, the leader of the New Star Path, is regarded as the most important constellation of the Barasana zodiac. It represents the Woman Shaman, Romi Kumu, the creatress and controller of the seasons. It happens to be positioned relatively close to the Galactic anti-center. The Caterpillar Jaguar, the leader of the Old Star Path, on the other hand, is positioned quite close to the Galactic center. In fact, it is composed of the very same stars that form the Scorpius constellation in the astrological zodiac. Just as the ecliptic zodiac of astrology emphasizes the Galactic center-anticenter axis by attaching special significance to Scorpius and Taurus as being fixed signs, or cardinal points in the heavens, so the Barasana zodiac emphasizes this same important axis by making the Caterpillar Jaguar and Star Thing the leaders of their respective Star Path sectors.^{[*37](#)}

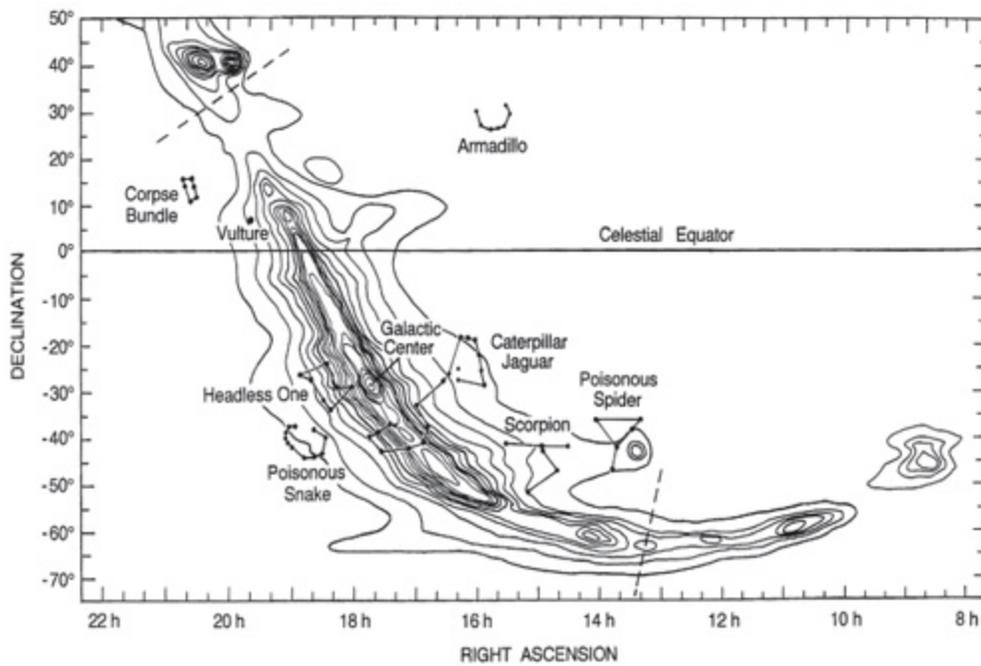


Figure 9.3. A contour map of the galactic radio background emission with the constellations of the Old Star Path superimposed for comparison. (Radio map after Piddington and Trent, Australian Journal of Physics.)

According to Hugh-Jones, the Caterpillar Jaguar is sometimes described as a jaguar having a snake for a tail and other times spoken of as a snake having “jaguar” only for a name. It is considered the “father of caterpillars” and is responsible for their proliferation. Although caterpillars are a source

of food for the Barasana, they are also regarded as dangerous creatures who send sickness and death to human beings. They are also associated with severe weather (storms, thunder, and lightning) and are regarded as manifestations of sorcery. The Caterpillar Jaguar is also considered the “father of snakes,” and is responsible for their creation. As a snake, this constellation is identified with large nonpoisonous constrictors and with mythical snake figures that were their predecessors. In many parts of Amazonia, this constellation is known as Boiassu, the Great Serpent.

Occidental star lores also associate this part of the sky with snakes, as represented in the constellation of Serpens (the Serpent) and Ophiucus (the Serpent Bearer), whose right foot points toward the Galactic center and whose left foot points toward the Scorpion’s Heart. Scorpio also has snake connotations in that it is associated with the genitals, which, according to Eastern yogic traditions, are the seat of the kundalini, or “snake power.”

Like Scorpio, the Caterpillar Jaguar is associated with procreation and regeneration, possibly a reference to the matter-energy creation aspect of the Galactic core. This procreation metaphor is portrayed by the pair of stars near Zeta Scorpii, which are identified alternately as the “eggs of the snake” and the “Jaguar’s testicles.” As the leader of the Old Path constellations, the Caterpillar Jaguar serves as the hub or “father” of all the Old Path’s negative traits, which he pours forth. Consequently, as with Scorpio in astrology, this constellation connotes procreation of a deadly sort, one that releases great quantities of snakes and poisonous caterpillars to plague the human race.

The Corpse Bundle, the last constellation of the Old Path sequence, lies along the galactic equator at longitude 58° , quite close to the galactic one-radian point. The Barasana regard this constellation as the body of a twice-killed Star Woman. As the legend goes, she was killed by a swarm of wasps, sometimes identified with the Star Thing. She then fell to Earth, came back to life, married a mortal, and returned to the sky with her mate. But then the Star Woman was killed a second time, this time by a star in the form of a snake. If this refers to the Poisonous Snake constellation, which lies at longitude 2° near the Galactic center, the myth appears to be associating a catastrophe experienced on Earth with the Galactic center, which lies at a distance of one radian from us.

The Barasana preserve several myths concerning ancient cataclysms. One describes a long period of darkness that once fell upon the world after a container had been carelessly opened:

The sun stayed high in the sky all the time and there was no night. The *Ayawa* [Thunders] complained that there was no beginning and no end to their day and that their life was not ordered and regular. Especially important to them was the fact that there was no established routine for picking, processing and eating of coca.

They went to Night House where Day Father and Night Father lived. They stayed in his house . . .

They decided to ask Night Father for night. They said to him, "Mother's son, give us night." He gave them a box telling them not to open it without first carrying out the appropriate blowing.

They went home and after blowing spells on the box, they opened it. A resin-like substance fell out and covered their bodies with sores. They were angry with Night Father saying that they had asked for night, not sores.

They went back to Night House and asked once again for night. Night Father gave them a pot and told them not to let the women see it. He told them also that they must blow spells against the night animals and against the illness of women, the latter because they would sleep with the women at night. He also warned them not to open the pot until they got back to their house.

They were very suspicious of the pot, thinking that it too would contain sores. When they reached the edge of their manioc garden they decided to open the pot and see what was inside. As they opened it, the lid flew off and covered the eyes of the sun. Everything became pitch black with heavy rain falling and wind whistling through the trees. The rivers rose and flooded the land and the *Ayawa* were very frightened. The night was very long.

Finally, *Kanea*, the youngest [of the *Ayawa*] went up into the sky and, using his powers as a shaman, found dawn. [25](#)

The Popul Vuh of the Maya also describes a thick resin falling from the heavens and bringing darkness. The resin and the pot lid covering the sun could be references to the cosmic dust that long ago invaded the solar system and blotted out the Sun's light. The wind, rain, and floods described in the myth may be the climatic effects that resulted from it.

The Barasana reenact this legend in a sacred ritual that is the most important of the tribe's entire ritual cycle. The ceremony begins at dusk at a time of the year when the Pleiades are setting and Scorpius (the Galactic center) is rising. It is a memorial ceremony performed in remembrance of Barasana ancestors who were drowned as a result of this tragic cosmic event that once befell the human race. The ritual is held within He House, an edifice that symbolizes the cosmic domicile of the mythic He people. Hugh-Jones describes the ceremony:

During the rite, the participants chant together continually, asserting that they are at one with their ancestors and doing what their ancestors have always done. They take hallucinogenic drugs that alter their perceptions of space and time and give direct access to the world portrayed in myth. The house, built as a replica of the cosmos, becomes the universe itself and the cycle of night and day takes on the proportions of the year. At the same time, the layers of the cosmos are conjoined and the living are united with the dead. Sacred instruments representing the bones of the ancestors are taken from their hiding places at the bottoms of rivers and brought up to the house. There they are assembled and given life and voice by the men who play them. In mythic terms, these instruments come from the underworld and are brought to life on earth . . . the Barasana believe that if this rite were not held regularly, the universe would come to an end.²⁶

The mythical pot that contained darkness is represented in the ritual by a gourd made of beeswax. It is one of the ritual's most important "instruments of darkness." The Barasana identify the gourd with the vagina of Romi Kumu, the Woman Shaman, and its contents with the poisonous menstrual blood she exudes. They also identify the gourd with the Pleiades, which they consider to be a nocturnal counterpart of the Sun. Both the

Pleiades and Romi Kumu are, in turn, associated with fire and flood as well as light and darkness. The Barasana believe that if the wax gourd was ever to be broken, a long night and catastrophic flood would ensue.

During the ritual in He House, the He people burn beeswax, symbolically releasing clouds of *werea* bees—honey smoke. The Barasana also burn beeswax at solar and lunar eclipses and when the Moon turns red and “dies.” Solar eclipses, especially, have negative connotations, as they are believed to cause epidemics.^{27, 28} The smoke of the burning beeswax, which represents the vast clouds that bring darkness, appears to signify the cosmic dust that long ago invaded the solar system and occluded the Sun, Moon, and stars.

At the midnight climax of the ritual, two men play sacred flutes up and down the east–west axis of the house. They are dressed in costume to represent the two sons of the Primal Sun. One myth relates that the two had a quarrel about who should be brighter and more dominant; than the other. One threatened to use his heat to burn up the world; the other (our present Sun) promised to ensure fertility by creating a regular alternation of wet and dry seasons.

Romi Kumu, who is involved in the darkness ritual through her association with the beeswax gourd, is also said to be the perpetrator of the universal conflagration and deluge. The myth describes these catastrophes:

In the beginning the world was made entirely of rock and there was no life. *Romi Kumu*, Woman Shaman, took some clay and made a cassava griddle. She made three pot-supports and rested the griddle upon them. The supports were mountains holding up the griddle, the sky. She lived on top of the griddle.

She lit a fire under the griddle. The heat from the fire was so intense that the supports cracked and the griddle fell down on the earth below, displacing it downward so that it became the Underworld; the griddle became this earth. She then made another griddle which is the layer above this earth, the sky.

She made a door in the edge of the earth, the Water Door, in the east. There was lots of water outside and when she opened the door the water came in and flooded the earth.

. . . The people made canoes to escape the flood but only those in a canoe made from the kahuu tree survived. Everyone else and all the animals were drowned.²⁹

Romi Kumu's association with the Pleiades at the Galactic anticenter suggests that the darkness, conflagration, and world-flooding events may be connected with the Galactic center, "pointed" out by her Old Star Path counterpart, the Caterpillar Jaguar. Moreover, the Barasana tradition of beginning the wax gourd ritual with the rising of Scorpius and culminating it at midnight when Scorpius is directly overhead, flanked by the ominous Old Star Path constellations, implicates the Galactic center as the prime cause of these catastrophes. In summary, the Barasana cosmology depicts in an ingenious manner the ominous nature of the Galactic center and its potentially dire consequences for the human race. Their tribe is to be commended for having preserved over so many thousands of years knowledge of this important phenomenon.

As already mentioned, the Caterpillar Jaguar constellation (Scorpius) has the form of a snake, and in many parts of Amazonia is known as the Great Serpent. Mayan cosmology also associates a cosmic serpent with ancient catastrophes. For example, the Mayan Codex Dresdensis manuscript depicts a serpentlike creature destroying the world by spewing water from the heavens (see figure 9.4). The serpent's body has the form of a celestial skyband that is segmented with symbols of constellations and signs of solar and lunar eclipses hanging from its belly. The black figure at the bottom represents Ek Chuah, the god of war. He holds two javelins and a staff, all pointing downward, and on his head perches the Moan bird of evil omen. Beneath the eclipse symbols the Old Woman Goddess, the patroness of death and destruction, holds an inverted bowl from which a flood also pours forth.

An account of this global cataclysm may be found in chapter 5 of the *Chilam Balams*, an unusual book conveyed in the Mayan language but written in Roman script. It reads:

This happened when the earth began to awake. Nobody knew what was to come. A fiery rain fell, ashes fell, rocks and trees crashed to the

ground. He [the Great Snake of the heavens] smashed trees and rocks asunder . . . And the Great Snake was torn from the sky . . . and skin and pieces of its bones fell onto the earth . . . and arrows struck orphans and old men, widowers and widows who were alive, yet did not have the strength to live. And they were buried on the sandy seashore. Then the waters rose in a terrible flood. And with the Great Snake the sky fell in and the dry land sank into the sea . . . [30](#)

The Mayan word *balam* means “jaguar” or “jaguar priest.” There is no indication that the sky serpent or snake of the Maya had any connection to the Galactic center, as did the Caterpillar Jaguar of the Barasana. Nevertheless, like the Barasana, the Maya (and Aztecs) clearly associated a global flood catastrophe with celestial events that once brought darkness to the heavens.

Archaeological Evidence for the Flood

Even today, glacier floods claim many lives. One example is the disaster that occurred in Armero, Colombia, on the night of November 13, 1985, in which as many as 21,000 lost their lives.^{[31](#)} The tragedy was triggered by an eruption of Nevado del Ruiz, the snow-capped northernmost volcano of the Andes. The eruption spewed mud and snow mixed with rock and hot ashes over several surrounding towns. The falling hot debris caused the volcano’s snow and ice pack to suddenly melt and produce a roaring avalanche of muddy water, which late that night swept down the mountain slope burying alive thousands of people in their homes.



Figure 9.4. Illustration from the Mayan Codex Dresdenensis showing the destruction of the world by water.

The flood at Armero, the worst disaster in Colombian history, pales in comparison to the deluges that swept over the continents at the close of the last ice age. Human remains occur only rarely in the terminal Pleistocene flood deposits, but bone caves exist that give credence to legends of catastrophic flood burial. Some of these sites are a cave at Choukoutien, near Peking, and Bishop's Cap Cave in the Organ Mountains of New Mexico, where human bones have been found chaotically deposited in strata containing the scattered remains of Pleistocene animals.³²

The most tangible evidence to date indicating that these ice-age floods destroyed prehistoric human settlements has been discovered at the Monte Verde archaeological site in southern Chile. It is located about 20 kilometers west of Puerto Montt on the bank of Chinchihuapi Creek, a stream that feeds into the Maulin River. The team of scientists who unearthed the site discovered the remains of twelve rectangular huts buried

under a layer of drift composed of soil and peatlike vegetable matter.³³ The huts each measured three to four meters square and were joined to one another by commonly shared walls in a manner reminiscent of modern row houses. Their foundations were constructed of small logs and roughly cut hardwood planks held in place by stakes driven into the ground. Their walls and roofs were made from sapling poles covered with animal hides. Radiocarbon dating of this site has established that it was buried between 14,500 and 14,200 calendar years B.P. (13,000–12,500 C-14 years B.P.).

All indications are that this antediluvian village was buried quickly by a flood of water, most probably of glacial origin. Organic materials found at the site—wood artifacts, animal-skin fragments, and assorted food remains—are relatively well preserved, indicating that they had been covered quickly by the overlying drift and protected from exposure to aerobic decay. For the dwellings to have been left in such a well-articulated state, the area must have been sheltered from the full force of the inundation.

At that earlier time, Monte Verde would have been situated close to the ocean shore and just 15 kilometers from the western edge of the Andes Cordilleran ice sheet (see figure 9.5). Geological studies indicate that the meltwater from the perimeter of the ice sheet drained westward into the Maulin River via a system of streams. Monte Verde was situated on the banks of one of these streams. Dating of the glacial deposits indicates that this ice sheet began to waste away rapidly and flood the surrounding territory beginning around 14,500±200 years B.P. (13,060±320 C-14 years B.P.), about the time when Monte Verde was settled.³⁴ This tremendous meltwater discharge left behind immense flood deposits called the Llanquihue Drift. The botanist Calvin Heusser and the geologist Richard Flint have noted the ubiquitous presence of this drift on Grande Chiloé Island, which lies about 60 kilometers southwest of Monte Verde.³⁵ The deposit almost completely covers the eastern part of the island and has been found at elevations of up to 350 meters on the island's western side, reminiscent of the high-altitude upland silts found in Alaska. The drift is composed of large volumes of outwash sand and gravel and covers an area that in one transect is nearly 100 kilometers wide and in places exceeds 100 meters in thickness. Heusser and Flint attribute the exceptional bulk of the

outwash to the piedmont character of the glaciation, implying that the enormous volumes of meltwater released during a period of climatic warming would have achieved considerable kinetic force.

The Alerce temperature profile, presented in figure 6.8d, shows how rapidly the climate was warming at that time in the Monte Verde area. The profile was produced by analyzing pollen species found in sediments cored from the Alerce peat bog about 25 kilometers northeast of Monte Verde. The record indicates that climate in this region began rapidly warming around 14,500 years B.P., about the same time that the ice sheets began their period of rapid wastage and reached an all-time high around 13,400 years B.P. As noted earlier, other parts of the planet had also begun to warm rapidly at this time, possibly the result of an overactive Sun. So, at the time when Monte Verde was inundated (14,500 to 14,200 years B.P.), temperatures in this region, as in the north, had begun to soar and the Andes ice sheet had begun to melt and discharge tremendous amounts of meltwater.

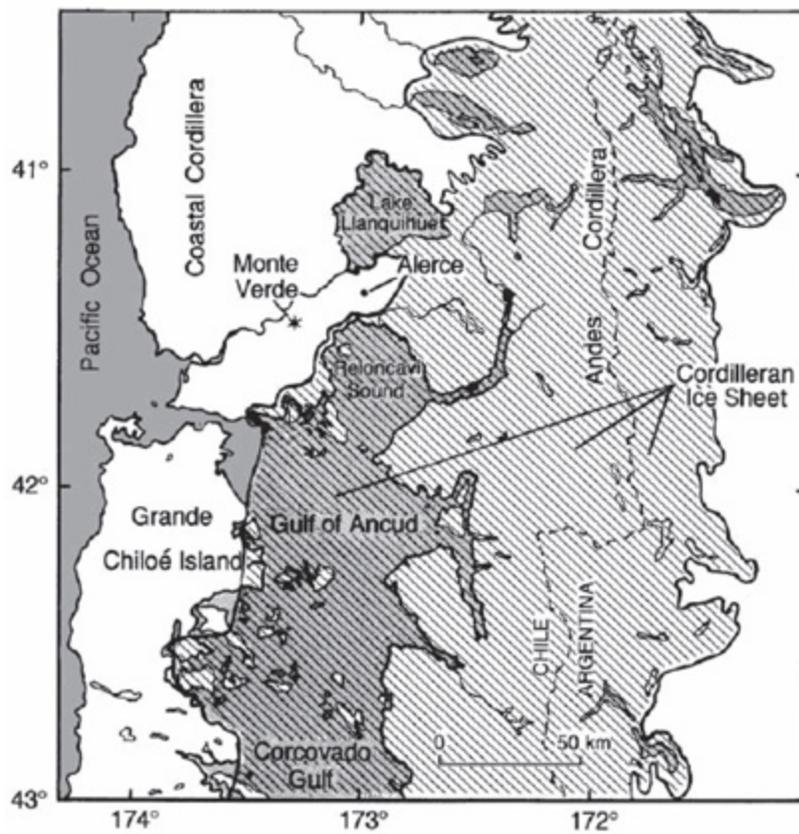


Figure 9.5. A map showing the extent of glacial coverage around 14,500 years B.P. (hatched region) in the vicinity of the southern Chile site of Monte Verde. (After Porter, Quaternary Research, figure 1.)

Although the Monte Verde excavation team suggested that the site was covered with deposits as a result of a shifting of the stream adjacent to the village settlement, the geologic evidence both at the site and in the surrounding regions compels a more dramatic end to this community. Monte Verde, like other endangered valley settlements, was destroyed by a glacier wave flood. Since a surge of meltwater released from this ice sheet had blanketed hundreds of kilometers with debris to heights of up to 350 meters, there seems to be no other choice but to conclude that Monte Verde succumbed to a sudden and tragic diluvial event.

Until now, excavations at Monte Verde have not turned up any human remains. Perhaps at the time of the disaster the villagers had fled from their settlement to higher ground. An account of this tragedy survives in a local myth. This relates that the Grande Chiloé Island and all its surrounding little islands were once part of the American continent. But one day the waters goddess, Water Snake, appeared and, obeying her commands, the waters began to rise and flood the valleys and hills, burying terrified inhabitants in the deepest parts of the sea. The land goddess, Land Snake, then appeared and began a long battle with Water Snake, raising lands and protecting inhabitants. Finally, Land Snake won, but only partially because although Water Snake was gone, the waters never returned to their original level, leaving the present archipelago.

TEN

TESTIMONY IN THE SKY



The Galactic Radio Background Emission

As many as two superwaves may already have left the Galactic center and be speeding toward our solar system, but there is no way that we can see them coming. Because a superwave travels outward from the Galactic center at essentially the speed of light, the radiation signaling its initial emergence from the Galactic core would arrive only minutes ahead of its cosmic rays. Once it arrives, a superwave's presence becomes quite a noticeable phenomenon in the heavens due to the light it beams toward us, as pointed out in chapter 3. However, once it has passed by, its presence is much less obvious. The forward-beamed synchrotron electromagnetic radiation, which was formerly being directed toward us by the approaching electrons, now would be directed away from us and hence would no longer be visible.

Although difficult to detect, superwaves that have long ago passed the Earth should nevertheless reveal some traces of their presence as their electrons interact with the magnetic fields of stars and nebulae encountered along the way. The magnetic fields in these regions would strip away some of a superwave's charged cosmic ray electrons and leave them spiraling in circular orbits. Whereas the synchrotron radiation from the large fraction of cosmic ray electrons that remained in the superwave would still be directed away from us and thus would be invisible to us, the beams from the captured spiraling electrons would periodically flash in our direction. At optical wavelengths, this diffuse synchrotron glow would be too dim to

discern against the backdrop of stars and nebulae, but at radio wavelengths it would easily stand out. It should be possible, then, to detect the presence of the receding super-wave shell by searching for this stray radio frequency emission. This radiation would be expected to be relatively diffuse. Also, we would expect it to be concentrated toward the galactic equator since, of all superwave cosmic rays, those directed outward along the dust-laden galactic plane would experience the greatest impediment, and hence would have the greatest chance of being captured into spiral orbits. In addition, one would expect that this radiation would appear most intense in the direction of the Galactic center, as in that direction we would be seeing radiation that the superwave emitted at a time when its cosmic rays were much closer to the Galactic core, and thus spatially much more concentrated.

Diffuse radio emission of this sort is, in fact, present and has become known as the *galactic radio background radiation*. Historically, it was the first phenomenon that radio astronomers came across in their study of the heavens. Although it comes from all parts of the sky, it is most evident along the galactic equator and rises to a maximum in the direction of the Galactic center just as the superwave hypothesis predicts (figure 10.1). Moreover, the observed emission has been determined to be synchrotron radiation produced by cosmic ray electrons.

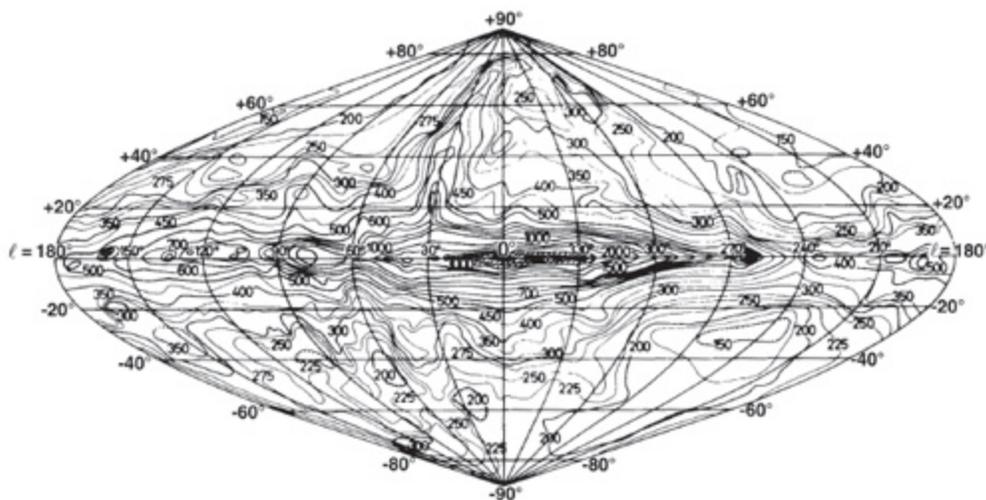


Figure 10.1. A contour map plotting the intensity of the galactic radio background radiation in galactic coordinates. (Landecker and Wielebinski, *Australian Journal of Physics*.)

Figure 10.2 shows how the radiation intensity coming from the 14,200-years-B.P. superwave event horizon would be expected to vary along the galactic equator (dashed line) and the intensity of the galactic radio background distribution actually observed (solid line).^{1, 2} As seen here, the general trend of the radio intensity profile closely matches the theoretical superwave prediction. The excess above the predicted amount is due to radio emission from other radio-emitting sources lying along the line of sight. The very high value seen within 8 degrees of the Galactic center may be attributed to synchrotron radiation coming from the galactic nucleus, the luminous, eyelike bulge seen in figure 2.6.

When astronomers first discovered the galactic radio background, which was many years before the superwave theory was proposed, they assumed this radiation was being produced by cosmic ray electrons magnetically trapped throughout the Galaxy's spiral arm disk. The radio emission present at high galactic latitudes above and below the galactic plane was presumed to be a stationary "radio halo" that surrounded the entire galaxy and, similarly, was supposed to consist of magnetically trapped cosmic rays. However, this model failed to predict the steep rise in radio emission intensity observed within 40 degrees of the Galactic center. It did not fit the observed radio distribution as well as did the superwave model.

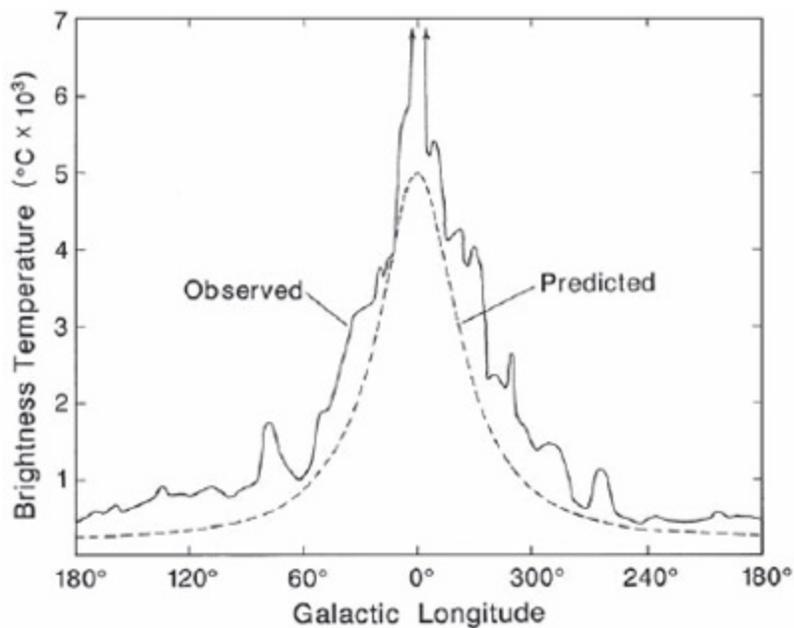


Figure 10.2. Solid line: The intensity of the galactic radio background radiation observed in a slice along the Galaxy's equator (after Price, *Astronomy and Astrophysics*, figure 1). Dashed line: The intensity expected along the event horizon of a superwave that would have passed us 14,200 years B.P.

How a superwave could explain the elevated radio intensity in the direction of the Galactic center can best be understood by considering the diagram in figure 10.3, which illustrates the present location of the superwave shell along the galactic plane. The circle labeled (a) shows the actual current location of a superwave front that would have passed the Earth around 14,200 years B.P. Since it takes approximately 23,000 years for the superwave to cover the distance between the Galactic center (GC) and Earth (E), this superwave would have originally left the Galactic center 37,200 years B.P. But because it takes time for radio waves from the superwave to reach us, we would see this event horizon not as a circle, but as an ellipse [see (b) in figure 10.3]. One focus of the ellipse would coincide with the Earth and the other with the Galactic center. The size and shape of the ellipse would be precisely determined by the amount of time that had elapsed from the date the superwave passed the Earth (see box on page 296). When looking at this elliptical horizon in the Galactic center direction, we would be seeing "older" radiation produced at a time when the superwave cosmic ray volley was about four times closer to the Galactic center and hence about 16 times more intense.

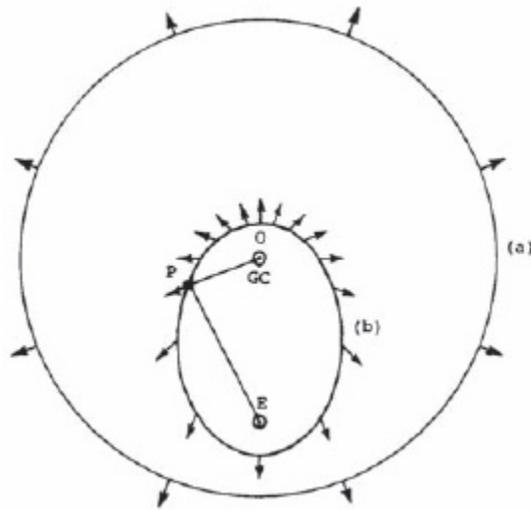


Figure 10.3. (a) The actual position of the superwave 14,200 years after having passed the Earth. (b) The superwave's position as it appears to an Earth observer, allowing time for the superwave's synchrotron radiation to reach Earth at the speed of light.

The Shape of the Superwave Event Horizon

For a volley of cosmic rays, emitted from the Galactic center 37,200 years B.P. and passing the Earth 14,200 years B.P., the following must be true. If t_1 represents the time taken for the superwave cosmic rays to travel at close to the speed of light from the Galactic center (GC) to an arbitrary point (P) on the cosmic ray front and if t_2 represents the time required for radiation generated at P to reach the Earth (E) at the speed of light, then regardless of the location of P on this front, the total time $t_1 + t_2$ must always equal 37,200 years. The locus of all points P on this front defines an ellipsoidal cosmic ray “event horizon” whose proximal focus is centered on the observer and whose distant focus is centered on the Galactic center. It will have an overall length $L = (23,000 + T)$ light-years and overall width $W = 2 [(L/2)^2 - 11,500^2]^{1/2}$ light-years, where T is the number of years that have elapsed since the time the superwave passed the Earth. In the Galactic center direction, we are seeing the superwave on the far side of the Galactic core at a time when it was just 7,100 light-years from the Galactic center and 30,100 light-years from Earth, whereas toward the Galactic anticenter, we are seeing the superwave when it was 30,100 light-years from the Galactic center and 7,100 light-years from Earth.

Gamma-ray observations made with the Energetic Gamma Ray Experiment Telescope (EGRET) orbiting on board NASA’s Compton Gamma Ray Observatory provide strong corroborating evidence for the existence of a superwave cosmic ray shell surrounding the Galaxy.³ The data announced in November 1997 indicates the presence of a diffuse gamma-ray glow or “halo” enveloping our entire Galaxy. Figure 10.4 is a computer-generated image of the EGRET data illustrating the excess high-energy gamma ray emission that surrounds the Milky Way for gamma rays ranging in energy from 30 Mev to about 20 Gev. Like the diffuse radio background emission (figure 10.1), it is more concentrated toward the galactic plane and toward the center of the Galaxy, as predicted by the galactic superwave model. Thus, the gamma-ray halo and the diffuse radio background radiation would both be produced by the same 14,200-years-B.P. superwave cosmic ray volley.

The EGRET observing team reported this discovery as an unexpected result, for they were unable to attribute the gamma-ray emission to discrete stellar sources scattered throughout the Galaxy. As their leading

explanation, they suggested that it is being produced by a diffuse volley of cosmic rays that originated from past activity of our Galaxy's core. This is exactly what the superwave theory had proposed *14 years before this discovery was made.*

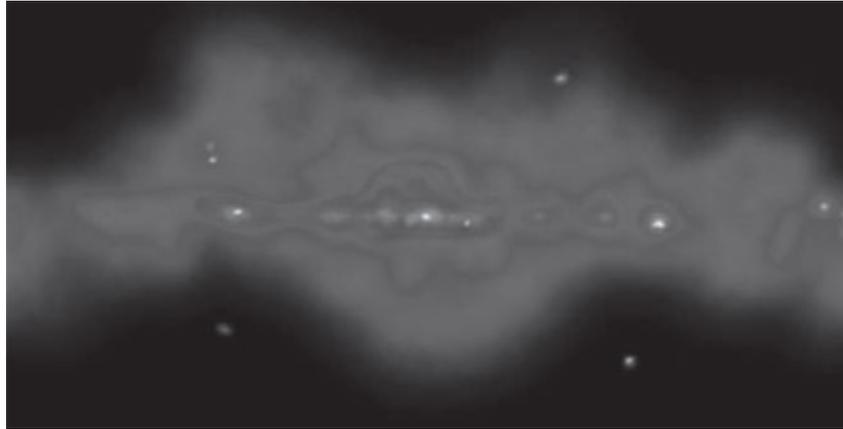


Figure 10.4. Computer-generated map of the Galaxy's gamma-ray halo. The outer gray region portrays the halo of gamma rays originating far off the galactic plane that cannot be accounted for by known celestial sources. The map excludes gamma rays that are predicted from the ordinary interaction of cosmic rays with light and matter in the Milky Way galaxy as well as those coming from a uniform gamma-ray "glow" that is thought to originate outside the Milky Way. The bright localized spots are discrete gamma-ray sources. (Courtesy of D. Dixon, D. Hartmann, E. Kolaczyk, and NASA.)

Supernova Remnant Signposts

As we have just seen, cosmic rays in the 14,200-years-B.P. superwave make themselves evident by the diffuse synchrotron radio emission they give off. In addition, their presence should become particularly evident wherever they happen to encounter the remnants of recent supernova explosions—that is, supernova remnants less than a few thousand years old. The hot, turbulent, magnetized plasma that is left expanding in the aftermath of such an explosion would form an impenetrable barrier that would trap a superwave's incident cosmic ray particles in tight orbits. These orbiting particles would beam synchrotron radiation in all directions, with a portion of this radiation being directed toward the Earth. Consequently, young supernova remnants lying immediately behind a superwave event horizon would be expected to appear as unusually luminous synchrotron radiation sources. Older remnants would be less visibly illuminated, since their

shells, being more distended and riddled with holes, would be relatively transparent to the incident superwave cosmic rays.

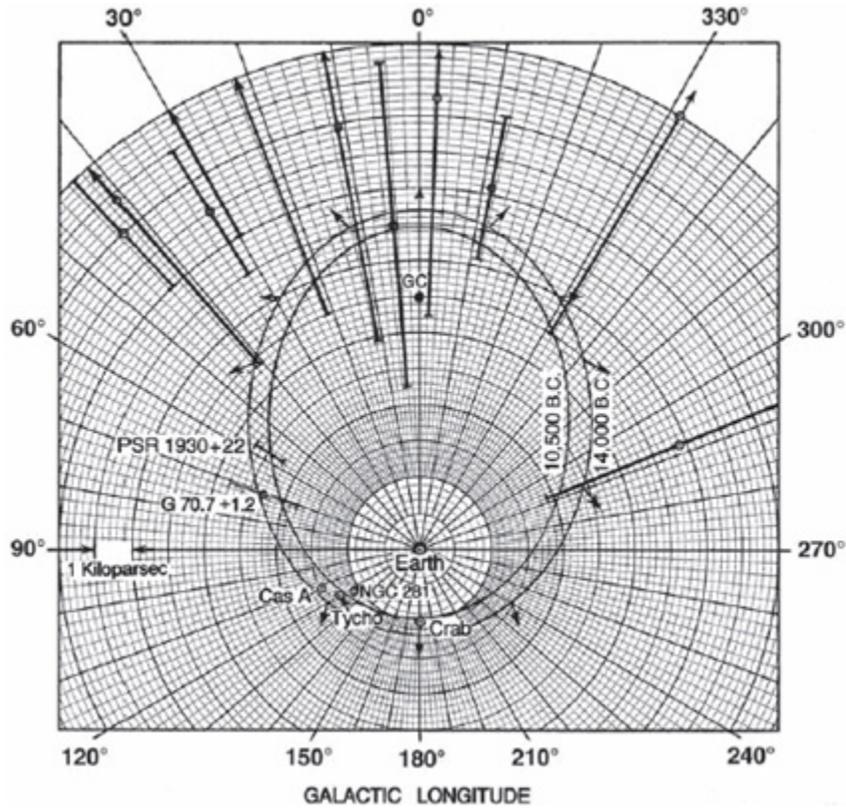


Figure 10.5. The outer and inner ellipses indicate the positions of the 14,000 and 10,500-B.C.E. event horizons. Cosmic ray intensity would have reached a maximum about midway between these boundaries. Sixteen supernova remnants observed to be the brightest radio frequency synchrotron-emitting remnants in the sky are plotted for comparison. The radial bars indicate the degree of uncertainty in their distances.

The superwave hypothesis leads us to conclude that young supernova remnants lying in the vicinity of the 14,200-years-B.P. superwave event horizon should be unusually intense synchrotron emitters. Such is found to be the case. Figure 10.5 plots the locations of 16 supernova remnants having the greatest radio surface brightness out of a sample of 125 young remnants.⁴ Here it can be seen that three of the sixteen, Cassiopeia A, the Crab Nebula, and the Tycho supernova remnant, lie close to this event horizon. The remaining thirteen, although their distances are not accurately known, appear to lie either near this event horizon or outside of it, where they might be encountering earlier superwave fronts. Few of these appear to lie in the region within the 12,500-years-B.P. event horizon ellipse, which

should presently have relatively low concentrations of galactic cosmic ray electrons. By comparison, when the remaining 109 low-and medium-brightness remnants are plotted (not shown in figure 10.5), a considerable fraction of these dimmer objects are found to lie within this inner low cosmic ray density region. Hence, the central portion of the ellipse is found to be relatively devoid of bright remnants, just as the superwave theory would predict.

The possibility that high-intensity cosmic ray electron fronts could travel out through the Galaxy from a source at the Galaxy's center is a new idea that was inspired by the zodiac's galactic explosion message. Consequently, astronomers had not previously seriously considered the notion that the cosmic ray electrons trapped in these remnants might have come from interstellar space. They presumed that the cosmic rays are spread relatively uniformly throughout the Galaxy and have an intensity about as low as levels currently observed in the vicinity of the solar system. Of course, such intensities would be far too low to produce the large quantities of synchrotron radio wave emission seen to come from these remnants. As an alternative, astronomers speculated that the cosmic rays producing this emission might have come from the original supernova explosion. However, this theory failed to account for the radio wave output from some of the more luminous remnants, such as Cassiopeia A and the Crab Nebula.

Cassiopeia A (Cas A) and the Crab Nebula remnants present the best evidence in favor of the superwave theory. Not only are their distances and ages better known than those of any of the 16 brightest supernova remnants, but also they happen to be the two brightest supernova remnants in the sky. Compared with the average brightness of the other 14 radio-bright supernova remnants, Cas A is 80 times brighter and the Crab Nebula about 17 times brighter. Both lie with high certainty just behind the 14,200-years-B.P. superwave event horizon, positioned between the two ellipses plotted in figure 10.5. Cas A, which lies about 9500 light-years away from our solar system, was produced by a supernova sighted by Western astronomers in 1680 A.D. The Crab remnant, which lies 6,585 light-years away, was produced by a supernova sighted by Chinese astronomers in 1054 A.D. and recorded as a Guest Star.

The Crab Nebula and Cas A both have been the focus of considerable attention by astronomers, since the profuse outpouring of synchrotron radiation coming from these remnants cannot be powered by the cosmic rays produced in the original supernova explosions, most of those particles having long ago escaped from their respective remnants, and those still remaining having exhausted most of their initial energy. Thus, some other energy source must be *continuously* supplying these remnants with fresh cosmic ray electrons. In the case of the Crab Nebula, astronomers have suggested that the electrons are being supplied by the Crab pulsar, a pulsating neutron star located near the nebula's center, or at least along our line of sight to its center (see figure 10.6).

However, the cosmic rays producing the radiation seen to come directly from the pulsar may not necessarily be the only ones energizing the Crab Nebula. This much may be gathered by comparing the pulsar's radiation spectrum to that of the nebula (see figure 10.7). Whereas both spectra have the same slope in the X-ray frequency region, their radiation intensities (flux densities) both decreasing with increasing frequency in a similar fashion, the slopes of the two spectra differ substantially in the radio and optical spectral regions. Most of the Crab Nebula's X-ray emission comes from a localized region lying within half a light-year of the pulsar; hence, much of it may be powered by the pulsar's cosmic ray wind. However, the nebula's radio and optical synchrotron emission comes from a much larger region measuring about 8 by 12 light-years in extent and which would mostly be produced by superwave cosmic rays striking the remnant face on.

If the nebula was being energized by an impacting superwave, then the central part of the nebula on the side facing us, the side receiving the brunt of the onslaught, would be expected to have the highest cosmic ray densities. The bow shock front formed on this upwind side would also tend to trap cosmic rays and increase their space densities in this central face-on region. As a result, emission from this central region would be expected to appear brighter from our vantage point. In fact, more synchrotron radiation is observed to come from the nebula's central part. Also the spectral line radiation coming from energized gas filaments is seen to be ten fold brighter in the central three-fourths of the nebula as compared with the nebula's periphery. Astronomers have found this puzzling since, if the

entire supernova shell were being uniformly energized by cosmic rays coming from a centrally located pulsar, the nebula's filamentary system should show no central brightening.

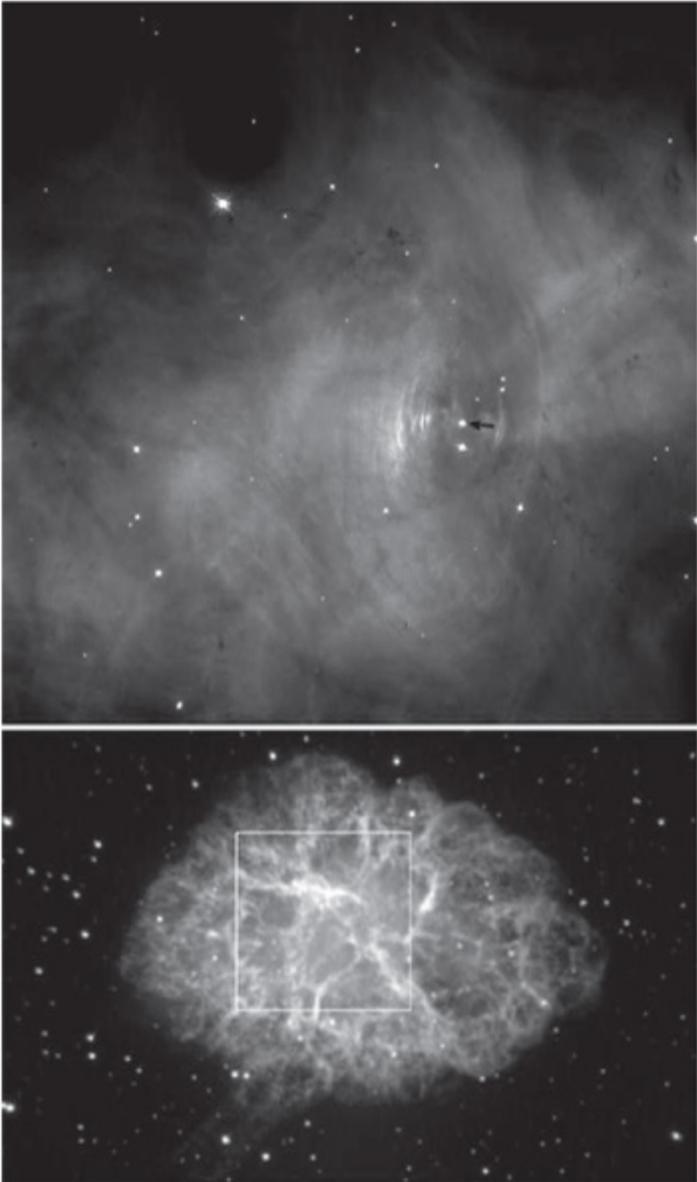


Figure 10.6. Left: The Crab Nebula taken with the Mt. Palomar telescope. Right: A space telescope close-up of the inner part of the nebula, the arrow showing the location of the Crab pulsar. (Courtesy of J. Hester, P. Scowen, and NASA.)

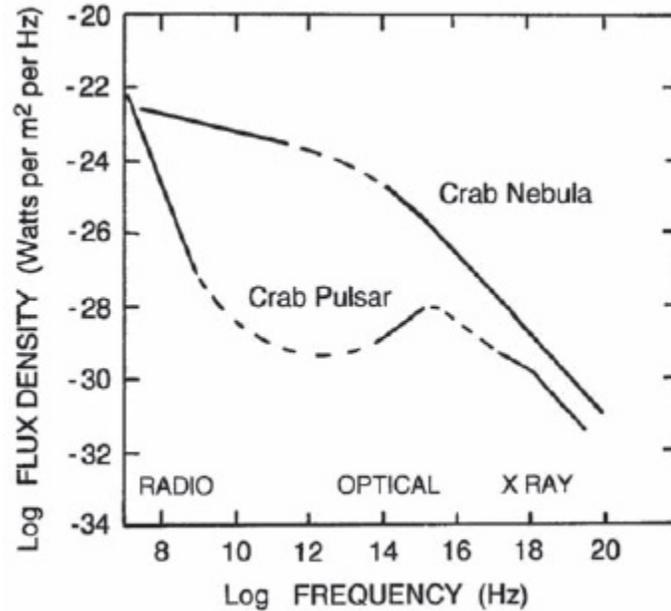


Figure 10.7. A comparison of the differential energy flux spectra from the Crab Nebula and Crab Pulsar. (After Erickson et al., *Astrophysical Journal*, figure 5.)

Let us turn now to the Cassiopeia A remnant located in the constellation of Cassiopeia. At radio wavelengths, it is the brightest and most luminous supernova remnant in the Galaxy. Unlike the Crab Nebula, which is located toward the Galactic anticenter direction, Cas A is located along the Milky Way equator about 68 degrees of arc from the Galactic anticenter (see figure 10.5). Cas A, then, is an ideal remnant in which to look for evidence of an impacting superwave. That is, from our point of view, the superwave would be approaching Cas A transversely to our line of sight.

Interestingly, the radio map of Cas A presented in figure 10.8 shows the remnant to be most luminous on its westward side (right side), which faces the Galactic center and would be receiving the full brunt of the superwave onslaught. Furthermore, the remnant is seen to be least luminous on its eastern side (left side), which is in the lee of this cosmic ray wind. A similarly skewed distribution in brightness is apparent in X-ray images of Cas A, such as the one shown in figure 10.9.

Like the Crab Nebula, Cassiopeia A requires a continuous input of cosmic rays to explain its enormous X-ray energy output, but no pulsar or neutron star has been found inside or near the remnant. Some astronomers have speculated that Cas A powers its emission by drawing on its own

kinetic energy. They suggest that the remnant's expanding shell forcefully plows into the surrounding interstellar gas medium and in so doing accelerates forefront electron ions to speed-of-light velocities. However, this theory has difficulty explaining why Cas A is so bright on its western side (right side), where little supernova remnant debris is present to do the plowing. The mystery is easily solved when it is recognized that the enhanced emission comes from the upwind side of the remnant that happens to face the Galactic center. It is from this side that superwave cosmic rays would be striking the sheath's impenetrable magnetized plasma.

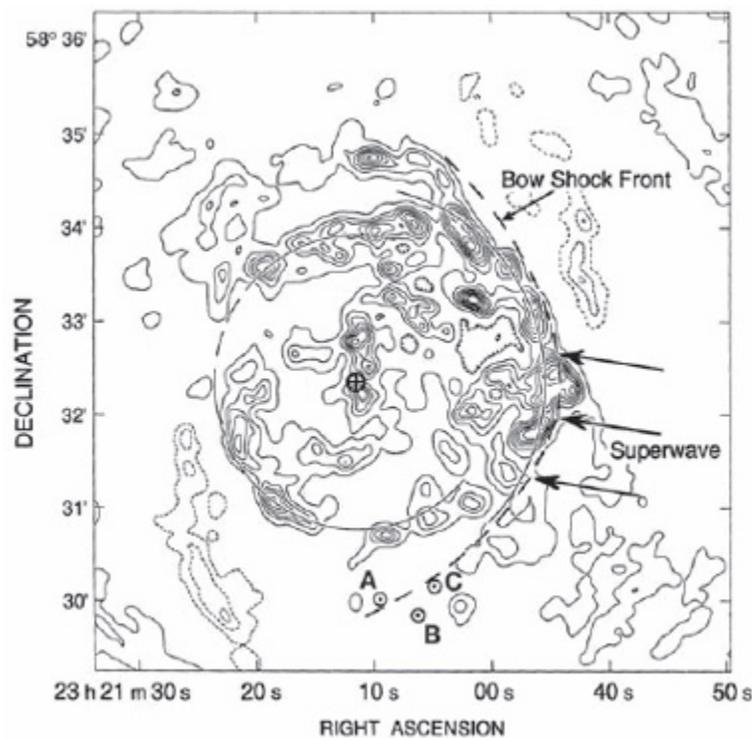


Figure 10.8. Radio contour map of Cassiopeia A made at a radio frequency of 2,695 megahertz (adapted from Dickel and Greisen, Astronomy and Astrophysics, figure 5). Each contour is equivalent to an antenna temperature of 1,200 Kelvin. The central cross represents the position of the supernova explosion center. The dashed arc traces the position of the bow shock front formed by the impacting superwave indicated by the arrows.

The superwave theory also explains why this emission region on the upwind side is displaced outward, giving the remnant a lopsided appearance. This is seen most clearly in figure 10.8. The central cross represents the site of the initial supernova explosion, as determined from the motion of the remnant's filaments. Centered on this point, a circular arc

has been drawn to illustrate the extent of the shell's outer rim. The westward emission peaks, however, are displaced farther to the right, as indicated by the second superimposed arc. This westward emission would be synchrotron radiation coming from super-wave cosmic rays that had become trapped in a bow-shaped shock front disposed several light-years ahead of the remnant's upwind side. This shock front would be similar to, but larger than, the bow front that the superwave would form around the solar system. Interstellar gases and magnetic fields compressed in this shock front region would efficiently trap the superwave's synchrotron-radiating cosmic rays, thus explaining the rightward displacement.

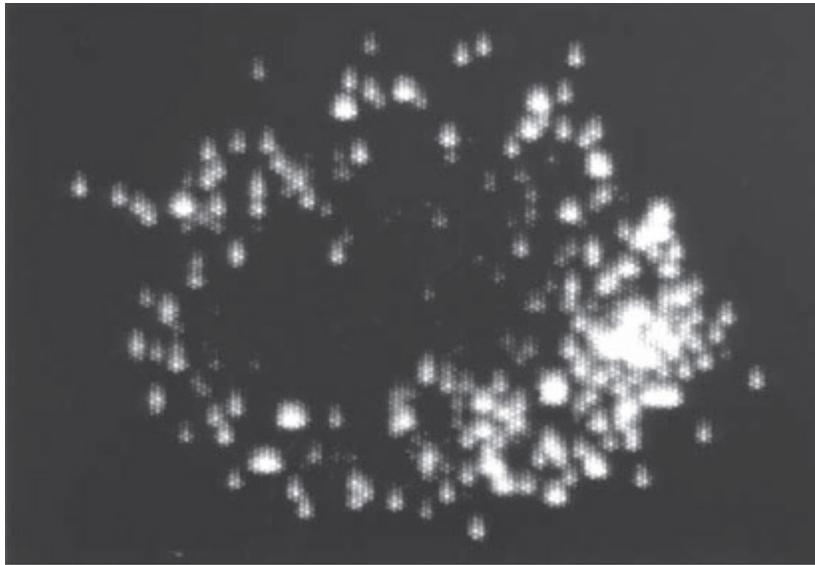


Figure 10.9. A map made with a satellite observatory showing the intensity of high-energy X-ray emission from Cassiopeia A. (Photo courtesy of S. Murray, Smithsonian Astrophysical Observatory.)

Unaware that a volley of Galactic cosmic rays might be impacting Cas A, radio astronomers originally speculated that the remnant is lopsided because it has expanded faster and moved out farther on its right side presumably because the interstellar medium presented less resistance on that side. But if it received less resistance to its expansion, that side of the remnant should also have accelerated fewer electrons and produced less synchrotron emission, which is contrary to observation. By comparison, the superwave theory offers a more natural and internally consistent explanation.

Impacting cosmic ray electrons could also account for the rapid movement of the “radio knots,” the localized regions of enhanced radio emission visible in figure 10.8. Radio images of this remnant made several years apart show that these knots move in random directions at speeds ranging from a few thousand to as high as 9000 kilometers per second (3 percent of the speed of light). Nothing like them has been observed in any other supernova remnant. If a time-lapse movie could be made of Cas A, these moving knots would make the remnant’s surface look like a pot of boiling porridge. This motion reveals the turbulent conditions induced in the bow shock front by the superwave volley.

Astronomers had also been puzzled as to the source of energy powering the three optically luminous gas filaments situated just south of the remnant, designated as A, B, and C in figure 10.8. In the case of the remnant’s other luminous gas filaments, which are moving at velocities of up to 8,500 kilometers per second, astronomers had supposed that the source of energy lay in the filaments’ own motion, their kinetic energy being converted to heat as they plowed through the interstellar medium. However, the three southern filaments lie outside of the remnant’s radio-emitting shell and remain essentially stationary, so motion cannot be the source of their energy. This mystery, like the others, is solved by realizing that they are being excited by impacting superwave cosmic rays. This would explain why the filaments happen to lie along the southern extension of the remnant’s bow shock front.

Before concluding this section, it is worth taking note of a few unusual radio sources that lie close to the 14,200-years-B.P. superwave event horizon, but which do not appear to be supernova remnants. One of these is G70.7+1.2, a 1.5-light-year-diameter radio-emitting shell that lies about 15,000 light-years away at galactic longitude 70.7° (see figure 10.5). Its surface is unusually bright, surpassed only by Cassiopeia A and the Crab Nebula. When this source was first discovered in 1984, its radio emission spectrum was found to be *nonthermal*, meaning that its radiation is produced by cosmic rays rather than by heated gas. Hence, the object was originally classified as a supernova remnant.⁵ However, in 1989 another group of astronomers questioned this supernova interpretation, noting that this radio-emitting shell shows no indication of high-velocity expansion of

the sort expected for a supernova remnant.⁶ They also found that the shell is centered on a heavily obscured star and is, in turn, surrounded by a dense cloud of molecular gas that would have been dispersed or disrupted if there had actually been a supernova explosion. They speculated that the radio shell was powered by a nova outburst from the central star. However, the problematic nature of that explanation left them to conclude that the physical nature of this source remained mysterious. The mystery, though, is easily solved by understanding that the star's radio shell is being struck by a volley of galactic cosmic rays associated with the proposed superwave.

Nebula NGC 281, located about 7000 light-years away at galactic longitude 123° , also lies close to the 14,200-years-B.P. event horizon. It, too, is centered on a star and emits a substantial amount of radio continuum radiation.⁷ Astronomers have found that the nebula's gases are ionized, except for an extensive tail of molecular hydrogen gas that trails to one side. Interestingly, this tail extends from the nebula on the side that is leeward to the approaching superwave wind.

Do Superwaves Trigger Supernovae?

Knowing the location, distance, and age of a supernova remnant, it is possible to determine which superwave event horizon was in its vicinity at the time the supernova progenitor star exploded. Proceeding in this fashion, the Crab Nebula supernova would have coincided with a superwave that passed us $14,000 \pm 60$ years B.P., the Cassiopeia A supernova with a superwave that passed us $14,670 \pm 500$ years B.P., and the Tycho supernova with a superwave that passed us $13,560 \pm 500$ years B.P. Given the respective uncertainties of these dates, it could be said that all three supernovae were detonated by the same superwave event horizon. An average of these dates suggests that this particularly intense superwave would have passed the Earth around $14,100 \pm 600$ years B.P. (table 10.1). Interestingly, the polar ice core beryllium-10 record indicates that the Earth's exposure to cosmic ray radiation peaked around 14,150 years B.P. (figure 3.8).

The theory that this Galactic superwave triggered supernova explosions finds further support when we consider the Vela XYZ remnant. Of all

medium-aged supernova remnants, Vela lies closest to Earth. It is located about 820 ± 100 light-years from Earth along galactic longitude $\ell = 264^\circ$ and has an estimated age of about $12,750 \pm 2,000$ years.⁸ This indicates that the Vela supernova coincided with the event horizon that passed the Earth around $13,600 \pm 2,000$ years B.P. Given the limits of uncertainty in predicting the event horizon dates, the Vela, Crab, Cassiopeia A, and Tycho supernova explosions could all have been triggered by the same superwave.

TABLE 10.1. INDICATION THAT A SINGLE SUPERWAVE TRIGGERED FOUR SUPERNOVAE

Remnant	Distance from Us	Date of Visible Explosion	Projected Date of Superwave Passage
Crab	$6,585 \pm 30$ l.y.	1054 A.D.	$14,000 \pm 60$ yrs B.P.
Cas A	$9,450 \pm 300$ l.y.	1658 A.D.	$14,670 \pm 500$ yrs B.P.
Tycho	$8,150 \pm 300$ l.y.	1572 A.D.	$13,560 \pm 500$ yrs B.P.
Vela	820 ± 100	$10,750 \pm 2000$	$13,620 \pm 2,000$ yrs B.P.
XYZ	l.y.	B.C.E.	
	Average of Crab, Cas A, and Tycho:		$14,080 \pm 600$ yrs B.P.

An unstable luminous blue supergiant star might be induced to explode if it were to receive a sufficient amount of extra energy from a passing superwave. This might occur in the same way that was described for the Sun's prehistoric outburst. Nearby interstellar dust, normally kept some distance away by the star's stellar wind, might be propelled close to the star. Pushed sufficiently close by the superwave, this material would spiral inward and crash onto the star's surface, thereby adding its acquired kinetic energy to the star. Also, if a dust sheath were to form around the star, it would add additional energy by returning a portion of the outgoing stellar radiation back to the star. In cases where the star was already relatively

unstable, this added energy could cause the star to explode.⁹, ¹⁰, ¹¹ Stars that happened to be surrounded by large amounts of dust would be most susceptible.

In 1961, the astronomer Geoffrey Burbidge proposed that supernova explosions could trigger one another, provided that stars were positioned sufficiently close together, as would be the case at the center of a galaxy. According to his “domino theory,” the shock wave from one supernova explosion would trigger an explosion in a nearby unstable star, whose shock wave would in turn set off explosions in other unstable stars. The superwave theory of supernova triggering resembles this theory in some respects, with the exception that the supernovae are triggered instead by a superwave. The superwave mechanism has the advantage of being able to induce supernovae in a coordinated fashion even in the galactic disk, where stars are separated from one another by tens of thousands of light-years. Nevertheless, one would expect supernovae to occur more frequently closer to the Galactic center, where superwaves are more intense and stars more abundant. Observations of other galaxies that determine how the frequency of supernova explosions vary with distance from their galactic centers strongly support the superwave triggering model.¹²

A Cosmic Surprise

The sky location of the Crab supernova remnant is most interesting. Of all recent galactic supernova remnants, it is not only the one that comes closest to the solar system, but also the one that comes closest to the plane of the ecliptic. It is positioned only one degree below the ecliptic and slightly over one degree from the tip of Taurus’s southern horn. If we were to use the Crab Nebula explosion as a time marker for the Earth’s polar precession chronometer, we would find that the Crab remnant marks the point where the vernal equinox would have been in the year 6,050 B.P. (4100 B.C.E.). The distance to the Crab Nebula has been fairly accurately measured to be $6,585 \pm 30$ light-years, giving a round-trip light-travel time of $13,170 \pm 60$ years from the Earth to the Crab Nebula and back again. Curiously, this very closely approximates the length of one half of a polar precessional Great Cycle, which varies over a 41,000-year cycle and which on the date of the Crab explosion measured out to be exactly 13,179 years. Furthermore, if this polar-precession-like 6,585 year value is used as a measuring stick to move backward in time from the vernal equinox date of 6,050 B.P., we arrive at the date $12,635 \pm 30$ years B.P., very close to the mammal extinction episode whose

date is cryptographically encoded in temples and myths. Certainly, we cannot expect that the Crab supernova was purposely triggered for our personal benefit. This must all be just a coincidence, right?

Superwaves may also trigger supernovae by inducing gravitational tides on stars. One physics theory predicts that the gravitational potential of a galactic core's gravity field would change suddenly during the onset of a core explosion event. This change would be communicated through the galaxy in the form of a gravity wave that would travel near the front of the superwave cosmic ray event horizon.^{13, 14} The front of the wave would have a very steep gravitational gradient that would be capable of exerting a very strong inward pull on any planet or star that it passed. A star would feel a tidal force tugging toward the Galactic center, much the same way that the Earth feels a tidal force from the presence of the Moon. If the star happened to be a very luminous unstable blue supergiant, frictional heat produced as the star rotated in the grips of this tidal force might cause it to explode.

Extragalactic Evidence for Superwaves

If cosmic rays from the Galactic center do penetrate far outside our Galaxy's nucleus to pass well beyond our solar system as the zodiac message suggests, then other spiral galaxies should similarly show evidence that explosions in their cores have affected their surrounding spiral disks. Such evidence is to be found in the rings of ionized gas seen in the disks of neighboring galaxies. These indicate that the nuclei of these galaxies are somehow affecting their peripheral regions, possibly by releasing a penetrating cosmic ray volley. Consider, for example, the Andromeda Galaxy, our closest neighbor (figure 10.10). Studies of Andromeda's 21-centimeter radio-emission spectral line indicate that neutral hydrogen gas in this galaxy is concentrated into several rings about its center (figure 10.11). The rings also contain numerous energized gas nebulae and X-ray emission sources, and are found to be the source of most of the galaxy's infrared emission.¹⁵ They also produce large amounts of synchrotron radiation, a sign that large concentrations of cosmic rays are present.

One theory suggests that the rings are regions where the gas density and magnetic field concentration is very high and these “density waves” move radially out through the galaxy at supersonic speeds (less than half a percent of the speed of light), accelerating particles to cosmic ray energies.¹⁶ However, without an external source of energy, such waves would rapidly slow down and come to a halt. Not only would they not move outward from Andromeda’s nucleus, they would also have no way of accelerating particles to power their copious emission.

This energy-source problem finds a ready solution if we admit that cosmic rays from explosions in Andromeda’s core are free to penetrate the entire galaxy at near light speeds, just as the superwave theory suggests. Each time a superwave moves outward from Andromeda’s core and passes through the ring, it supplies a portion of its energy and cosmic rays to the ring, thereby sustaining the ring’s motion and radiant-energy output. Gas and dust that once resided in Andromeda’s nucleus would be swept outward gradually and concentrated into ring-shaped regions at regular distance intervals.¹⁷ We may presume that Andromeda’s core has recently undergone explosive activity since its nucleus is presently radiating a considerable amount of synchrotron emission and because gases are seen to be expanding radially away from its core at because of up to 100 kilometers per second.



Figure 10.10. The Andromeda Galaxy. This close neighbor lies 2 million lightyears from the Milky Way (Lick Observatory photograph).

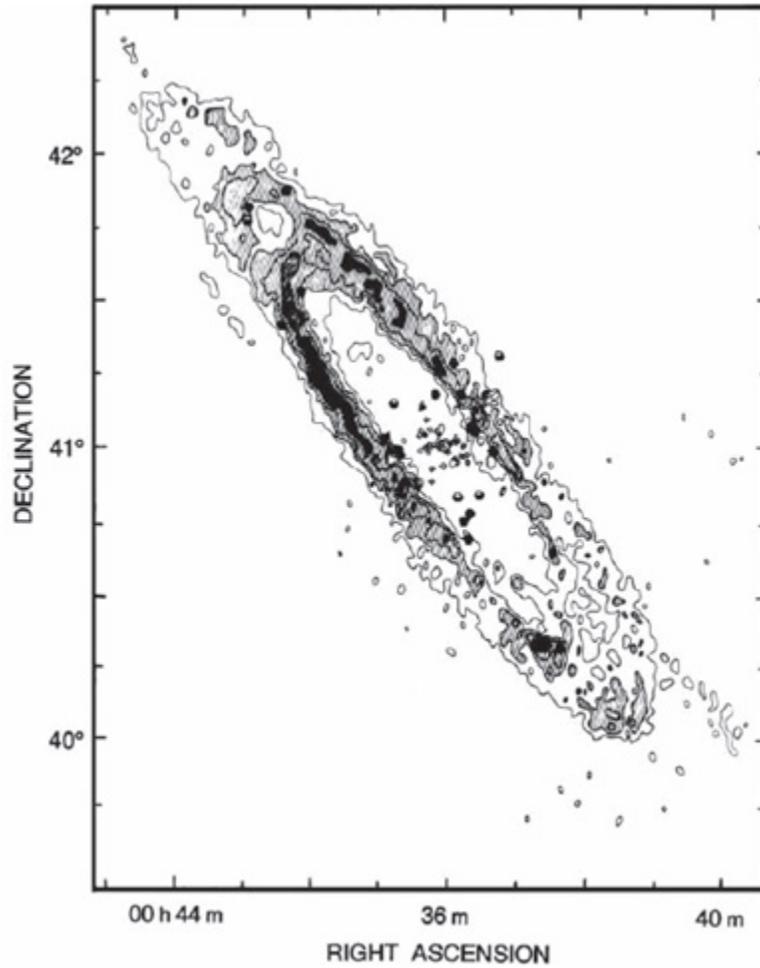
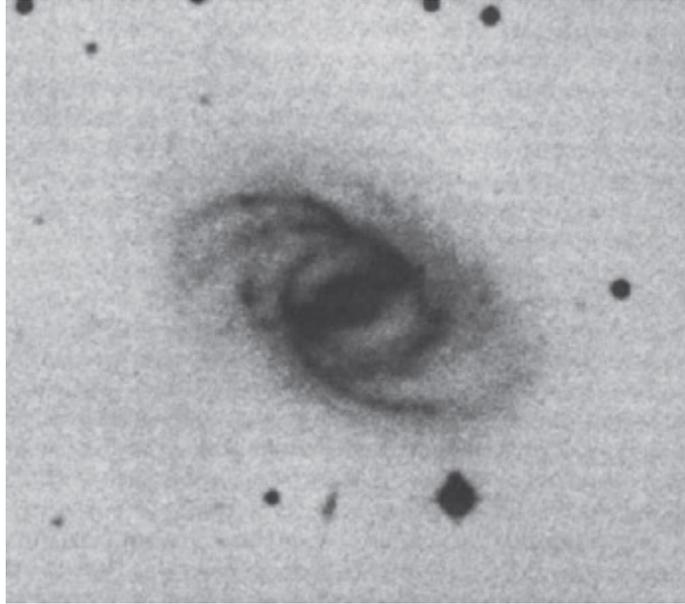


Figure 10.11. A map of neutral hydrogen radio emission in the Andromeda Galaxy. Three concentric rings are evident at distances of 13,000, 20,000, and 32,000 light-years from Andromeda's center. The black dots near the galaxy's center indicate the locations of X-ray sources detected with the Einstein X-ray Observatory. (After Emerson, Monthly Notices of the Royal Astronomical Society; Van Speybroeck et al., Astrophysical Journal, figure 4.)



*Figure 10.12. A photographic negative of NGC 2523, a spiral galaxy with a well-developed inner ring. (From Kormendy, *Astrophysical Journal*, plate 14.)*

Energized gas rings are clearly seen in optical photographs of some galaxies, as in that taken of the ring/spiral galaxy NGC 2523 (figure 10.12). Sometimes a galaxy's rings can even appear brighter than its spiral arms, as in the ring galaxies shown in figures 10.13 and 10.14. In some cases, the spiral arms cannot be discerned at all, as in the ring galaxy shown in figure 10.15.

Rings are also present in galaxies such as Seyfert galaxies NGC 1068 and Markarian 10, whose nuclei are active. Both have emission rings positioned tens of thousands of light-years from their centers. NGC 7552, a spiral galaxy with an active core, has a circular ring of radio-emitting gas that measures 4000 light-years in diameter.¹⁸ In some cases, entire galaxies are seen to be surrounded by faintly luminous shells.¹⁹ A survey conducted by Malin and Carter indicates that 17 percent of all isolated elliptical galaxies are surrounded by one or more concentric shells.²⁰ Up to 18 shells have been detected around elliptical galaxy NGC 3923 (figure 10.16), the farthest one lying over a million light-years from the galaxy's center.²¹ The giant elliptical Centaurus A, the closest galaxy to our own that is currently exploding, contains a similar number of shell structures within 60,000 light-years of its center.²² These shell features and others seen in many other

galaxies could be evidence that volleys of cosmic rays travel far from a galaxy's core to shape the distribution of interstellar gas.

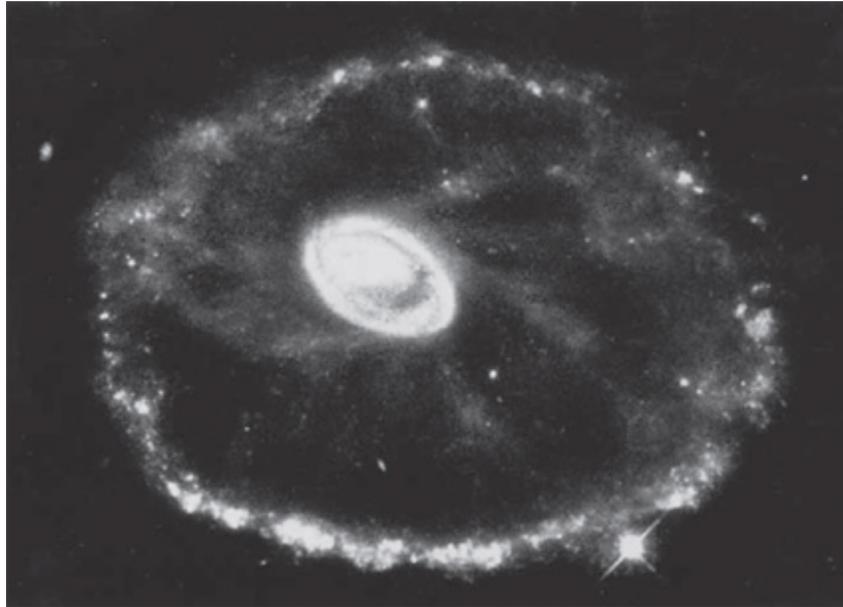
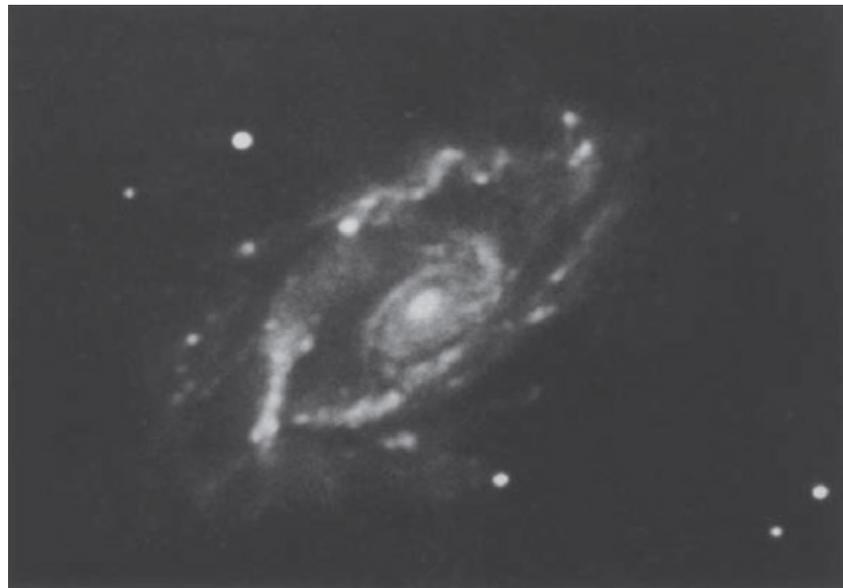
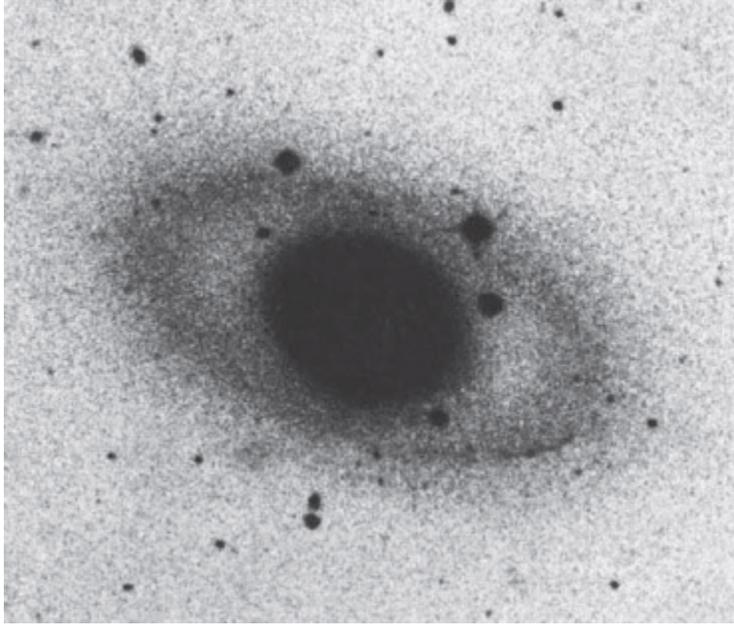


Figure 10.13. The Cartwheel Galaxy (Lu 003-534) imaged with the Hubble Space Telescope. The two rings are located 15,000 and 110,000 light-years from the galaxy's center. (Courtesy of Kirk Borne and NASA.)



*Figure 10.14. The peculiar spiral galaxy NGC 3646. Two rings are located 35,000 and 100,000 light-years from its center. The outer ring is slowly expanding away from its center. (From Burbidge et al., *Astrophysical Journal*, figure 1.)*



*Figure 10.15. A photographic negative of NGC 3945, a ring galaxy with a single visible ring. (From Kormendy, *Astrophysical Journal*, plate 15.)*

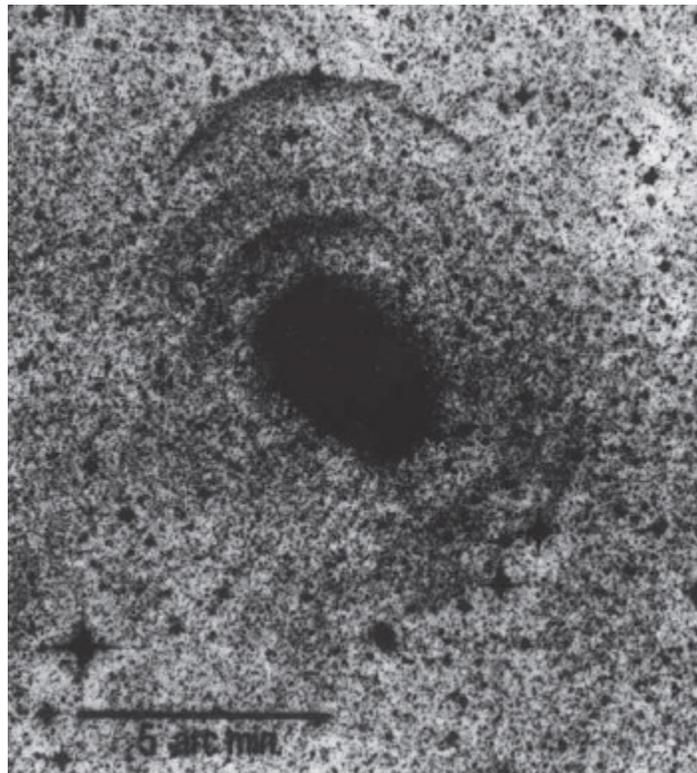


Figure 10.16. A negative print of elliptical galaxy NGC 3923 showing three inner shells. (Photograph by David Malin from UK Schmidt plates.)

Evidence that galactic core explosions can produce long-range effects is also seen in studies of the elliptical radio galaxy PKS 215269.²³, ²⁴ The galaxy's core contains no sign of a bright compact synchrotron source similar to that found in exploding galaxies. Yet in 1987, astronomers reported that they had seen such activity in a gas cloud situated about 26,000 light-years from the galaxy's center. Because the radiation comes from the side of the cloud that faces the galaxy's nucleus, we may presume that the cloud is being impacted by cosmic rays that were ejected long ago from the galaxy's core and which are part of a superwave shell that continues to move outward through the galaxy even though the core has long since ceased its explosive activity. This would also explain why the gas cloud is seen to be more highly ionized than either the galaxy's nucleus or the radial filaments that immediately surround its nucleus.

Radio telescope studies of quasar 3C 179 offer further support for the superwave model. 3C 179 is a galaxy whose exploding core is so bright as to mask the light coming from its spiral arm disk. Astronomers have found that the galaxy's core contains two compact synchrotron-emitting radio sources that are separating from one another at such a high rate as to give the illusion that they are moving away from each other at many times the speed of light.²⁵ Several other quasars exhibit a similar phenomenon of apparent faster-than-light radio source separation in their cores. As is generally accepted, these unusually high velocities are a visual effect created by radio-emitting cosmic rays travelling *toward* the observer at a velocity very close to the speed of light (but not exceeding it). Their near light speed causes their trip outward through the galaxy to appear to us greatly compressed in time. Hence, the synchrotron radiation produced by such radio sources is best described as coming from cosmic rays that are propagating *radially* away from the galaxy's core, just as the superwave model proposes.

Quasar 3C 179 is particularly significant in that it provides evidence that these radially propagating cosmic rays penetrate millions of light-years outside the galaxy. This is the first galaxy that has been found to contain both faster-than-light separating radio sources in its core and large synchrotron-emitting radio lobes on either of its sides. Significantly, the radio sources in the core of 3C 179 are separating along a direction

precisely aligned with the axis of the two outer radio lobes, indicating that the same radially propagating shell of cosmic rays that is producing the core radio emission penetrates the galaxy and continues on toward us through intergalactic space, beaming its synchrotron radiation to us just as the superwave model predicts. We are able to see simultaneously the radio emission from the more distant inner radio sources and the closer outer radio lobes because both the cosmic rays and their emitted radiation are traveling toward us at almost the same speed. Since faster-than-light separating radio sources are also seen in other quasars, we must conclude that long-range, radial propagation of cosmic rays from galactic cores is commonplace.

As described in appendix B, astronomers have mistakenly assumed that these large radio lobes project outward from the galaxy perpendicular to our line of sight, when actually the above evidence indicates that they and their cosmic ray electrons are directed toward us. This has led to a mistaken overestimate of the duration and recurrence time of galactic core explosions. The notion that a radio galaxy's radio lobes are powered by cosmic rays traveling toward us from the galaxy's core was predicted by the superwave theory before the findings about radio galaxy 3C 179 were published. Consequently, the 3C 179 discovery constitutes subsequent confirmation of the superwave theory.

ELEVEN

CYCLES OF DESTRUCTION

Geocosmic Cycles

There is evidence that biological extinctions tend to occur at times when the Earth is exposed to high cosmic ray fluxes. One group of scientists has studied the recurrent mass extinctions of unicellular ocean-dwelling organisms called phytoplankton and has concluded that they were most likely killed off by momentary increases in the influx of cosmic ray radiation.¹ Other studies have found that mass extinctions of land animals and of shell protozoans (foraminifera and radiolaria) closely correlate with reversals of the Earth's magnetic field.^{2, 3, 4} Although geomagnetic reversals themselves could not be the cause of these extinctions, the decrease in field intensity associated with such reversals would reduce the Earth's magnetic shielding against cosmic rays. However, a total elimination of this shielding would produce only a 16 percent increase in cosmic ray intensity at the Earth's surface and would result in an insignificant half-percent increase in animal mutation rates.^{5, 6} But, as we have seen, geomagnetic field disturbances are most probably produced at times when the Sun is in its actively flaring T Tauri state, so galactic superwaves and giant solar storms could be responsible for producing cosmic ray intensity increases of many orders of magnitude and for other hazardous effects as well.

A major geomagnetic reversal, the Brunhes-Matuyama reversal, occurred 730,000 years ago, shortly after the Earth's climate had turned

increasingly severe (see figure 5.2). This geomagnetic event coincided with the extinction of Java man and with the abrupt appearance of mutational changes in ocean plankton. The remains of Petralona man,⁷ a hominid who roamed northern Greece contemporaneously with Java man, also date from this time, suggesting that this extinction was global in nature. Again, a superwave is a likely cause.

If extinctions occur at times when the cosmic ray flux and genetic mutation rate is very high, one would expect to find these extinctions coinciding with sudden evolutionary jumps. This is exactly what is found. The geologic record indicates that evolutionary changes occur in bursts, with a majority of changes in a species occurring over just a few generations followed by long periods of little change. This view of evolution, first proposed in 1942 by Ernst Mayr, is termed *quantum speciation*.^{8, 9} Often these evolutionary quantum jumps occur at times when the population of the parent species has become decimated to the point that all that remain are one or more localized populations, a situation termed *catastrophic selection*.^{10, 11} This evidence weighs against Darwin's theory of natural selection which instead suggests that major evolutionary changes should occur at times of overpopulation when the forces of competition and survival of the fittest are particularly acute. Darwinian selection also has difficulty accounting for the phenomenon of adaptive radiation, wherein a single ancestral group surviving at an extinction boundary may rapidly proliferate to spawn many new kinds of animals (see figure 11.1). This is because adaptive radiation usually takes place in isolated habitats where Darwinian competition and predation would be minimal.

The superwave hypothesis fares much better in accounting for these characteristics of natural evolution. Adaptive radiation, quantum speciation, and catastrophic selection would all follow as natural consequences of a superwave event.¹² The harsh climatic conditions and lethal radiation emissions produced during such a catastrophe would abruptly diminish species populations and would leave behind segregated animal communities genetically mutating at a greatly accelerated rate. This would take place over a wide geographical area and would affect a wide variety of species.

Computer studies published in 1984 and 1986 showed that marine animal extinctions and geomagnetic reversals have a tendency to recur about every 30 million years in step with the Sun's galactic plane crossing cycle.^{13, 14} During its 200-million-year orbital journey around the Galactic center, the Sun repeatedly cycles up and down through the galactic disk, being restrained from wandering too far by the gravitational forces of galactic disk stars. It takes about 63 ± 6 million years for the Sun to complete one cycle of this "z-axis" oscillation, which means that it passes through the galactic plane about once every 29 million to 34 million years.

One team of NASA scientists proposed that during a galactic plane crossing, the solar system has a greater chance of encountering interstellar dust and gas clouds capable of energizing the Sun and adversely affecting the Earth's climate, effects that could lead to an increased chance of mass extinction.¹⁵ Their suggestion was quite similar to the superwave dust-incursion scenario, with the exception that it failed to mention the important contribution of superwaves. That is, superwaves provide the force that drives these outlying dust particles inward against the pressure of the solar wind. During galactic plane crossings, the solar system risks passing through high concentrations of cosmic debris, which can considerably aggravate the effects of passing superwaves. It may not be just a coincidence that for the past 3 million years the solar system has been in the midst of one of these perilous plane-crossing intervals, which is essentially the duration of the current ice epoch.^{*38}

The Galactic core explosion cycle is another important cycle that Earth must reckon with. As mentioned in chapter 3, the ice core beryllium-10 record indicates that galactic superwaves pass us about once every $25,400 \pm 2,000$ years, approximating the period of one polar precessional cycle, with other cycles being present as well having recurrence intervals of $40,000 \pm 6000$ years, $18,600 \pm 1400$ years, $12,200 \pm 1000$ years, and $5,400 \pm 300$ years. This periodicity may originate in the mechanism that generates superwaves at the Galactic core. Correspondingly, a 23,000-year climatic cycle is found in the Earth's climatic record although only a few of the superwave-cosmic dust events are intense enough to initiate or terminate a glacial period. Climatic data also indicate the presence of a 100,000-year

cycle, which could also be initiated by superwaves since it approximates four polar precessional cycles, or four superwave periods.

The 23,000-year period could be due to orbital cycles that produce small changes in the way the Earth receives radiation from the Sun. For example, due to the eccentricity of its orbit, the Earth receives 7 percent more solar radiation at its closest approach to the Sun (orbital perihelion) than when it is farthest from the Sun six months later (orbital aphelion). Since the Earth is currently at perihelion on January 3 of each year, it is presently experiencing mild winters and cool summers in the Northern Hemisphere and cold winters and hot summers in the Southern Hemisphere. The moderate seasonality in the Northern Hemisphere would presently predispose the northern ice sheets toward glacial growth in the event of a cosmic dust incursion. However, the 26,000-year polar precession cycle and 41,000-year polar nutation (nodding) cycle cause the Earth's axis to make a complete circuit, one Great Cycle, in about 20,000 to 26,000 years, which causes the date of the Earth's orbital perihelion and aphelion to advance slowly relative to the seasons. Thus, 12,250 years ago, when the Earth's perihelion fell at its summer solstice, the Northern Hemisphere was experiencing hot summers and cold winters, conditions conducive to ice sheet recession and continental flooding.

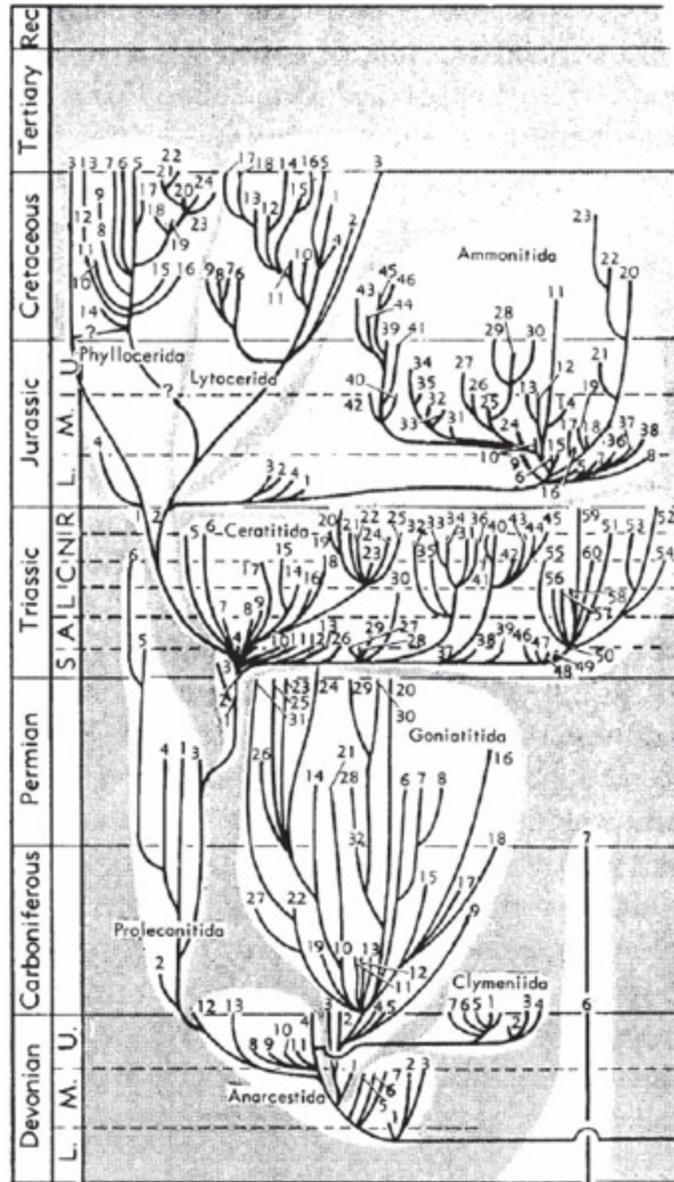


Figure 11.1. Phylogeny of the order of Ammonoida (sea ammonites) showing the rapid appearance of new families following events of mass extinction. (Teichert, *Essays in Paleontology and Stratigraphy*, p. 198.)

The notion that such orbital variations in seasonality could directly affect the Earth's climate was first proposed in the nineteenth century by the German climatologist M. Milankovitch. However, climatologists now realize that this seasonality effect is far too slight to cause the large amplitude warmings and coolings evident in the climatic record. Nor does it act swiftly enough to account for the rapidity of these transitions, which can transpire in just a matter of decades. Seasonality, then, cannot be the

primary direct cause of climatic change as Milankovitch claimed. For the same reason, the 100,000-year cyclic variation in the amount of the Earth's orbital eccentricity does not account for the 100,000-year cycle observed in the Earth's climatic record. Studies have since shown that the resulting changes in insolation would have an insignificant impact on climate. These difficulties are overcome when it is realized that seasonality plays instead the secondary role of modulating the Earth's response to the powerful and abrupt climatic disturbances inflicted by passing galactic superwaves.

In summary, we find there are four principal cycles that may strongly influence the evolution of terrestrial life: the thirty million-year cycle of the Sun's oscillation through the galactic plane, the 23,000-year seasonality cycle, and the Galactic core explosion cycle, which repeats on cycles of 40, 25.4, 18.6, 12.2, and 5.4 thousand years and possibly contains an additional 100,000-year cyclic regularity.

The Days of Brahma

Studies of DNA mutation rates suggest that modern humans originated anywhere from 150,000 to 300,000 years ago.¹⁶ The human race, then, has lived through about two glacial cycles and survived numerous superwave catastrophes. The Neanderthal race, which once coexisted with *Homo sapiens*, was apparently not as lucky. Neanderthals became virtually extinct 35,000 years ago during a time when the Earth was plagued by high cosmic ray intensities, a high rate of cosmic dust influx, geomagnetic disturbance, and general climatic upheaval. This evidence strongly suggests that a superwave was responsible for their demise.

Knowledge of these earlier superwave calamities must have been passed down through the generations, for traditions from various parts of the world speak of recurring world cycles, each being ended by a global catastrophe. Legends warn us that these past catastrophes will be repeated, that our civilization, like others, may be forced to contend with some of nature's most violent forces. The ancient Greeks spoke of a cyclic period called "the Great Year," which was supposed to last about 26,000 years, the duration of the most recent polar precession cycle (one astrological Great Cycle). This was supposed to include two catastrophic epochs, a "great summer" called

ekpyrauses (world combustion) and a “great winter” called *kataclysmos* (deluge), separated from one another by about 13,000 years. They believed that at these solstices all human beings are annihilated. Curiously, this Great Year and its semi-cycle period approximate the intervals between cosmic ray events as indicated by the $25,400 \pm 2,000$ and $12,200 \pm 1,000$ year cycles found in the polar ice beryllium-10 record.

If the ancient Greek Great Year solstices were referenced relative to the Galactic center in Scorpio, then their great summer would have taken place 12,850 years B.P., when the Galactic center was at its northernmost position in the sky, the Earth’s North Pole then being maximally inclined toward Sagittarius A*. The geologic record shows that this was a time of excessive warmth, substantial glacial meltwater flooding, and severe extinction of large mammal species. Ancient traditions setting the vernal equinox at the Virgo–Leo constellation boundary could have been marking this important date. About 260 years from now (2264 A.D.), polar axis precession will have brought the Galactic center to its southernmost “winter solstice” position. According to this formula, the world would then be in store for a deluge. However, if a superwave were to strike us now, it would be more likely to induce a period of heavy precipitation and glacial growth in high-latitude regions.

The Babylonian sect Mazdaism, founded in the seventh century B.C.E. by Zarathustra (Zoroaster), believed that history should be divided into a sequence of world ages lasting 12,000 years and terminated by a universal destruction. They subdivided these ages into 12 intervals, each millennium represented by one of the 12 astrological signs. According to their figuring, the current age began in 9630 B.C.E., a year that falls very close to the date 9600 B.C.E. that Plato gave for the sinking of Atlantis (recall chapter 8). The final millennium of the present Mazdaic age, then, would close in the year 2398 A.D., near the time when the Galactic center will have reached its winter solstice. Mazdaism predicts that this closing will bring an extended period of darkness during which the Sun conceals itself, followed by 30 straight winters that will bring on the glacial period of Malkôs. Then, after 57 years, a new Sun will appear in the sky.¹⁷ The sacred text Dâdistân-î Dînîk speaks as follows about the devastation brought with the onset of Malkôs:

. . . even that prodigious devastation of which it is declared that it happens through the rain of Malkôs, when, through snow, immoderate cold, *and* the unproductiveness of the world, most mortals die; *and* even the things attainable by mortals are attended with threatenings of scarcity.¹⁸

The *Bahman Yast* describes this glacial interval as follows:

. . . the winter of Malkôs is such that, owing to the cold and snow which occur, out of a myriad of men in the world only one will remain, and the trees and shrubs all become withered, and the quadrupeds, whether carrying, walking, leaping, or grazing, will all utterly die. Then, by the command of God, they will come from the enclosure formed by Yim, and the men and quadrupeds from that place spread over Irân, and make the world populous a second time.¹⁹

The ancient Chinese encyclopedia *Sing-li-ta-tsiuen-chou* also refers to a Great Year, which it says measures the span of time between two successive catastrophes. It states that “in a general convulsion of nature, the sea is carried out of its bed, mountains spring out of the ground, rivers change their course, human beings and everything are ruined, and the ancient traces effaced.”²⁰ The Chinese count a total of ten such perished ages, or *kis*, from the beginning of the world until the time of Confucius.²¹ The Neo-Confucianist philosopher Shao-Yung taught that one such cycle had a span of 129,600 years.²² Interestingly, ice core studies indicate that about 123,000 years elapsed between the last ice age and its predecessor.

Other cultures report fewer cycles. The Icelanders believed that nine worlds went down in a succession of ages, as told in their Edda.²³ The Mexican *Annals of Cuauhtitlan*, written around 1570 in Nahuatl-Indian and based on ancient sources, records seven world cycles that they call *Chicon-Tonatiuh*, “the Seven Suns.”²⁴ The natives of North Borneo claim that six Suns have perished and that the world is presently illuminated by the Seventh Sun.²⁵ Perhaps their usage of the word sun is in remembrance of

the Sun periodically becoming highly activated. Or it may refer to the appearance of a new “Sun” in the sky, the exploding core of our Galaxy.

The Seneca Indians of western New York say that we now live in the Seventh World.²⁶ The six previous “Worlds,” they say, were destroyed by the Great Spirit, Swen-i-o, because mankind was not grateful for the gifts shared by Mother Earth and instead caused a disease of waste to visit Nature Land. Those who honored his decree he placed under a blanket of protection; the rest were destroyed by the forces of nature. Swen-i-o ended the First World by ordering the Sun to use its power to cleanse and devastate the Earth. He ended the Second World with cold by ordering the Sun to withdraw his warmth from the face of Mother Earth, leaving only the Moon to exert his feeble light. This is probably a reference to the onset of a brief cold interval or a longer period of glaciation. The Third World was ended by being cleansed by a flood of water. The Fourth World was ended through the combined efforts of the Sun, the Moon, and Water, and the Fifth World by the combined powers of the Sun and Moon. The Sixth World was ended by the power of the Moon followed by a cleansing by Water, which rewarmed the land. Interestingly, the legend presents these destructions in a reasonable order. That is, excess warmth (Sun) is needed to produce glacial ice cover (Moon), and glacial ice cover is required to produce glacier wave flooding (Water).

The Aztecs of Mexico also used the term *sun* to refer to the destructions that ended successive ages. Although there is some uncertainty as to the order of their occurrence, it is generally believed that the Aztecs spoke of four cycles having passed before the present one, the present Sun being counted as the fifth. The four preceding destructions are said to have been due to hunger, wind, fire, and water.

The Maya of Yucatán record three past destructions, the present race of man comprising the fourth world. Two of these cycles are said to have been concluded by devastating plagues called “the sudden deaths.” It was said that the disease was so swift that the buzzards and other fowl birds dwelt in the houses of the cities and ate the bodies of their former owners. Some say the third cycle was terminated by a hurricane that blew from all four corners of the Earth. Others say it was ended by an inundation that swept across the world swallowing all things in its mountainous surges. They called the

deluge *hun yecil*, which means “the inundation of the trees,” for all the forests were swept away.²⁷

Hindu scriptures, like Aztec legends, tell of four past ages, the fifth age being that of the present. Each of these ages was ended by a general cataclysm called *pralaya* that nearly destroyed mankind. One of the Shastas teaches that the human race was first destroyed by water, second by winds, third by Earth engulfment, and last by fire.²⁸ The sacred Hindu book Bhagavata Purana claims that each world age met its destruction through conflagration, hurricane, and flood.

The Hindus call these four world ages yugas and name them as follows:²⁹

Satya Yuga, the golden age	4,800 years
Treta Yuga, less virtuous	3,600 years
Dvapara Yuga, more depraved	2,400 years
Kali Yuga, the worst age	1,200 years
Total = one Daiva Yuga:	12,000 years

Their sum equals one Daiva Yuga, which was believed to correspond with the time required for the vernal equinox to precess through half of its zodiacal cycle. However, the period of two Daiva Yugas, 24,000 years, somewhat underestimates this polar precession period, which presently equals about 26,000 years.

Furthermore, ancient Hindu astronomers taught that the Sun revolves around the Grand Center called Vishnunabhi, which was believed to be the seat of the creative power, Brahma, perhaps a reference to the Galactic center. They maintained that the Sun alternately approaches and recedes from this center on a cycle that matches the 26,000-year polar precession cycle. In other words, the solar system was conceived to oscillate radially in and out from this Grand Center as it orbited about it. As the Sun gradually passed from its distal to its proximal position over a period of roughly 13,000 years, the world was believed to evolve from its lowest to its highest state of spiritual awareness, passing from the beginning of a Kali Yuga to

the end of a Satya Yuga. Then as the Sun continued journeying to its most distal point from the center, the world was said to pass from the beginning of a new Satya Yuga period to the end of a Kali Yuga period, whereupon humanity's spiritual awareness was believed to decline to a minimum. In his book *The Holy Science*, Swami Sri Yukteswar writes that the Sun was farthest from the Grand Center and humanity at its lowest point of spiritual development in 501 A.D. Accordingly, the Sun would have approached nearest the Grand Center approximately 12,600 B.C.E., or around the time of unusual ice-age warmth, when the ice sheets were rapidly melting and flooding the continents.^{[*39](#)}

The sacred Buddhist text Visuddhi-Magga speaks of a long sequence of ages separated from one another by global catastrophes. These "world cycles" are terminated by three kinds of destructions involving fire, water, and wind. The text describes the destruction by fire:

When a world-cycle perishes by fire, there arises in the beginning a cycle-destroying great cloud, and a great rain falls throughout one hundred thousand times ten million worlds. . . . [T]he clouds keep up a braying noise, but do not allow a drop to fall; all rain is utterly cut off.^{[30](#)}

The great cosmic cloud that at first produces rain followed by an extended drought appears to be a reference to the invading cloud of cosmic dust. It describes this as happening not only to the Earth, but to one trillion other worlds as well. Interestingly, astronomers estimate that our Galaxy contains about four hundred billion stars. If each star has several planets, then indeed there would be about one trillion planets in the Galaxy. The text describes how many species perish from this long drought and continues:

When now a long period has elapsed from the cessation of the rains, a second sun appears . . . there is no distinction of day and night; each sun rises when the other sets, and an incessant heat beats upon the world. And whereas the ordinary sun is inhabited by its divinity, no such being is to be found in the cycle-destroying sun. When the ordinary sun shines, clouds and patches of mist fly about in the air. But

when the cycle-destroying sun shines, the sky is free from mists and clouds, and as spotless as a mirror, and the water in all streams dries up, except in the case of the five great rivers. After the lapse of another long period, a third sun appears, and the great rivers dry up. After the lapse of another long period, a fourth sun appears, and the sources of the great rivers in the Himalaya Mountains dry up . . . After the lapse of another long period, a fifth sun appears, and the mighty ocean gradually dries up, so that not enough water remains to moisten the tip of one's finger. After the lapse of another long period, a sixth sun appears, and the whole world becomes filled with smoke and saturated with the greasiness of that smoke, and not only this world but a hundred thousand times ten million worlds. After the lapse of another long period, a seventh sun appears, and the whole world breaks into flames . . . The upper regions of space become one with those below, and wholly dark.

The Journey of the Hopi

The Hopi Indians of the southwestern United States explain that there have been three past ages. These were: the First World—Tokpela, meaning “Endless Space”; the Second World—Tokpa, meaning “Dark Midnight”; and Third World—Kuskurza, a word that has no modern translatable counterpart. They say that our current world civilization populates the Fourth World—Tuwaqachi, which means “World Complete.” They identified this series of successively deteriorating worlds with the minerals gold, silver, copper, and sikyapala (mixed mineral) in a manner similar to the ancient Greek designation of the Ages of Gold, Silver, Bronze, and Iron. Each of the previous worlds was ended by a global cataclysm: the first by fire, the second by a polar shift and freezing cold, and the third by a flood of water.³¹

The Hopi describe the First World as an idyllic paradise similar to Western accounts of the Golden Age or the Garden of Eden. The people had lived simply with the animals, but after learning the art of speech communication, they became suspicious of one another and eventually began to fight among themselves. One day a being by the name of Sotuknang appeared to the few good people who were left and told them

that the Creator had decided to destroy the Earth, and that they would be spared from the tragedy. By following their inner vision, which allowed them to see a certain cloud by day and a certain star by night, they were led to a certain place where, along with groups of people of other races, they entered an underground mound, or Ant-people kiva, where they would be safe. Afterward, the world was destroyed by fire.

The survivors began to populate the Second World. They had developed handicrafts, homes, and villages. But eventually they became greedy in their dealings and began to quarrel and fight. Sotuknang one day appeared and told the few good people who were left that he had decided to destroy the Second World but would first lead these chosen ones to a place of safety. As before, they took refuge in underground dwellings. Thereupon Sotuknang commanded the twin guardians of the Earth's North and South Poles to leave their stations:

The twins had hardly abandoned their stations when the world, with no one to control it, teetered off balance, spun around crazily, then rolled over twice. Mountains plunged into seas with a great splash, seas and lakes sloshed over the land; and as the world spun through cold and lifeless space it froze into solid ice.³²

For many years the elements of the Second World “were frozen into a motionless and lifeless lump of ice.” During this entire period, the survivors remained in the underground world of the Ant-people. Sotuknang then ordered the two guardians back to their stations at the poles: “With a great shudder and a splintering of ice the planet began rotating again. When it was revolving smoothly about its own axis and stately moving in its universal orbit, the ice began to melt and the world began to warm to life.”³³ This abrupt cooling probably refers to the sudden onset of the Younger Dryas, which began about 12,700 years B.P. As explained in the next chapter, a galactic gravitational wave disturbance may also have arrived about this same time and through tidal forces affected the Earth and its rate of polar precession.

After Sotuknang finished creating the Third World, the people came out and began life anew. Their numbers multiplied, and they quickly advanced

so that they were able to create big cities, nations, and a whole civilization. Although some people still sang praises to the Creator from the hilltops, many had turned to using their creative powers for evil gain and war. So Sotuknang, the Creator, decided to destroy the world again, this time by water. He instructed Spider Woman to find all the people who still had the song in their hearts and save them by sealing them up inside the hollow stems of plants. The people survived their stay inside these reeds by eating cornmeal dough and drinking small amounts of water. When they were all safe, Sotuknang loosed the waters upon the Earth: “Waves higher than mountains rolled in upon the land. Continents broke asunder and sank beneath the seas. And still the rains fell, the waves rolled in.”³⁴

Finally, the rushing waters ceased and all became quiet. The people emerged from their reeds onto a small piece of land that once had been the top of their highest mountain. All else, as far as they could see, was water. They then built rafts and paddled to the east. After a while, they came to the shore of a much larger island covered with trees and food-bearing plants. They hiked over land to the eastern shore and continued eastward and a little to the north on newly built rafts. Finally they arrived on the shore of a great continent. This was the Fourth World. Sotuknang then asked them to look back on the path they had followed. One by one the islands they had crossed sank under water until all were gone.

The terminal flood refers perhaps to a glacier wave released during the Preboreal warming, which began around 11,550 years B.P. The account of the submergence of the islands appears to be a reference to the gradual rise in sea level that resulted from the melting of the ice sheets.

TWELVE

PROPHECIES

The Day of the Lord

Although the Bible tells of a past cataclysm, the Deluge that took place in the days of Noah, references to global catastrophes contained in most other parts of the Bible are framed in the future tense, portending things to come. The Bible speaks of this as a period of cleansing called the Day of Judgment or Day of the Lord, a retribution brought forth by God to punish mankind's sins. Thus the Bible portends a catastrophe that could recur, much like the world cycles of the Buddhists or "Suns" of the Aztecs.

The Second Epistle of Saint Peter, chapter 3, conveys the recurrent nature of this cosmic disaster as follows:

6. Whereby the world that then was, being overflowed with water, perished: [a reference to the Flood of Noah]
7. But the heavens and the earth, which are now, by the same word are kept in store, reserved unto fire against the day of judgment and perdition of ungodly men.

As with a Galactic superwave, this heaven-induced catastrophe can take thousands of years to unfold, the word *day* being used in its general sense to mean "period." For Peter notes:

8. But, beloved, be not ignorant of this one thing, that one day is with the Lord as a thousand years, and a thousand years as one day.

As mentioned earlier, a superwave would travel toward us at very close to the speed of light. Consequently, its cosmic ray electrons would arrive just minutes after the first flash of light radiation from the initial Galactic center outburst. Thus, it would not be possible to see a superwave coming and to predict its precise time of arrival. In a similar manner, the Book of Peter relates that there is an element of surprise in the arrival of the Day of the Lord:

10. But the day of the Lord will come as a thief in the night; in which the heavens shall pass away with a great noise, and the elements shall melt with fervent heat, the earth also and the works that are therein shall be burned up.

The New Testament in many places associates judgment day with the *coming of the Son of man*—in other words, with the coming of the Christ. It prophesied that this event will entail a sudden separation of the spiritually oriented individuals from mankind's ranks, the "winnowing of the wheat from the chaff." This calls to mind the notion of catastrophic selection that paleontologists theorize forms the basis of biological evolution. As in the legend of the Hopi Indians, the spiritually attuned are promised to inherit a new world. The abrupt arrival of this day of judgment is explained also in Chapter 24 of the Book of St. Matthew:

27. For as the lightning cometh out of the east, and shineth even unto the west; so shall also the coming of the Son of man be.

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

30. And then shall appear the sign of the Son of man in heaven: and then shall all the tribes of the earth mourn, and they shall see the Son of man coming in the clouds of heaven with power and great glory.

36. But of that day and hour knoweth no man, no, not the angels of heaven, but my Father only.

37. But as the days of Noah were, so shall also the coming of the Son of man be.

38. For as in the days that were before the flood they were eating and drinking, marrying and giving in marriage, until the day that Noah entered into the ark,

39. And knew not until the flood came, and took them all away; so shall also the coming of the Son of man be.

40. Then shall two be in the field; the one shall be taken, and the other left.

42. Watch therefore: for ye know not what hour your Lord doth come.

43. But know this, that if the goodman of the house had known in what watch the thief would come, he would have watched, and would not have suffered his house to be broken up.

44. Therefore be ye also ready: for in such an hour as ye think not the Son of man cometh.

The catastrophes prophesied in the Bible very much resemble the natural disasters described in legends from other cultures. One common theme concerns the occlusion of light from the luminaries. For example, as stated in St. Mark, chapter 13:

24. But in those days . . . the sun shall be darkened, and the moon shall not give her light,

25. And the stars of heaven shall fall, and the powers that are in heaven shall be shaken.

Another theme concerns the occurrence of a searing heat:

5. And the Lord God of hosts is he that toucheth the land, and it shall melt, and all that dwell therein shall mourn: and it shall rise up wholly like a flood; and shall be drowned, as by the flood of Egypt. (Amos 9)

4. And the mountains shall be molten under him, and the valleys shall be cleft, as wax before the fire, and as the waters that are poured down a steep place. (Micah 1)

4. He rebuketh the sea, and maketh it dry, and drieth up all the rivers: Bashan languisheth, and Carmel, and the flower of Lebanon

languisheth.

5. The mountains quake at him, and the hills melt, and the earth is burned at his presence, yea, the world, and all that dwell therein.

6. . . . his fury is poured out like fire, and the rocks are thrown down by him. (Nahum 1)

8. But with an overrunning flood he will make an utter end of the place thereof, and darkness shall pursue his enemies. (Nahum 1)

6. Therefore hath the curse devoured the earth, and they that dwell therein are desolate: therefore the inhabitants of the earth are burned, and few men left. (Isaiah 24)

9. And the streams thereof shall be turned into pitch, and the dust thereof into brimstone, and the land thereof shall become burning pitch.

10. It shall not be quenched night nor day; the smoke thereof shall go up forever: from generation to generation it shall lie waste; none shall pass through it for ever and ever. (Isaiah 34)

The Book of Isaiah also portends the occurrence of widespread earthquakes, which drive people to seek shelter in caves. It states:

19. And they shall go into the holes of the rocks, and into the caves of the earth, for fear of the Lord, and for the glory of his majesty, when he ariseth to shake terribly the earth. (Isaiah 2)

19. The earth is utterly broken down, the earth . . . is moved exceedingly.

20. The earth shall reel to and fro like a drunkard, and shall be removed like a cottage; and the transgression thereof shall be heavy upon it; and it shall fall, and not rise again. (Isaiah 24)

Earthquakes could be triggered by a gravitational energy potential wave that quite possibly would accompany a superwave. As this gravity wave passed through the solar system, it would exert substantial tidal forces on the Sun and planets. Even at our distance of 23,000 light-years, the steep gravity gradient at the leading edge of this wave front might generate tidal

forces substantially greater than those produced by the Sun or Moon.¹ It could deliver a powerful jolt to the Earth's crust and cause high ocean tides. A sudden crustal displacement of even a few meters could trigger widespread earthquake activity. Moreover, there is reason to suspect that a Galactic gravity wave might also strongly influence the Earth's rate of polar precession (see text box on page 334).

From astronomical observations of the Milky Way and other galaxies, it is difficult to determine whether potentially destructive gravity wave fronts typically accompany superwaves. Unlike cosmic ray electrons, which make their presence known through the synchrotron radiation they emit, gravity waves would give no direct indication of their presence in remote regions of space. Nevertheless, there is evidence that very low-intensity gravity waves are presently arriving from the Galactic center direction. Gravity wave detectors operated by the University of Maryland physicist Joseph Weber during the late 1960s and early 1970s recorded statistically significant events that were more intense when the detectors were aligned with the Galactic center.² Although other investigators had difficulty reproducing these experiments, earlier work by the physicist T. Townsend Brown corroborated Weber's findings. Brown monitored gravity wave activity over a period of more than 50 years and found cyclic variations in his data that reached maximum and minimum values when the Galactic center longitude was close to the nadir and zenith.^{3, 4} Much of Brown's early work on this, which was carried out at the Naval Research Laboratory in Washington, D.C., is still classified for some unknown reason.

Do Superwaves Periodically Jerk the Earth's Axis?

Is it merely a coincidence that the average time between superwave arrivals ($26,000 \pm 3,000$ years) so closely matches the period of the Earth's 26,000-year-long precessional cycle, or could galactic super-waves be a principal force influencing polar precession? Perhaps the Earth's precessional period has become entrained by the heartbeat of the Galactic core. Modern scientists have traditionally assumed that polar precession is activated solely by the tidal pull of the Sun and Moon. The Earth being slightly oblate (larger at its equator), this tidal force attempts to reduce the inclination of the Earth's equatorial plane with respect to the Sun and Moon, the plane being

maximally inclined to the ecliptic and the effect being strongest at times of solar–lunar conjunction or opposition at summer or winter solstice. But the angular momentum of the Earth’s rotation prevents the equatorial inclination from being reduced. Instead, the Earth responds like a gyroscope, translating this equator-tugging force into a polar-precessional force that is applied in the same direction that the poles presently precess—from west to east.

However, a superwave might produce far greater tidal forces. In the grip of a superwave gravity potential wave, the Earth would feel a tidal force pulling directly toward (or directly away from) the Galactic center, which would attempt to reduce the inclination of the Earth’s equator relative to the Galactic center. This precession-inducing force would have been at a maximum at times when the Earth’s polar axis was maximally inclined in this direction, and it was near such Galactic center “solstices” when past superwaves happened to arrive (based on dates for beryllium-10 peaks). Interestingly, the ancient Egyptians and Greeks set their equinoctial Great Cycle to begin at 12,700 years B.P., a date that approximates that of the most recent Galactic center solstice, 12,850 years B.P.

Greg Hodowanec, a researcher who has spent many years operating detectors that measure ambient gravity potential, has produced somewhat similar results in that his instruments register a gravity potential minimum when the Galactic center is at a nadir.⁵ Furthermore, he has observed significant changes in the shape of this Galactic center minimum occurring over a period of a few years. Devices of this sort may be a good way of keeping a watchful eye on the Galactic center’s activity. Unfortunately, since a galactic core gravity wave might not necessarily propagate at the speed of light, there is no assurance that it would arrive at the same time as its associated cosmic ray volley.

Close to the end of the millennium, a large number of psychic predictions were circulating claiming that the Earth would soon experience a change in the orientation of its spin axis, a so-called polar shift. The controversial historian Immanuel Velikovsky described a similar idea in 1955 in his book *Earth in Upheaval*, except the polar shift he proposed was an event that was supposed to have occurred thousands of years ago. He suggested that at the time when the continental ice sheets formed the Earth’s crust was aligned differently with North America situated farther to the north. He claimed that the ice age was brought to an end when the continents suddenly shifted by 20 degrees to their present latitudinal position, leaving the mammoths of Alaska and Siberia to perish in a newly

frozen arctic environment. He proposed that this catastrophic displacement was triggered by gravitational forces associated with Earth's supposed near collision with the planet Venus.

In the mid-1950s Professor Charles Hapgood espoused a similar theory, that climatic changes are brought about by sudden displacements of the Earth's crust, but he left out Venus as the cause. Rand and Rose Flem-Ath more recently have proposed a variation of this theory.⁶ They claim that Antarctica, during the ice age, was located almost 2000 miles from its present position, with its western Palmer Peninsula positioned close to where the southern tip of Chile is located today. They suggest that for this reason Antarctica's ice-age climate was far more temperate than it is today and that although its central mountainous region was glaciated, its shores remained deglaciated, harboring vegetation, animal life, and even a civilization that they identify with the legendary Atlantis. Furthermore, they propose that a major shift of the Earth's crust ($\sim 30^\circ$ of latitude) abruptly moved this continent to its present South Pole position, triggering upheavals that caused the destruction or "sinking" of Atlantis. The colder climate that ensued, they say, resulted in Antarctica with its purported civilization becoming completely covered with ice.

Geological evidence, however, contradicts such crustal displacement theories by showing that the Earth's crust has not departed appreciably from its current latitudinal location. For example, data from ice cores penetrated through various parts of the Antarctic ice cap show that all parts of this continent have been continually glaciated back through the last ice age and that Antarctica's temperature was as much as 9 degrees centigrade *colder* during the last ice age. This invalidates crustal shift theories, which instead claim it was warmer. Ice cores penetrated on the low-elevation western side of the Antarctic ice sheet (figure 3.7), such as the Byrd Station ice core (80°S , 120°W) and the J-9 ice core (82°S , 169°W), drilled through the Ross Ice Shelf, lead to the same conclusion.⁷, ⁸ Taking the J-9 site as an example, the crustal shift theory predicts that prior to 9600 B.C.E., this part of the Antarctic coast was deglaciated, with no surrounding ice shelf, and located outside the Antarctic Circle at about 60° S latitude, close to where the southern tip of Chile is situated today. Yet the lower portion of the J-9 ice record contains over 150 meters of ice age glacial accumulation prior to

9600 B.C.E., indicating that the ice shelf was present in that era. Also, like other ice records, the J-9 climatic data indicate that during the ice age, Antarctica was colder than it is today, not warmer.

The crustal shift theory also has difficulty explaining the temperature oscillations that occurred at the end of the ice age. As seen in figure 5.7, beginning about 14,500 years B.P., climate warmed to present-day temperatures and then recooled to ice-age temperatures at least three times before finally settling into the present interglacial mode some 11,600 years ago. To account for these swings with crustal movement, the crust would have had to repeatedly move by 30 degrees and then return to its former position.

This evidence indicates that Antarctica could not have shifted appreciably from its present position, certainly not more than a few degrees of arc. Although there is geological evidence that the Earth's magnetic pole axis has occasionally flipped to a new orientation, there is certainly none to suggest that its spin axis or crust has abruptly displaced by any substantial amount. Nevertheless, this ice core data does not rule out the possibility that sometime in the past, a cosmic gravitational disturbance might have given our planet a severe jerk, displacing its crust by several meters, rather than by thousands of kilometers.

There may have been a time when Antarctica's low-lying coastal regions were deglaciated, but this would have been much longer ago than the Flem-Aths suggest, and it would have been due to a global climatic warming rather than to a polar shift. For example, there was an 8000-year period at the beginning of the last interglacial, lasting from about 130,000 to 122,000 years B.P., when the Earth as a whole was warmer than it is today (recall the climatic profile in figure 3.8). If parts of the Antarctic coastline were deglaciated at that time, then the 1513 A.D. Piri Ri's world map from Turkey, which is said to depict Antarctica's true coastal contour, may have a much older origin than previously thought.

The Revelation of Saint John

The Book of Revelation of the Christian scriptures recounts a vision that appeared to St. John (first century A.D.) while he was on the Aegean island of Patmos. The global cataclysms that he vividly saw occurring in the future

bear a strong resemblance to the catastrophes described in the tale of Ragnarok and other legends.

As his vision begins, John sees in heaven a divine being sitting on a throne and holding in his right hand a book secured by seven seals. Twenty-four seated elders, crowned and clothed in white, form a ring around the throne. Immediately around the throne are four beasts, one being like a lion, a second like a calf, a third having a face like a man, and a fourth being like a flying eagle (Revelation 3:6–7). These match the description of the four signs that make up the Sphinx zodiac key, although the signs are given in a different order. Their presentation here calls to mind the zodiacal message of the prehistoric galactic superwave.

With the breaking of the first four seals that bind the book, four horsemen emerge, similar in many ways to the horsemen of the *Elder Edda*. These four are a white horse carrying a crowned conqueror armed with a bow, a red horse carrying a being who has been given the power to take peace from the Earth, a black horse carrying a man holding a pair of balances, and a pale horse carrying Death, with Hell following behind him. This scene is depicted in figure 12.1, which presents one of a series of thirteenth-century frescoes that adorn a corridor wall in the Dionysiou monastery on Mount Athos (northern Greece) and which depict scenes from the Book of Revelation. The monastery fresco shown in figure 12.2 depicts events that transpired upon opening the sixth seal. Revelation reports that phase as follows:

12. . . . and, lo, there was a great earthquake; and the sun became black as sackcloth of hair, and the moon became as blood;

13. And the stars of heaven fell unto the earth, even as a fig tree casteth her untimely figs, when she is shaken of a mighty wind.

14. And the heaven departed as a scroll when it is rolled together; and every mountain and island were moved out of their places.

15. And the kings of the earth, and the great men, and the rich men, and the chief captains, and the mighty men, and every bondman, and every free man, hid themselves in the dens and in the rocks of the mountains . . . (Revelation 6)

The darkening of the sun and reddening of the moon, which have their counterparts in the tale of Ragnarok, would be a sign of a cosmic dust invasion. The stars falling to Earth would be referring to meteor falls. As in other parts of the Bible, such as Isaiah, as well as in the Norse tale of Ragnarok, we find earthquakes occurring and people seeking shelter in caves. Enhanced earthquake activity could result from a number of possible causes—shifting of the Earth’s crust due to a change in the extent of glacial ice cover, tremors resulting from the impacts of large comets, and the impact of gravity waves that might accompany the superwave.

Chapter 8 of Revelation describes the occurrence of seven catastrophes heralded by seven angels sounding trumpets. First, there was “hail and fire mingled with blood,” which burnt up a third of all the trees and all the grass. With the second sounding, a “great mountain burning with fire was cast into the sea,” causing a third of the sea to turn to blood, killing a third of its creatures, and destroying a third of its ships. Then, a great burning star fell upon a third of the rivers and springs, making their waters bitter and causing many to die (dust from a comet?). When the fourth angel sounded, a third of the Sun, Moon, and stars were darkened so that light was diminished for a third part of the day. Some of these events are graphically depicted in the fresco shown in figure 12.3.



Figure 12.1. The charge of the four horsemen of Judgment Day. Dionysiou monastery, Mount Athos, Greece. The images were defaced in the nineteenth century by a mad monk who one night attempted to remove the eyes from all the monastery's icons. (Photo by the author)

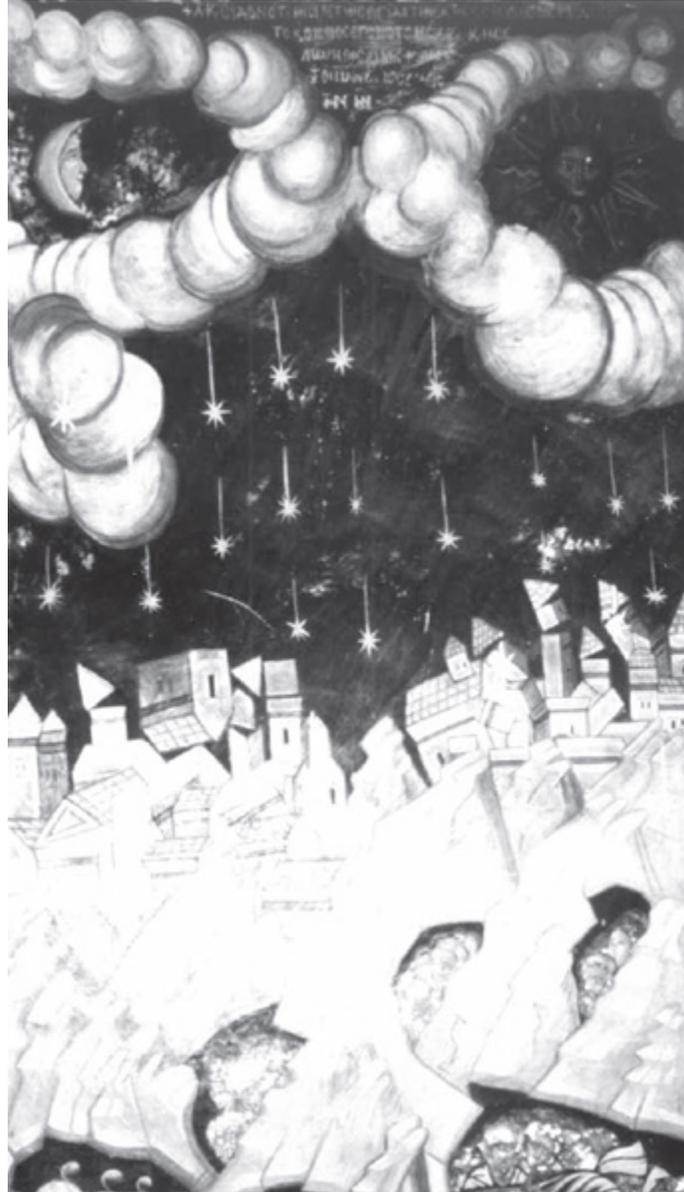


Figure 12.2. A fresco depicting the darkening of the Sun and Moon, falling of stars, and earthquakes as described in the Book of Revelation. Dionysiou monastery, Mount Athos, Greece. (Photo by the author)

Unlike most ancient catastrophe legends, Revelation frequently refers to celestial objects falling from the sky. Such passages have undoubtedly inspired a number of authors, as well as some astronomers, to propose that past global catastrophes have been brought about chiefly by large comets or asteroids colliding with the Earth. Sizable comets and meteors do periodically strike the Earth, such as the Tunguska comet, which exploded over Siberia in 1908, and the meteor that struck southern Arizona about

30,000 to 50,000 years ago and left a crater more than one kilometer in diameter. Enhanced meteoric activity would be expected if cometary bodies located near the heliopause sheath were being vaporized and fragmented by super-wave cosmic rays. Polar ice-core studies, though, show no evidence that the climatic transitions of the last ice age were precipitated by comet impacts. Cosmic bodies do hit the Earth from time to time, but it is more likely that future climatic catastrophes will be instigated by superwave-induced cosmic dust incursions.

Chapter 9 of Revelation goes on to describe the remaining trumpet soundings and their associated catastrophes. It tells of how another star fell from heaven to Earth and opened up a “bottomless pit,” which poured out smoke, as from a great furnace, which darkened the Sun and air. Out of this smoke came a swarm of human-headed locusts, wearing iron breastplates, that had the teeth of lions, the shapes of horses prepared for battle, and scorpion-like tails with stingers that could hurt men for five months (figure 12.4).

The description of the heads and teeth calls to mind the signs of Aquarius and Leo, which are oriented perpendicular to the Galactic center. The description of the warrior-like horse-shaped bodies and scorpion-like tails calls to mind the constellations of Sagittarius and Scorpio, which flank the Galactic center. Could these strange Sphinx-like beasts be indicating a causal connection between Galactic center cosmic rays and this cosmic sun-darkening smoke? The war-horse metaphor surfaces again when, with the sixth trumpet sounding, two hundred million lion-headed horses having breastplates of fire and brimstone come forth to slaughter one third of mankind.



Figure 12.3. A fresco depicting the partial darkening of the Sun and Moon, the storm of hail, and destruction of ships at sea. Dionysiou monastery, Mt. Athos, Greece. (Photo by the author)



Figure 12.4. The emergence of the human-headed, horse-scorpion locusts. Dionysiou monastery, Mount Athos, Greece. (Photo by the author)

The Book of Revelation then describes the opening of the “temple of God” in heaven, which is “filled with smoke from the glory of God, and from his power.” As related in chapter 16 of Revelation, seven angels clothed in pure white linen come out of this temple holding seven golden vials full of “the wrath of God.” A voice from the temple instructs them to pour these “seven plagues” upon the Earth and Sun, reminiscent of Aquarius pouring out his flood of cosmic water (cosmic dust) upon the Earth (see figure 12.5). The contents of the first vial, poured upon the Earth,

brings forth a “grievous sore” upon mankind’s misguided masses. The contents of the second vial, poured upon the sea, cause all sea life to die. As the third vial is poured upon the rivers and springs, their waters turn red like blood. The contents of the fourth vial, poured upon the Sun, give him the power to “scorch men with fire” and to scorch them “with great heat.” The fifth vial, poured out upon the “seat of the beast,” brought darkness and pain to the beast’s kingdom. The sixth vial was poured out upon the Euphrates River, causing its waters to dry up. The seventh vial was poured into the air, whereupon there was a mighty earthquake, thunder, lightning, and hail.

Many of the effects described in the above passage resemble those resulting from a cosmic dust incursion. Note that the pouring of the “wrath of God” upon the Sun causes it to burn Earth’s inhabitants with a great heat, similar to the T Tauri–star scenario we discussed earlier. As in Revelation, this cosmic dust incursion would bring darkness, drought, and climatic disturbances. The “grievous sore” could be a reference to irritation from the acidic dust or to skin cancer inflicted by the increased UV radiation.

The Fátima Prophecy

Three children living near the town of Fátima in Portugal claimed to have encountered a snow white radiant being one spring day in 1916 while tending their sheep. Identifying himself as the angel of Peace, he invited them to join him in prayer. Afterward he administered to them the sacrament of communion, then, after additional prayer, he disappeared. In the months that followed, the children prayed at regular intervals as the angel had instructed.



Figure 12.5. A fresco depicting the streams of “the wrath of God” being poured out upon the Earth, Sun, and Moon. Dionysiou monastery, Mount Athos, Greece. (Photo by the author)

On Sunday, May 13, of the following spring, the children witnessed a new apparition while tending sheep in a large basin-shaped pasture. They reported seeing a brilliant flash of light, and afterward beheld a young woman of transcendent beauty, whose luminescent form hovered above a small holm oak tree. She asked the children to come to that spot on the 13th of every month to pray with her for the conversion of mankind to spirituality.

News of the vision spread to the surrounding community, and with each successive monthly rendezvous, more and more people came to watch. In July, when the children went to the spot for the third time, the Lady showed them a frightening vision and gave them an important message that they were to keep secret until the year 1960, when a major portion of the message was to be released. None of the others attending saw or heard the vision. However, at subsequent monthly meetings the crowd became aware of certain paranormal phenomena, evidenced by the dimming of the Sun's light, the presence of a multicolored radiance tinting the clouds and landscape, the descent of a great globe of light to treetop level, and the downward fluttering of flower petals that dissolved before touching the ground.

The promise of a miracle on October 13, for the sixth and last rendezvous with this apparition, drew a throng of 50,000 to 80,000 people, despite a strong downpour of rain. The Lady of the Rosary appeared to the children around noon with the message that people should recite the rosary daily. Then, all who had gathered witnessed the following vision. The rain ceased and the clouds seemed to part, revealing what one witness described as "a disc with a sharp rim and clear edge, luminous and lucent, but not painful to the eyes." Its color was "as changeable as the luster of a pearl."⁹ The "sun" then began to spin on its axis like a pinwheel. As it whirled, streamers of light came from its rim and flashed across the sky, coloring the landscape and faces of the spectators with a variety of constantly changing colors.

After about four minutes, the "sun" stopped spinning. Then, after a brief rest, it resumed its spinning and its fantastic display of varicolored light. Again it stopped and then resumed spinning for a third time, again throwing off light of different colors. Then, retaining its rotary motion, this "sun" departed from its position and boldly advanced on the Earth, threatening to squash the people with its huge and fiery mass. As the heat increased, the crowd began to pray. Just as it seemed that the orb was about to crash into the crowd, the disk retreated into the sky. When the people rose from their knees, they found that their clothes, which minutes before had been completely soaked, were now completely dry. The ground too had dried.

The Catholic Church began an official inquiry into the events at Fátima in May 1922. After eight years of intensive investigation, the Church issued a letter recognizing the validity of the apparitions and authorizing the adoration of Our Lady of the Rosary of Fátima. The letter recording the secret message that the children received on July 13, 1917, was passed along to the Catholic Church hierarchy, but when the long-awaited date of 1960 arrived, the message continued to be withheld. In 1967, a Vatican spokesman disclosed that Pope Paul VI had concluded that it was not yet the proper time to reveal the contents of the message. And so, until this day, the Catholic Church has continued to guard the letter.

The book *Fatima Prophecy* contains information that the author Ray Stanford psychically channeled from a divine “Source” between August 1971 and March 1972 and which provides insights into the contents of the Fátima prophecy and the meaning of the miracle performed on October 13. Portions of these channeled writings state that the Fátima prophecy was foretelling that, before the end of this century, the Earth would encounter an extremely hazardous “cosmic-solar” event. As we shall see, the described phenomenon sounds very much like an encounter with a Galactic superwave.^{[*40](#)}

For the most part, these channeled writings are concerned with the present state of mankind’s spirituality and the need for its further development. Our interest here lies specifically with the portions that describe the nature of the prophesied events. Let us begin with the channeled writing of March 3, 1972. In those the Source relates:

At the beginning of that reading, we gave that man, humanity, is as one walking in the sleep upon the edge of a precipice, having the vision neither to look upward to the stars nor to perceive that precipice upon which, in a somnambulistic state, he walks. Thus, without a redeeming factor, without eyes to see, ears to hear, and heart to understand, he is in danger of the precipice itself.

We gave also at that time that there was a great cosmic-solar event causing a radiation which contributed to [the mutational] change in the developing protoanthropoids and those which succeeded them. This,

too, relates to events which are to come within the Earth in not the distant future.

From one-third to two-thirds of the Earth's population may meet death unless that, which by some has been called a chastisement, is averted by turning away from materialism and selfishness to the ways of Love, and by going within and allowing the mind to respond more perfectly to Spirit.^{[10](#)}

Considering the symbology of the Fátima apparition of 1917, the psychically channeled Source continues:

In that appearance at Fatima, there was the likeness of the woman clad essentially in that which was filled with light, but white, with a blue veil, of a sort, covering the head and dropping down the sides; and there was the golden thread, as mentioned, thereabout. There was the likeness of a sphere or ball in the region of the heart center, and the two beams of light, as if a cord, suspending it [the sphere] about the neck; and downward toward the hem of the garment, there was a glowing point of light, or sun, or star. Upon the right hand, as mentioned, was held a rosary of five decades . . . that appearance is of major significance, for it was upon that occasion that major messages of significance to *those events which are to come* were given, despite the fact that they have not been released by the Church.

As mentioned earlier, . . . some years in the past, a cosmic-solar event—a *cosmic*-solar event—caused the Earth to be showered by radiation and particles from the Sun, creating mutational changes significant in the acceleration of the evolution of bodies toward the perfected vessel of God's becoming manifested individualized. That is to say, it accelerated the evolution of man.

The star symbolizes not only an area of cosmic rays and [energy] intensity (related to that which can only be understood later by astronomical studies of the formation of stellar bodies) which the solar system approaches in space, but that which will be the response of the day star, the Sun itself, and of Earth to it. Its being between the legs in the robe symbolizes its duality of manifestation as the area of cosmic

activity in space, which the solar system approaches, to which the Sun will respond, and the sun's response itself.^{[11](#)}

In reporting that the solar system will soon encounter a region of high cosmic ray intensity, the Source appears to be describing the nearing approach of a Galactic superwave. The starlike point of light appearing on the robe of the Lady of the Rosary, said to symbolize these cosmic rays and their associated energy, would be representing the appearance of the Blue Star at the position of the Galactic center. Recall that the electromagnetic emission beamed toward the Earth by the superwave cosmic rays would appear in the sky as a pointlike source of light.

At the time of this message, astronomers were in the early stages of theorizing about Galactic core explosions and had not yet come to realize that such explosions also take place in our own galactic nucleus. Thus, the prediction that the reality of this cosmic ray phenomenon would later be discovered through astronomical studies relating to the nature of stellar bodies (that is, Galaxy core masses) appears to be quite accurate.

In addition, the Source's statement that these events were responsible in the past for the decimation and mutational evolution of the human species and that they will play a similar role in the future is precisely the kind of thing one would expect from a superwave. This passage is also in agreement with paleontological findings indicating that biological evolution is shaped by a catastrophic selection process, one that possibly involves episodes of elevated cosmic ray radiation.

The superwave scenario is also implicated by the Source's statement that the Sun would be equally involved in this catastrophic event, due to its adverse response to these cosmic rays. Further on, the Source that Mr. Stanford psychically channeled gave additional information consistent with the notion that the Sun could be activated into a T Tauri-like condition:

At the present time, the physical solar system heads in space at a great rate toward a mass of cosmic energy and particles which, in the not-distant future, will collide with the Sun and planets and energize the ionosphere of planets and the atmosphere, and will energize the photosphere of the Sun—unless it is averted. Hear now the meaning

and the actuality of that which may come, of that which the children of Garabandal feared and which caused them to fall in terror and in screams.^{[*41](#)} Hear now that which is of such significance that the prophets more than two thousand years in the past spoke together of it.^{[12](#)}

The Source seems to suggest that the effects of this cosmic-solar event could be alleviated through divine intervention provided that mankind mends its evil ways, a theme found in the Bible and also in some American Indian legends:

Without the early event mentioned . . . man would not be where he is today, for the physical form would not be so evolved. Now, another cosmic-solar event is about to occur. If man approaches this properly, the evolution brought about by it will be smooth, and many deaths and sufferings will be averted; for the activity of the angelic realms and those who serve them from outside the Earth, would cause the change of conditions that this may be averted, but not unless the consciousness of those beings animate in the solar system and in the Earth, changes, for the Earth *must change in its consciousness*.

You each must repent of materialistic ways, and according to your own concept of God and religion, must devote yourself fully and diligently to it, praising the Lord daily. You must go into your own closet of consciousness and meet the Lord and receive His Holy Spirit, at whatever level you know it.^{[13](#)}

The Source then mentions the involvement of cosmic dust and the consequent activation of the Sun from the impact of this dust. It also describes details of how the solar wind would have increased in intensity and adversely affected the Earth.

The activity of cosmic “dust” and cosmic rays encountering the Sun and planetary body of the Earth would cause a chemical reaction in the ionosphere. The reaction of the Sun itself would cause a great enhancement and increase of solar winds, of atomic hydrogen moving

through space, and of other isotopic substances carried by magnetic fields to the Earth and other planets, encountering and affecting even the atmosphere.¹⁴

Following this, the channeled Source describes the significance of the “miracle of the sun” witnessed in Fátima on October 13, and portends the occurrence of periods of darkness and solar activity:

This was prophesied in Fatima, in the sphere of the Earth being suspended—by Love—away from “falling into” the star or sun. Thus, it was prophesied, symbolically, that only by turning to the Love and devotion . . . would discernment through the willingness of Love, prevent the Earth’s falling into the drastic catastrophe and, in a sense, chastisement that may come about through this cosmic-solar event.

This, also, was symbolized in the final miracle of Fatima, for that has been called the miracle of the sun. The sky was darkened on that day by clouds, and it rained . . . The sky and clouds, literally, had moved apart, and that which appeared to be the sun was seen. Three times it spun upon its axis, showering [as if a warning] rays of light and influence. Yet, it was not as the sun, for it was darkened and dimmed and you could look upon it—but with awe or terror. Then it descended, as if to threaten the Earth; and many fell upon their knees and repented.

This was a symbolic prophecy of what could happen to the Sun. The three times of spinning and then ceasing symbolize three days. The “sun’s” darkness, compared to the normal sun, symbolizes that the sun shall be darkened. The rays of light symbolize that strange and diverse energies shall come from the sun and shower the Earth. The finally coming closer symbolizes that, in the final phase, the sun will emit energies that would change the Earth drastically as the water was dried from the clothing and the ground [at Fátima].

The Source goes on to describe what appears to be a severe solar flare storm and its effects on the Earth:

Imagine, if you will, a showering of the ionosphere, not alone with cosmic particles whereby it begins to glow as a great aurora, but then with the combination of basic isotopic elements from space, from the Sun. These, reaching the Earth in a highly agitated state, would combine in the ionosphere and in the stratosphere, creating electrical charges and great [electrostatic] discharges from clouds [or from the Earth to clouds]. Noxious and gaseous clouds containing isotopes would form . . .

. . . Then, for half the world it is prophesied that it [the “chastisement”] shall come on a day that is lighted and the sun is seen. Then the cosmic-solar event will begin. The Earth shall be showered with cosmic rays and atomic forms of specific elements. Chemical changes in the atmosphere, highly electrically charged clouds, and noxious clouds and gases will become present; even the presence of great quantities of ozone will be inclined to poison many, that they would die of body.

That is why Padre Pio was told that when you see these things come to pass, you must close yourself into your own house and keep the windows and doors closed and never open them or go out, or you will die. For *if* such occurs, you would expose yourself too greatly to these conditions, even to the radioactivity itself, from the cosmic-solar event caused by the Earth and the sun encountering the area of concentrated cosmic particles and materials in space, and the response of the Sun thereto . . .

Then will begin the three days of darkness, fulfilling the [biblical] prophecy that, “The sun shall be darkened and the moon shall not give forth her light.” That was symbolized in the cutting down [dimming] of the light of what appeared to be the Sun at Fatima; and the three days were symbolically prophesied by the three times of spinning upon its axis.

The spinning symbolizes the drunkenness and chaos by which men shall respond to the darkness of the sun and to the energies that it emits. The strange colors there at Fatima symbolize the strange energies and rays which the Sun shall effect upon the Earth, the colors and fires which shall come even in the skies and from the clouds. [15](#)

The Source then describes how the event, if not averted, will cause a mass destruction of the human race and alter the genetic makeup of those who survive:

Then, there shall be the final burst of energy in that event; and then it shall begin to let off. Those who survive shall have fallen upon their knees in repentance. Many shall have died of failure of heart or by the conditions availed by the cosmic-solar event.

Those who would survive such will be aided by those who would come from outside the Earth, and those of the White Brotherhood, and those of the angelic realms. It will be important in those periods that they would aid, for there will be the disposal of the bodies of from one-third to two-thirds of the Earth's population.

What is more, those that survive shall have been changed, even though they remain within their houses, where they must pray and meditate all during this event . . . Even the genetic pattern in many of these will be changed. A new race of man shall have begun. *The evolution of man shall have been enhanced.* The offspring shall change in their appearance. Strange shall be their eyes, and a new tendency for a different coloration of eye, varying from the normal eye colorations as known [at the present time]. There shall be a reshaping, to some extent, of the basic proportions of the body and of the cranium.

. . . then shall there begin that period of peace and resurrection of consciousness toward Godliness among men. [16](#)

Future Vision

There have been many predictions that a cataclysm would come at the turn of the century. The sixteenth-century seer Nostradamus predicted that a world catastrophe was to come in July 1999. The American psychic Edgar Cayce prophesied in 1934 that between 1958 and 1998 there would be land upheavals and subsidences all over the planet, volcanic eruptions, and a shifting of the Earth's poles in 2000 that would cause the warming of the polar regions. Dr. Chet Snow in his book, *Mass Dreams of the Future*, describes his dream of a major collapse of civilization occurring in 1998

brought about by widespread volcanic eruptions and earthquakes resulting in the submergence of most of California.¹⁷ In 1976, the clairvoyant Aron Abrahamsen echoed the predictions of the Hopi Indians that a new Sun would come into view by the year 1998. Also the clairvoyant Gordon-Michael Scallion foresaw that, beginning some time in 1998, a blue star, or “second sun” would appear and would herald coming Earth changes. He said it would be 10 times as bright as Venus and that it would come in the form of a comet. In their book *The Mysteries of the Great Cross of Hendaye*, Jay Weidner and Vincent Bridges decipher an inscription engraved in the base of the Cross at Hendaye, an enigmatic monument found in a churchyard in the French coastal town of Hendaye, and find that it foretells of a celestial disaster launched from the Galactic center that was to arrive in 2002.¹⁸

Although these predicted dates have come and gone without any serious event, people continue to receive messages of an impending occurrence. Many predictions target the approaching Mayan calendar end-date of December 21, 2012, a time when the winter solstice sun will coincide approximately with the galactic plane–ecliptic crossing point in Sagittarius. Researcher John Major Jenkins has suggested that an era of world transformation will begin on that date.¹⁹ The Maya believed that on this date the doorway opens into the Heart of Creation, the center of cosmogenesis. This solstice position was so important to the Maya that they memorialized it in their temple sitings and symbolized this solar-galactic-plane conjunction in their sacred games. Interestingly, this location lies in Sagittarius, only a few degrees east of the Galactic center, suggesting that the Maya were aware that this Galactic center region has a major influence on terrestrial cataclysmic cycles.

Whether a mishap will indeed occur on the claimed dates only time will tell. The Galactic center is currently exhibiting activity even in its quiescent state. Observations made with the Chandra X-ray Observatory have shown that Sgr A* is a flaring X-ray source. On October 26, 2000, the X-ray emission from Sgr A* was observed to brighten 45-fold within the space of a few minutes and then decline to its preflare intensity over a period of 3

hours. X-ray observations should be a good way to monitor Galactic center activity in the future.

Humanity received a wake-up call on December 26, 2004, with the occurrence of a magnitude 9.3 earthquake off the coast of Sumatra in Malaysia. The tsunami that accompanied it left over 240,000 either dead or missing. It was the worst to affect this area since the 1883 explosion of Krakatau. This earthquake was so strong that it exceeded by a factor of 10 the next most powerful earthquake to occur anywhere on our planet in the past 25 years. Also quite alarming, just 44.6 hours later on December 27th, gamma ray telescopes orbiting the Earth picked up the arrival of the brightest gamma ray burst ever recorded! This raises the question of whether these two mega events may have been causally linked. The chance is 1 in 5000 that two such distinctive events would have been separated in time purely by coincidence.

Other gamma ray bursts have been detected whose source explosions were intrinsically more powerful than this one, but because they originated in other galaxies, those bursts were not very bright when they arrived at our solar system. What makes the December 27th gamma ray burst unique is that it is the first time that a burst this bright has been observed, and this may be attributed to the fact that it originated within our own Galaxy, its source being tens of thousands of times closer. In fact, telescopes converging on its source, SGR 1806-20, found it lay in the constellation of Sagittarius about 10 degrees northeast of the Galactic center and between 20,000 to 32,000 light-years away from us, or approximately as far away as the Galactic center.

Was the December 26th earthquake and tsunami triggered by the SGR 1806-20 outburst? As I elaborated in my 1983 Ph.D. dissertation, galactic core explosions are likely to produce gravity wave shock fronts that travel in association with their cosmic ray outbursts and these waves could induce sizable tidal forces on the Earth capable of triggering earthquakes (as discussed at the beginning of this chapter). One such Galactic tsunami may have been responsible for triggering a series of supernova explosions as it swept through our own Galaxy and passed us about 14,200 years ago; see chapter 10. It is reasonable to expect that a similar phenomenon could happen on a much less energetic scale when the explosion arises from a

massive star rather than from a multi-million solar mass galactic core. In fact, astronomers have theorized that gravity wave pulses might travel in association with gamma ray bursts.

Gamma ray photons are deflected by gravitational fields they happened to encounter in the course of their flight, an effect similar to the bending of starlight by the Sun's gravitational field. Also they are scattered by dust and cosmic ray particles they happened to encounter. As a result, they would not travel towards us along a perfectly straight-line path and so would be expected to arrive slightly later in comparison with their associated gravity wave pulse which would pass through space relatively unimpeded. In the case of the December 27th gamma ray burst, a 44.6 hour arrival delay for gamma rays traveling a 26,000 light-year journey, would amount to a delay of just one part in 5 million. So if the gravity wave reached us at the speed of light, the gamma ray burst would have progressed towards us 0.2 millionths slower than the gravity wave pulse due to its more convoluted path.^{*42} Therefore, a causal association between the December 27th gamma ray burst and December 26th Malaysian earthquake is entirely plausible. Unfortunately, the only two gravity wave telescopes that might have been able to detect this wave were down for servicing at that time, so it was not possible to check for sure if a gravity wave was the ultimate trigger of this earthquake.

If anything, the December 27, 2004, gamma ray burst shows us that we do not live in a peaceful celestial environment. And if the December 26th earthquake was in fact part of this same celestial event, we see that this stellar eruption has claimed many lives. For this reason, it is important that we prepare for the possibility of even stronger events in the future, the arrival of superwaves issuing from the core of our Galaxy. Like the December 26th earthquake and the December 27th gamma ray burst, the next superwave will arrive unexpectedly. It will take us by surprise.

By studying the spacing of cosmic ray peaks in the geologic record, we may infer that at this very moment several high-intensity galactic superwaves are on their way toward us from the Galactic center. Low-intensity superwaves may occur even more frequently. Radio telescope observations indicate that the Galactic core (Sagittarius A*) has erupted 14 times in the past 6000 years, each time spewing out a cloud of ionized gas

(see figure 12.6).²⁰ About 80 percent of these Galactic core outbursts occurred within 500 years of one another, yet it has been 700 years since the last event. There is a high probability, then, that another core explosion event horizon might soon be passing us. The ice core beryllium-10 record indicates that for the past 11,000 years Galactic core outbursts have not been large enough to increase terrestrial cosmic ray intensities above the prevailing cosmic ray background level. Will the next volley be a minor one like those of the past 6,000 years or will it be sufficiently intense to throw our planet into another ice age? Astronomical observations provide no way of telling us in advance.

Nevertheless, there may be cause to worry even about the arrival of a relatively low-intensity superwave. Although such a volley may be too weak to induce a major change of the Earth's climate, there is still a possibility that it will carry a hazardous electromagnetic energy pulse (EMP) similar to that generated by a high-altitude nuclear explosion. While a superwave EMP might have passed unnoticed 700 years ago, when the last outburst would have been seen, it could raise havoc if it passed us today. A strong EMP could produce high-voltage surges in electric power transmission lines and telephone lines sufficient to cause power failures and communication blackouts over large continental areas. In addition, there is always the fear that such a pulse might be mistaken for an aerial nuclear detonation and might induce the launching of nuclear-armed missiles. The risk that such a mishap might trigger a nuclear war between the former eastern bloc countries and the West was greatly reduced after the end of the cold war in the late 1980s. However, there still remains a danger of an accidental launching given the continued presence of nuclear missiles in various countries.

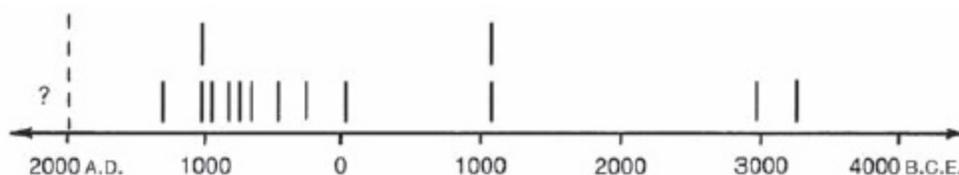


Figure 12.6. History of minor Galactic center explosions during the past 6000 years; dates approximate times when radiation pulses would have arrived from the Galactic center. Note the earliest date is 3300 B.C.E. (Based on data of Lacy et al., *Astrophysical Journal*, pp. 132–46.)

In 1989, when the superpowers were still maintaining a nuclear arms stalemate, the Starburst Foundation, a research institute dedicated to superwave research (appendix C), conducted an outreach project in which it sent information about the superwave phenomenon to U.N. ambassadors, strategic defense centers, and governmental and nongovernmental organizations around the world, warning them about the potential hazard of a superwave electromagnetic pulse. The foundation also proposed that nations participate in setting up an international superwave monitoring station that would warn countries of any signs of the impending arrival of a superwave.

Steps should be taken to investigate how modern technology could be used to lessen the effects of an impacting superwave should one arrive in the near future. The objective would be to find a way to create some sort of force field just outside the solar system on the side toward the Galactic center that would act as a shield to deflect approaching galactic cosmic rays so that they pass around the solar system. If this was possible, the cosmic rays could be prevented from vaporizing nearby cosmic debris and propelling the resulting dust into the solar system, thereby breaking the sequence of events that might otherwise significantly alter the Earth's climate and dangerously activate the Sun. Detonating hundreds of atomic bombs in space would not be a wise method of creating such a shield; the hot plasma they would generate would vaporize nearby interstellar debris and aggravate the cosmic dust problem.

Perhaps a safe way to generate a “star shield” is to set up an electrostatic force field in space that would deflect cosmic rays as they passed through it.²¹ Such force fields could be created by employing exotic technologies that blend phased-array microwave radar technology with Nikola Tesla's method of generating stationary electromagnetic waves through repeated low-frequency pulsing. For example, with present technology, it is possible to refract a microwave beam so as to form a counterpropagating beam that is the *phase conjugate* of the original beam.²², ²³ These two beams precisely phase-lock so as to form a stationary, electromagnetic wave pattern capable of storing an enormous amount of power, many orders of magnitude greater than the input power used to generate it. By means of such “scalar wave” beams, as they are

sometimes called, energy may be transmitted over large distances between the phase conjugator and a remote target without suffering significant losses. Using several such microwave beams in the form of a phased radar interferometer array, a high-intensity electric field deflector shield might be established outside the solar system for deflecting superwave cosmic rays.

Much of the work on phase conjugate radar technology has not been publicly disclosed. Nevertheless, strange energy phenomena continue to occur around the world that do not appear to be of natural origin: the worldwide epidemic of crop circles, and strangely transparent luminous spheres that speed through the sky, divide, and subsequently recombine. Could these all be evidence that such technology does exist and is currently being tested in secret? If energy fields can bend wheat stems in farm fields thousands of miles away, perhaps the same technology can deflect cosmic rays approaching our solar system and thereby prevent the destruction of our planet.

Little is known about the black projects currently being undertaken in secret government laboratories or whether research is being done to investigate the superwave phenomenon. However, certainly no such research is presently being done in the unclassified world. Instead, efforts toward its investigation are consistently opposed by reactionary elements in the scientific establishment. Even though the United Nations declared the 1990s to be the International Decade for Natural Disaster Reduction, the world has no contingency plans to deal with a global superwave disaster should one unexpectedly arrive. Although the sky may look charming on a clear night, its appearance can be deceiving. Tomorrow we could wake up and find the Fenris-wolf once again freeing himself from the chains that have bound him for so many years.

THIRTEEN

REQUIEM



Some ancient legends that describe the occurrence of global catastrophes convey an extraordinary amount of detail about these events, indicating that their authors had highly developed skills of observation. Consequently, these legends are evidence that science existed in prehistoric times. After all, science essentially involves the ability to observe accurately a natural phenomenon and record those observations so that they may be communicated to others. Anthropologists have marveled at the technological achievement of prehistoric tribal cultures that developed a means of keeping a lunar calendar by carving notches on pieces of bone or sticks of wood. But this feat falls far short when compared to what Stone Age peoples accomplished in informing us about the terminal Pleistocene galactic superwave, perhaps the most trying event that the human race has experienced in its entire history.

Concepts symbolically encoded in astrology and conveyed in the constellations and their associated myths indicate an advancement in physics and astronomy that rivals that of twenty-first-century science. Is this knowledge that was consciously acquired through the labors of scientists living in an advanced prehistoric civilization that once populated the Earth? Is it information that was obtained through an inner channel of intuition or through psychic contact with spiritual beings? Or was this knowledge brought to us by visitors from some other star system, beings who had access to radio telescopes and sensitive electronic microwave detectors capable of imaging the arc-shaped radio-emitting structures

hidden near the Galactic center and of discerning the Leo–Aquarius temperature variation in the cosmic microwave background radiation field? Without these legends and ciphered messages, modern science might still be ignorant of the elusive superwave phenomenon, which comes without warning “like a thief in the night.”

Because of its special nature, we will conclude with the following prayer that the Aztecs recited to their supreme god Tezcatlipoca. It gives a graphic and touching account of the darkness, drought, starvation, and suffering that our ancient predecessors endured for many generations during the course of this terrible cosmic hurricane:

O mighty Lord, under whose wing we find defense and shelter, thou art invisible and impalpable, even as night and the air. How can I, that am so mean and worthless, dare to appear before thy majesty? Stuttering and with rude lips I speak, ungainly is the manner of my speech as one leaping among furrows, as one advancing unevenly; for all this I fear to raise thine anger, and to provoke instead of appeasing thee; nevertheless, thou wilt do unto me as may please thee. O Lord, thou hast held it good to forsake us in these days, according to the counsel that thou hast as well in heaven as in Hades, alas for us, in that thine anger and indignation has descended upon us in these days; alas in that the many and grievous afflictions of thy wrath have overgone, and swallowed us up, coming down even as stones, spears, and arrows upon the wretches that inhabit the earth!—this is the sore pestilence with which we are afflicted and almost destroyed. O valiant and all-powerful Lord, the common people are almost made an end of and destroyed; a great destruction the ruin and pestilence already make in this nation; and what is most pitiful of all, the little children, that are innocent and understand nothing, only to play with pebbles and to heap up little mounds of earth, they too die against stones and a wall—a thing very pitiful and grievous to be seen for there remain of them not even those in the cradles, nor those that could not walk or speak. Ah, Lord, how all things become confounded! Of young and old and of men and women there remains neither branch nor root; thy nation and thy people and thy wealth, are leveled down and destroyed.

O our Lord, protector of all, most valiant and most kind, what is this? Thine anger and thine indignation, does it glory or delight in hurling the stone and arrow and spear? The fire of the pestilence, made exceeding hot, is upon thy nation, as a fire in a hut, burning and smoking, leaving nothing upright or sound . . . Perhaps, hast thou altogether forsaken thy nation and thy people? Hast thou verily determined that it utterly perish, and that there be no more memory of it in the world, that the peopled place become a wooded hill, a wilderness of stones? Possibly, wilt thou permit that the temples, and the places of prayer, and the altars, built for thy service, be razed and destroyed, and no memory of them left? Is it, indeed, possible that thy wrath and punishment and vexed indignation are altogether implacable, and will go on to the end to our destruction? Is it already fixed in thy divine counsel that there is to be no mercy nor pity for us, until the arrows of thy fury are spent to our utter perdition and destruction? Is it possible that this lash and chastisement is not given for our correction and amendment, but only for our total destruction and obliteration; that the sun shall never more shine upon us, but that we must remain in perpetual darkness and silence; that never more wilt thou look upon us with eyes of mercy, neither little nor much?

Wilt thou after this fashion destroy the wretched sick that cannot find rest, nor turn from side to side, whose mouth and teeth are filled with earth and scurf? It is a sore thing to tell how we are all in darkness, having no understanding nor sense to watch for or aid one another. We are all as drunken, and without understanding: without hope of any aid, already the little children perish of hunger, for there is none to give them food, nor drink, nor consolation, nor caress; none to give the breast to them that suck, for their fathers and mothers have died and left them orphans, suffering for the sins of their fathers . . .

O most compassionate Lord, thou knowest that the common folk are as children, that being whipped they cry and sob and repent of what they have done. Perhaps, already these poor people by reason of their chastisement weep, sigh, blame, and murmur against themselves; in thy presence they blame and bear witness against their bad deeds, and punish themselves therefore. Our Lord, most compassionate, pitiful,

noble, and precious, let a time be given the people to repent; let the past chastisement suffice; let it end here, to begin again if the reform endure not. Pardon and overlook the sins of the people; cause thine anger and thy resentment to cease; repress it again within thy breast that it destroy no further; let it rest there; let it cease, for of a surety none can avoid death nor escape to any place. We owe tribute to death; and all that live in the world are vassals thereof; this tribute shall every man pay with his life . . .

O most pitiful Lord, at least take pity and have mercy upon the children that are in the cradles, upon those that cannot walk. Have mercy also, O Lord, upon the poor and very miserable, who have nothing to eat, nor to cover themselves withal, nor a place to sleep, who do not know what thing a happy day is, whose days pass altogether in pain, affliction, and sadness. Than this, were it not better, O Lord, if thou shouldst forget to have mercy upon the soldiers and upon the men of war whom thou wilt have need of sometime? Behold, it is better to die in war and go to serve food and drink in the house of the Sun, than to die in this pestilence and descend to Hades. O most strong Lord, protector of all, lord of the earth, governor of the world and universal master, let the sport and satisfaction thou hast already taken in this past punishment suffice; make an end of this smoke and fog of thy resentment; quench also the burning and destroying fire of thine anger; let serenity come and clearness [light]; let the small birds of thy people begin to sing and to approach the sun; give them quiet weather; so that they may cause their voices to reach thy highness, and thou mayest know them.¹

APPENDIX A

COORDINATES AND PROPER MOTIONS FOR KEY CONSTELLATION STARS

Star Name	Right Ascension (1950)	Declination (1950)	Proper Motion per Century (RA) (Dec)	
γ Sge (FK5)	19h 56m 31.994s	+19° 21' 18.43"	+0.465s,	+2.34°
δ Sge (FK5)	19h 45m 09.484s	+18° 24' 34.65"	+0.048s,	+0.83°
δ Sgr (FK5)	18h 17m 47.603s	-29° 51' 04.64"	+0.270s,	-2.82°
γ Sgr (FK5)	18h 02m 35.739s	-30° 25' 35.81"	-0.420s,	-18.49°
Galactic Center	17h 42m 29.335s	-28° 59' 18.6"	—	—
ν Sco (FK5)	17h 27m 21.728s	-37° 15' 28.60"	-0.014s,	-3.10°
ϵ Sco (FK5)	16h 46m 55.262s	-34° 12' 15.57"	-4.936s,	-25.2°
α Sco (FK5)	16h 26m 20.255s	-26° 19' 22.01"	-0.072s,	-2.03°
β Cru (FK5)	12h 44m 47.041s	-59° 24' 56.86"	-0.626s,	-1.35°
γ Cru (FK5)	12h 28m 22.748s	-56° 50' 00.57"	+0.279s,	-26.23°
α Cru (FK5)	12h 23m 48.041s	-62° 49' 19.77"	-0.519s,	-1.21°
δ Cru (FK5)	12h 12m 28.626s	-58° 28' 15.19"	-0.525s,	-0.89°
Vela Pulsar	8h 33m 39.19s	-45° 00' 10.0"	-0.17s,	+2.8°
ξ Ori (ACRS)	6h 09m 05.8s	+14° 13' 18.5"	-0.012s,	-2.0°
ν Ori (FK5)	6h 04m 42.963s	+14° 46' 34.33"	+0.042s,	-2.13°
χ_2 Ori (ACRS)	6h 00m 57s	+20° 08' 29.0"	+0.008s,	-0.27°
χ_1 Ori (ACRS)	5h 51m 25.2s	+20° 16' 07.4"	-1.33s,	-8.46°
Crab Pulsar	5h 31m 31.405s	+21° 58' 04.39"	-0.08s,	+0.5°

Data for stars marked FK5 are taken from the FK5 star catalog, available from the U.S. Naval Observatory through its Internet FTP connection: pyxis.usno.navy.mil under the Pub directory. Data for stars

marked ACRS are taken from the Astrographic Catalog of Reference Stars. Errors for the FK5 proper motion range from: ± 0.003 s to ± 0.013 s and from $\pm 0.05''$ to $\pm 0.10''$.

APPENDIX B

THE DURATION OF GALACTIC CORE EXPLOSIONS

Radio astronomers have long presumed that a galaxy's interstellar magnetic fields prevent charged cosmic ray particles from its core from traveling along a straight-line course. This has led them to misinterpret the nature of the large radio-emitting lobes seen to flank radio galaxies, which, in turn, has led to the current misconception that Galactic core explosions recur relatively infrequently. Let us take a moment to see how these misconceptions arose.

In the case of a radio galaxy, such as that shown in figure B.1, astronomers assumed that cosmic ray particles emitted from the Galaxy's core strongly interact with interstellar and intergalactic magnetic fields to form what is called a magnetically bound plasma. The cosmic rays were imagined to become thoroughly entangled, like those in the turbulent gas of a supernova remnant shell and to radiate synchrotron radio emission uniformly in all directions.

The speed at which these entrapped cosmic rays would diffuse away from the core was thought to be determined by the speed of the plasma's own rate of expansion, the plasma being thought to behave somewhat like a slowly expanding gas or fluid. Seeing that the lobes appear to project out from either side of their parent galaxy for hundreds of thousands to millions of light-years and that the core of the parent galaxy is currently active, astronomers assumed that these synchrotron-radiating cosmic rays were escaping from the galaxy's nucleus for millions of years. They then presumed that core explosion events in other galaxies typically last millions of years. Figuring that only a few percent of all galaxies are currently

active, they then concluded that core explosions must cyclically recur about every 10 to 100 million years.^{[*43](#)}

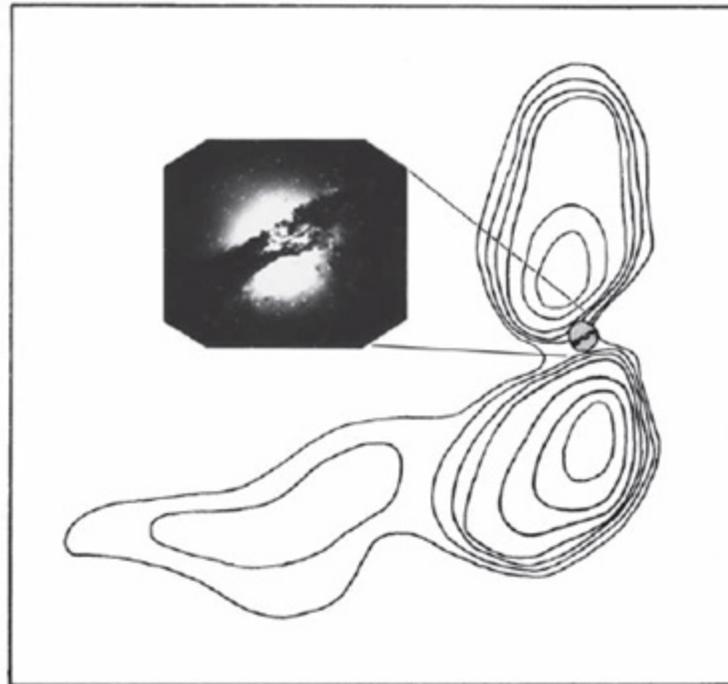


Figure B.1. The nearby radio galaxy Centaurus A flanked by two radio-emitting lobes (circular contours). Viewed in projection, these lobes appear to extend one million light-years on either side of the galaxy. In other radio galaxies, the lobes can be up to tenfold larger.

In drawing the above conclusions, astronomers have assumed that their cosmic ray plasma escapes from each pole of the galaxy and flows out into intergalactic space as two jets oriented perpendicular to our line of sight (see figure B.2a). However, there is another way of interpreting this radio lobe phenomenon that leads to an entirely different set of conclusions which suggests that core explosions occur much more frequently than astronomers had supposed. According to the superwave model, the core of the radio galaxy would be active for a few hundred to a few thousand years, producing a volley of cosmic rays that would travel radially outward in the form of an expanding superwave shell moving forward at very close to the speed of light (recall figure 3.1).

Interacting weakly with surrounding magnetic fields, these particles would penetrate through the galaxy into intergalactic space. As a result of weak magnetic interactions, they would emit synchrotron radio waves

restricted to a very narrow-angle cone aimed in their forward direction of flight (see figure B.2b). Consequently, as Earth observers, we would see radiation only from those superwave cosmic rays whose radiation beams happened to intercept the Earth—that is, from particles traveling almost directly toward us from the radio galaxy. Thus, cosmic rays in the superwave shell that were producing the observed radio emission would be confined to two forward-inclined beams oriented on either side of their galactic disk, their angular deviation from our line of sight being comparable to the narrow angle of their beamed radiation. This emission appears as two distinct lobes, rather than as a ring, because cosmic rays passing through the radio galaxy's gaseous disk are attenuated to a greater extent. The emission, then, would be strongest from beams angled above and below the disk.

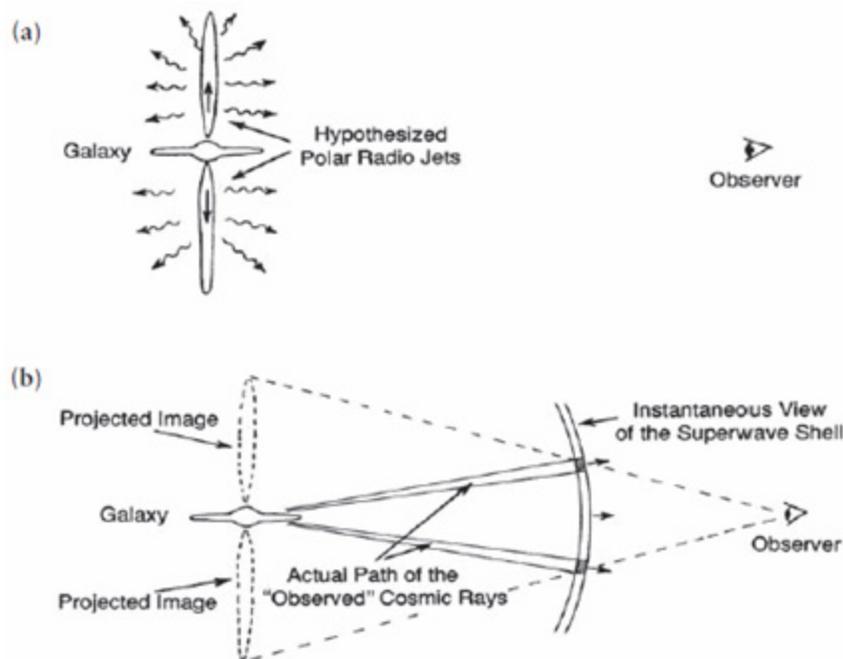


Figure B.2. Two ways of interpreting the nature of the radio emission jets that surround radio galaxies. (a) The conventional view: the jets extend from the galaxy's pole perpendicular to its disk and contain magnetically entrapped cosmic rays that radiate synchrotron radio emission in all directions. (b) The superwave interpretation: the jets are an illusion; the synchrotron radio emission is beamed forward from a thin shell of cosmic rays moving toward the observer at close to the speed of light.

Because the particles move outward from the galaxy nearly as fast as their emitted synchrotron radiation, synchrotron photons produced during

the entire extent of the superwave's multimillion-year journey would be seen by us almost simultaneously. Photons produced late in the superwave's journey would appear to come from directions farther from the source galaxy while those produced earlier would appear to originate closer to the source galaxy. Thus, the duration of the superwave outburst—the thickness of its forward-moving cosmic ray shell—in no way determines the extent of the radio lobes that this shell traces out.

Consequently, by attempting to judge the duration of the galaxy's core explosion by measuring the apparent projected size of its radio lobes, astronomers would necessarily arrive at an erroneously long time estimate. This, in turn, would lead to an erroneously long time estimate for the time between successive explosions. Likewise, by assuming that the radiation lobes are directed perpendicular to our line of sight rather than being angled toward us, they have grossly underestimated the distance that the cosmic rays have traveled through intergalactic space.

APPENDIX C

ATTEMPTS TO MOVE THE SCIENTIFIC INVESTIGATION FORWARD

Getting the Word Out

The discovery of high cosmic dust concentrations in ice-age polar ice was astounding, to say the least. Evidence that a cosmic event adversely affected the Earth's climate and biosphere in geologically recent times could require the complete rewriting of textbooks on geology, astronomy, paleontology, and ancient mythology. Equally important, this finding helped to substantiate the theory that a farsighted society or group of individuals living thousands of years ago had valiantly attempted to communicate a warning message to Earth's future inhabitants about the past occurrence of a galactic superwave catastrophe.

Understandably, I was eager to share these astounding ice core findings with the scientific community. In May of 1983, having just completed my doctoral study, I traveled to Baltimore, Maryland, to make a presentation at the spring meeting of the American Geophysical Union. Also, in September of that year, I presented the cosmic dust findings at the annual Meteoritical Society meeting held in Mainz, Germany. In delivering these papers, I explained that I had carried out this ice core investigation as a way of testing the superwave hypothesis. I did not reveal how I had come to formulate this hypothesis because to mention anything about the deciphering of the ancient astrological time capsule message or about legends of ancient catastrophes would have unnecessarily distracted the scientists from attending to the analytical results being presented. There would be plenty of time to do that later. After all, it was necessary to have the superwave hypothesis judged on the basis of how well it was supported

by observational data, rather than on the basis of how I had first conceived the idea.

When new observational or experimental results contradict long-held scientific beliefs, no matter how carefully the research has been carried out, the experimenter should not expect immediate acceptance. The scientific community is generally conservative. Before accepting a novel controversial finding, scientists usually wait until others have independently duplicated the result. Nevertheless, my findings seemed to be received with interest at both meetings, with one exception. At one point during the question period that followed my presentation in Mainz, the session moderator stood with her back to me and addressed the amphitheater audience. As if making a prepared speech, she proceeded to advise the scientists gathered there that they should not give too much weight to the cosmic dust results I had presented since there may be other explanations of the high elemental concentrations (iridium, nickel, and tin) than a nebular dust incursion. She did not put this in the form of a concern addressed to me, but rather stated it more as a proclamation of fact, with the aim of urging the audience to dismiss the findings. I stated firmly that I disagreed with her, that the high iridium values were strong evidence that a substantial portion of the dust in the ice was of cosmic origin and that there had been a significant increase in the rate of cosmic dust deposition. The high elemental concentrations could not have been due to a lower ice accumulation rate during the ice-age period, for such a reduction, at most, would have doubled the elemental concentrations rather than produced the hundreds of fold higher concentrations that I had found.

At the time I announced these findings, the prevailing belief was that the amount of cosmic dust in the solar system has not changed appreciably during the past several millions of years and that the minimal amounts currently seen come primarily from short-period comets and asteroids repeatedly orbiting the Sun. Data from ground telescopes, satellites, and spacecraft showing that substantial amounts of interstellar dust lurk just beyond the heliopause sheath and that a steady stream of this dust currently enters the solar system had not surfaced at that time. Had these findings been known then, the meteoritical science community might have been more willing to accept the possible occurrence of a prehistoric interstellar

dust incursion event. However, with the worldview as it was, the announcement of my cosmic dust findings did not generate much long-lasting excitement. Unlike the discovery of cosmic material at the dinosaur extinction boundary, the discovery of these Late Pleistocene iridium spikes was not picked up by the news media.

Just a little over a century ago, reports of rocks falling from the sky were regarded as preposterous by most geologists. Although the study of meteorites has today become a well-established branch of science, researchers proposing extraterrestrial causes for terrestrial catastrophes still meet with considerable skepticism from the geological community. For example, the group of University of California Berkeley scientists who in 1979 proposed the idea that the dinosaurs were killed off by the impact of a giant asteroid were confronted with widespread opposition from both paleontologists and geologists. Since that time, hundreds of scientific papers have been published and several well-attended scientific conferences have been held on the subject. Now their theory has become widely accepted.

While meteoritical astronomers and cosmochemists accepted the possibility that asteroids or comets periodically collide with the Earth, the notion that cosmic dust might have recently entered the solar system under the force of a cosmic ray volley was quite new to them. A narrowly conservative faction was completely unwilling to admit this as a reasonable possibility or to even take time to look at the evidence favoring it. As it turns out, these conservatives are most often the ones called upon to review manuscripts submitted for publication. As a result, although abstracts of my 1983 presentations were published in technical journals (*Eos* and *Meteoritics*),¹ ² attempts to publish a more thorough disclosure of the cosmic dust findings in refereed journals were strongly resisted. Hence, publication of my work turned into a long drawn-out ordeal. The technical paper in which I presented the Camp Century ice-core iridium and nickel results was rejected by three different journals before it was finally published in 1985 in *Meteoritics*.³ Its accompanying paper, which describes the ice sample abundances of heavy metals such as tin, gold, silver, and antimony and nine other elements, was rejected by five different journals.

Many referees simply refused to believe that the geochemical evidence I had found was valid. To justify their negative bias, they often charged that the ice samples must have become polluted by contaminants either at the time they were cored from the ice cap or when they were being prepared for analysis, and that the high iridium concentrations were merely evidence of such contamination. Countering this criticism, I explained that the iridium concentrations in the polar dust samples were several hundred to several thousand times higher than those found in most terrestrial dust sources; hence, it was highly unlikely that the measurements reflected contamination by any kind of terrestrial material. I also pointed out that the iridium-to-nickel ratio in the samples closely matched that found in meteoritic material. Moreover, I noted that careful precautions had been taken to minimize the chance of sample contamination. The samples in question had been processed at Ohio State University in a Class-100 laboratory clean room equipped with a filtering system that continuously removed dust particles from its interior air. This room could be accessed only through an air lock and admission to it was permitted only to personnel wearing appropriate sanitized garments. In addition, extensive precautions were taken in preparing the samples. To dispose of any dust or fluid that may have lodged on a sample's surface, an outer layer of ice was carefully removed from each sample prior to its analysis. All laboratory beakers and instruments were cleansed with water that had been distilled three times and passed through a submicron particle filter.

Why should the referees be so adamant in insisting that the iridium values were due to contamination? The Portland study was the first of its kind to look this far back in time. Thus, the referees really had no contradicting evidence to indicate that the iridium levels were not as high as I had found. They merely chose to disbelieve the results and deny that such large quantities of cosmic dust could have entered the solar system.

However, it is known that large quantities of heavy metals are synthesized during the initial phase of a supernova explosion. As a supernova fireball progressively expanded and cooled, specific compounds would have serially crystallized out at specific temperatures from its vapor cloud and these compounds would have become segregated into masses of relatively homogeneous composition. Tin oxide, for example, would have

begun to crystallize out several years after the initial explosion, when the supernova fireball temperature had fallen to about 1,800 degrees centigrade. Thus, it is quite possible that material from the North Polar Spur supernova explosion contained a large number of cometary bodies enriched in a particular substance such as tin. During a superwave passage, then, dust particles of peculiar composition could at times have entered the solar system in large quantities.

The Ohio State glaciologist Lonnie Thompson also met with resistance when he first sought to publish his discovery of high tin concentrations in Camp Century ice.⁴ His Ph.D. dissertation describes how he carried out extensive tests to check for sources of tin contamination that might have been present in his clean room facility, but no such sources could be found. Besides, the laboratory contamination argument failed to explain why he had found tin particles only in the ice-age portion of the ice core, i.e., the lower few hundred meters, rather than randomly scattered throughout its length.

The Portland polar ice study was similar to the Berkeley study that in 1979 reported discovering high concentrations of iridium at the 65million-year-old dinosaur extinction boundary.⁵ Both studies used a similar geochemical analysis technique for detecting iridium and other trace metals. However, the Portland study had much more trouble getting published. Whereas its results were repeatedly barred from publication on claims that its samples were contaminated, the UC Berkeley results received no such criticism. Yet, compared with the pristine polar ice samples analyzed in the Portland study, the clay samples in the Berkeley study actually stood a much greater chance of containing contaminants, as they came from a clay layer that had been exposed to atmospheric dust as well as groundwater percolation.

Perhaps the main reason why the Portland study encountered opposition was that it dealt with a relatively unconventional phenomenon—galactic superwaves. By comparison, the asteroid impact phenomenon was far more familiar. Numerous meteorite craters have been found on the Earth, some quite large, and scientists around the world have devoted their careers to analyzing the cosmic bodies found at these various impact sites. The

superwave theory, on the other hand, was essentially unknown. Unlike comets and asteroids, which are frequently evidenced by their appearance in the night sky, superwaves recur only after many thousands of years and produce observable effects only while impacting the solar system. In addition, to infer their presence, one must gather and analyze data from many different scientific fields, data on phenomena that often have unwittingly been attributed to other causes. By its nature, superwave research is an interdisciplinary undertaking. Unfortunately, few of today's scientists are willing to take such a broad view in their study of natural phenomena.

Journal referees who were asked to evaluate the polar ice results were not broadly knowledgeable in the majority of these fields, nor would they have taken the time to understand and evaluate the pieces of supporting evidence. They were usually specialized in areas of geochemical analysis of meteorites, cosmic dust, or ice samples. In fact, the same referee who had dismissed the ice core findings was quoted as saying that the superwave theory was "too all-encompassing" and that it was "not a good use of people's time" to investigate it. Here we see the classic symptoms of overspecialized twentieth-and twenty-first-century science at work. Not only do many of today's scientists view their work from a narrow perspective, but they also think that something is wrong with other researchers who do not similarly adopt narrow perspectives. By preventing researchers with an interdisciplinary orientation from publishing their theories, they contribute to creating a science that dissects nature into little pieces and has little interest in picturing how it operates as a whole.

Like the Berkeley asteroid-impact hypothesis, the superwave hypothesis suggested that an astronomical event had seriously affected the Earth's climate and biosphere. The superwave hypothesis, however, would have been more apt to evoke emotional responses from referees. Whereas the dinosaur extinction theory deals with a relatively brief impact event that occurred millions of years ago and affected species far removed from our stage of evolution, the superwave theory proposes an event that should have altered the Earth's climate for thousands of years and should have occurred recently enough to have had a major effect on the human race. It deals with

a phenomenon that, if true, could even disturb one's sense of security about the future.

Undoubtedly, it would have been much easier to publish the polar ice cosmic dust results if the paper had not mentioned the superwave hypothesis and cosmic dust incursion scenario. But then what would have been the point of all those years of work and careful planning geared toward testing a key prediction of the superwave hypothesis and the zodiac cryptogram message? If the cosmic dust data were published barren of any interpretation, the superwave hypothesis would have been entirely unknown. Although I followed a more difficult path, with sufficient persistence I succeeded in having some of my papers published in scientific journals.

Subsequent Investigation Attempts

Portland State University had no money available to support scientific research. Thus, I had to finance my doctoral cosmic dust study with money borrowed from friends and family, with most of the reactor irradiation expense being paid by a U.S. Department of Energy grant. Nevertheless, financial considerations made it difficult to analyze a very large set of ice core samples. The small number of samples I did analyze did not provide a sufficiently dense set of data points to give a clear picture of how solar system cosmic dust concentrations varied in the prehistoric past. I hoped to conduct a more thorough study as a postdoctoral research follow-up to this initial work. Preferably this would have involved analyzing several dozen ice samples spanning the present interglacial interval as well as the last ice-age period.

In 1984, I teamed up with an oceanographic climatology professor at Oregon State University to submit a research proposal to the National Science Foundation's Polar Glaciology Program. OSU was well equipped for neutron activation analysis work, as it had a nuclear reactor facility where such work was routinely carried out. Our project would have determined the chemical composition of more than 50 polar ice core samples and would have assessed their respective cosmic dust content using iridium and nickel as indicators. However, several of the scientists who refereed our proposal recommended that the project not be funded. They

claimed that my previous ice core findings suffered from sample contamination and hence there was no point in carrying on further investigation. I sent a lengthy ten-page rebuttal to the Polar Glaciology Program office; in response, the head of the program sent our proposal out to be re-reviewed by two new referees. Their comments were quite positive. They rated the proposal “good” and “very good.” In fact, one of the referees was actually angry that the National Science Foundation (NSF) had not already decided to fund the proposal.

If the NSF review process had proceeded forward, it is possible that the proposal could have been approved for funding. However, just at the point when I was to learn the outcome of the second review, the Polar Glaciology Program underwent a major administrative change. The Reagan administration had recently appointed a new director to head the NSF Polar Programs Division and shortly thereafter, as a result of a bitter controversy, the Polar Glaciology Program head and some of his staff resigned in protest. When I called up the office expecting to speak with the person who had been overseeing the review of my proposal, I instead was greeted stiffly by a temporary replacement who proceeded to tell me that my proposal had been rejected. When I asked about the outcome of the second set of reviews, this person told me in a very abrupt manner that second reviews of proposals were not permitted.

In September 1984, before the first round of referee comments had been turned in, the chairman of the U.S. Senate Committee on Commerce, Science, and Transportation wrote on my behalf to the director of NSF:

. . . Dr. LaViolette has presented to the Committee extremely interesting research results and scientific papers written on experiments conducted at Portland State.

His research addresses the abrupt climatic changes that have occurred over geological time. He hypothesizes that such changes are the result of sudden incursions of cosmic dust into our solar system, causing dramatic temperature changes.

I am interested to know if research into major climatic shifts is presently being funded by NSF, and if so, are the investigators aware of Dr. LaViolette’s hypothesis.

Needless to say, the phenomenon of sudden climatic shifts has enormous import to all of us and all reasonable hypotheses should be carefully examined.

This letter was somewhat prescient in that it was written at a time when global warming had not yet emerged as a political issue. Nevertheless, it did not seem to forestall the strange happenings of the NSF proposal review.

Over the following years, I submitted proposals to a variety of institutions with the hope of securing a postdoctoral position to carry out further polar ice cosmic dust analysis. I applied to the NASA Goddard Space Flight Center, the NASA Johnson Space Flight Center, Los Alamos National Laboratories, the National Center for Atmospheric Research, the University of Colorado, Carnegie Institute of Washington, and the U.S. Geological Survey. However, each time, my proposal was passed over. Competition for postdoctoral appointments is quite stiff. Usually only 10 to 20 percent of the applicants succeed in having their research projects funded.

In 1984, in an attempt to create an alternate means by which money could be raised for such research, I founded a nonprofit research institute called the Starburst Foundation. Investigation of the galactic superwave phenomenon was one of its top priorities, as no other research institution was doing anything in this area. Hundreds of businesses and charitable institutions were asked to make donations so that this important ice core research project could proceed. However, few contributions were forthcoming.

The difficulty I had in raising money did not mean that the scientific community was not interested in my cosmic dust findings and superwave theory. Scientists from the United States and other countries (e.g., England, Austria, Holland, East Germany, Russia, Sri Lanka, India, mainland China) were interested in this work and wrote requesting paper reprints. The following are excerpts from a few of their letters:

Thank you very much for the reprints. Your idea and your approach to the problem are very interesting and prospect. I should greatly

appreciate receiving your thesis. (A professor, Ioffe Physico-Technical Institute in St. Petersburg)

Thanks for your interesting reprints and your letter. It is certainly necessary to keep in mind the possibilities you speak of . . . (A renowned climatologist, Scripps Institution of Oceanography)

Thank you for the copy of your dissertation. It is a monumental work of a proportion not usually seen in geology . . . Congratulations on a fine piece of work. (A glacial geochemist, New Mexico Institute of Mining & Technology)

Thank you very much for your articles. The most interesting paper for me is the “Heavy metals in Wisconsin stage polar ice.” You have convincingly shown that the high concentrations of tin, gold, silver, antimony, iridium, and nickel in polar ice are of extraterrestrial origin. Thus you proved that sometimes extraterrestrial matter has fallen out on the Earth’s surface whose composition is different from that of ordinary meteorites . . . (A well-known cosmochemist, Moscow State University)

Members of the world-famous UC Berkeley team that had researched the dinosaur extinction boundary sympathized with my efforts to secure funding. They agreed that my cosmic dust discovery would be a major scientific finding if it was confirmed by subsequent research. They even said they would be willing to help out on a future ice core investigation by counting the samples on their ultrasensitive gamma ray coincidence counter, which was set up specially to detect iridium.

Glasnost

During the early 1980s, the Soviet polar program had begun drilling two polar cap ice cores at their Vostok science station in Antarctica. The deeper of these cores was providing the longest continuous ice record then available. It penetrated through the last ice age and the preceding interglacial into the preceding glacial period. By 1984 its climatological findings began attracting considerable attention from the scientific community. The Soviet program was closely collaborating with the French glaciology program at that time and was sending samples to them for

analysis. Many U.S. researchers also wanted to share in the excitement, but requests through government channels went unheeded.

I, too, had become interested in obtaining some Vostok ice, with the intention of getting more data on past rates of cosmic dust influx. Early in 1986, I approached the NSF Polar Programs Division to see if they might serve as an intermediary to convey to the Soviets my sample request. The Polar Programs director said that NSF could be of no help because at the time it had no official relation with the Soviet polar program. Beginning in June, then, I sent a series of letters to the coordinator of the Soviet program stating that I wanted to obtain 17 Vostok ice core samples ranging from 2,000 to 35,000 years in age with the intention of determining their contents of cosmic dust. A number of these samples spanned the key period of interest between 16,000 and 11,000 years B.P. Many months went by with my letters unanswered. I made a third attempt through the Soviet Embassy in Washington. Finally, in May 1987, my request was granted. Indeed, this was quite an honor, for it was the first time that the Soviets had agreed to send ice samples to a U.S. citizen. This overture was yet another indication of the gradual improvement in U.S.–Soviet relations, which was then taking place under the Gorbachev administration.

The Soviets also wrote a letter to the director of the NSF Polar Programs Division relaying their wish to grant my request and hinting at their interest in initiating for the first time a mutual exchange of scientists between their base at Vostok and the U.S. South Pole station. Upon receiving a copy of that letter, I called the NSF Polar Programs Division. I was surprised to discover that they had made no effort to deal with the matter. It was not until I called their attention to this overture and to the opportunity for developing better diplomatic relations that would facilitate U.S. access to Soviet ice samples that NSF officials took any action. They began telephone contacts with Leningrad (St. Petersburg) and soon a U.S.–Soviet ice core exchange program began developing.

However, NSF Polar Programs personnel showed little appreciation for the role I played in initiating the ice core exchange program. In fact, they actively resisted my attempts to obtain the very ice samples that the Soviets had promised to me. That June, I asked the NSF Polar Programs Division if they would review a proposal requesting a few thousand dollars for travel

funds to obtain the ice samples, but the program director refused even to consider it. Eight months later in February 1988, a Polar Programs employee urged me to write up a travel proposal and submit it. However, two weeks after submitting the proposal, I received word from the Polar Programs director that they would not review it. Instead, the director ordered me to cease any attempt to obtain the samples, saying that my request would “interfere” with their attempts to arrange an ice core exchange program.

Choosing to ignore the order, I continued searching for an alternative source of funding. Fortunately, in May of that year, the Starburst Foundation received a donation that covered the cost of transporting the ice. I traveled to the Netherlands, boarded the Soviet Antarctic research vessel while it was docked in Rotterdam, packed the Vostok samples in special refrigerated containers, and transported them back to the United States (see figure C.1). This trip received considerable media attention partly because it portrayed the ongoing improvement in U.S.–Soviet relations.^{6, 7} Once in the United States, the ice samples were put into freezer storage. Unfortunately, as of this print date, they remain in storage, for Starburst has been unable to raise the money needed to finance their analysis.^{*44}

After the samples had been safely put into cold storage, I teamed up with a glacial geochemist at the U.S. Geological Survey in Denver, and together we submitted proposals to NSF and NASA for analyzing the Vostok ice. Both proposals were turned down. I also sent proposals to twelve different private charitable institutions; still, no funds were forthcoming. One sympathizer jested that the cost of one bomb dropped in the Persian Gulf War would have been sufficient to fund the entire project. It is expected that funding will eventually be found and that data on this crucial period of human history will be forthcoming.

In December 2004, one group of ice core researchers led by Gabrielli and Barbante of Venice, Italy, did publish a study measuring the content of iridium and platinum in 36 Greenland ice core samples as a way of assessing the influx of submicron-sized meteoric smoke particles, smoke produced by meteors during their passage through the Earth’s atmosphere.⁸ They found that iridium and platinum were being deposited an average of

two to three times faster in the ice-age samples they analyzed than in samples taken from the present interglacial period. Their ice-age samples contained iridium at concentrations that were 6 to 45 times higher than levels found in the Earth's crust. Operating on the assumption that the meteor flux has remained constant at its present level, they attempted to account for these high levels by suggesting that dust blown onto the ice sheet during the last ice age had come from a continental source that was particularly enriched in iridium. However, it is more likely that most of this iridium-bearing material is of extraterrestrial origin and that the observed increased iridium flux reflects an increase in the influx of submicron-sized particles during the last ice age, consistent with the findings of the 1983 Portland cosmic dust study.



Figure C.1. Vostok ice core samples being unloaded from the Soviet Antarctic research vessel in Rotterdam for shipment to the United States. This June 1988 trip was conducted by the Starburst Foundation.

Five of their samples were taken from the same ice-age interval as that investigated in the Portland study. While their iridium concentrations were, on average, substantially lower, this could indicate that they sampled times

when the cosmic dust influx happened to be low. Also, their technique was designed primarily to measure iridium in meteoric smoke particles and was less sensitive to assessing the iridium contribution from larger dust particles (those over half a micron in size), which would have made up a substantial fraction of the interstellar dust mass flux. Iridium and platinum rank among the most difficult metals to ionize and measure by means of mass spectrometry—the technique they used. The ionization problem would have been particularly difficult for the larger cosmic dust particles. So the samples of Gabrielli and Barbante could have contained greater quantities of extraterrestrial dust than they had estimated. The neutron activation analysis technique used in the Portland study requires no sample ionization step and hence is able to assess the total content of iridium irrespective of cosmic dust particle size. In 2003, one other research team published the results of a neutron activation analysis study which assessed iridium levels in Greenland polar ice. They reported finding a very low iridium concentration in one 20,500-year-old sample. But this sole ice-age data point does not invalidate the conclusions of the Portland study which reported low levels, below the threshold of detection, in three out of the eight Greenland samples analyzed.

In summary, the Portland study conducted by the author was the first cosmochemistry investigation to determine whether our planet had experienced an extraterrestrial catastrophe in relatively recent times. It was also the first such study to attempt to check the validity of a prehistoric time capsule message that informs of the past occurrence of such a disaster. Although it turned out that the ice core samples in that study covered a period much earlier than the date indicated by the zodiac message, those results, however, do support the contention that superwave cosmic ray volleys have passed through our solar system at earlier times. Together with the abundant beryllium-10 evidence and the recent discovery that large amounts of acidic cosmic dust rained on the Earth 15,850 years ago, we are led to believe that there may be much truth in legends of an ice-age cosmic holocaust, one that could recur in the near future.

Predictions and Their Later Verification: Chronology—1979 to Present

Sept. 1976—Paul LaViolette begins doctoral studies at Portland State University in the Systems Science Ph.D. Program. Three years later he deciphers the zodiac cryptogram and, as a result, formulates the hypothesis that a volley of galactic cosmic rays had bombarded the Earth and solar system toward the end of the last ice age.

1979–82—Prediction No. 1: Galactic core explosions. LaViolette theorizes that such superwaves recur about every 10,000 years and last for several hundred to a few thousand years. He is the first to suggest such a short recurrence time for Galactic core explosions and that our own Galactic core undergoes Seyfert-like explosions with similar frequency.

1998—Concurrence: One astronomer who in 1988 had dismissed LaViolette's idea as having no merit ten years later was quoted in a mainstream astronomy magazine as saying that the center of our Galaxy does explode about every 10,000 years with these events each lasting 100 years or so.

1980–83—Prediction No. 2: Cosmic ray propagation. Dr. LaViolette concludes that Galactic core cosmic ray volleys interact minimally with interstellar magnetic fields and are able to propagate radially outward along rectilinear trajectories traveling through the Galaxy at near light speed in the form of a coherent, spherical, wavelike volley. He is the first to suggest this “galactic superwave” idea.

1985—Verification: Astrophysicists discover that X-ray pulsars Cygnus X-3 and Hercules X-1 continuously shower the Earth with high-energy cosmic ray particles that have traveled over 25,000 light-years at nearly the speed of light, following straight-line trajectories unaffected by interstellar magnetic fields.

1997—Verification: Astronomers detect a strong gamma ray pulse arriving from a galaxy billions of light-years away. Leonard and Bonneli writing in *Sky and Telescope* magazine suggests that this gamma ray pulse may be accompanied by a volley of high-energy cosmic ray particles traveling at very close to the speed of light along a rectilinear trajectory and that the gamma ray pulse is produced by the radial outward movement of this volley. In effect, they were validating the galactic superwave idea that LaViolette had proposed 14 years

earlier in the face of stiff resistance from mainstream astronomers.

2000—Verification: At the January American Astronomical Society meeting, radio astronomers announce that the Galactic center (Sgr A*) radiates circularly polarized synchrotron radio emission. Scientists present at the meeting concur with Dr. LaViolette's suggestion that the circular polarization indicates that cosmic ray electrons are traveling radially away from the Galactic center along straight-line trajectories.

1980–83—Prediction No. 3: Cosmic ray bombardment. LaViolette concludes that a volley of Galactic cosmic rays bombarded the Earth and solar system toward the end of the last ice age (ca. 14,000 years B.P.). Also, his findings suggest that other such superwaves passed us at earlier times and were responsible for triggering the initiation and termination of the ice ages and mass extinctions. He is the first to suggest that the Earth is exposed to recurrent and frequent bombardment by cosmic ray volleys. **1987—Verification:** Glaciologists discover beryllium-10 isotope peaks in ice-age polar ice. These indicate that the cosmic ray flux on the Earth became very high on several occasions during the last ice age, confirming Dr. LaViolette's theory that galactic superwaves have repeatedly passed through our solar system in geologically recent times.

1980–83—Prediction No. 4: Solar system cosmic debris. LaViolette hypothesizes that large amounts of interstellar dust and frozen cometary debris lie outside the solar system just beyond the heliopause sheath and form a reservoir of material that has supplied large amounts of cosmic dust during prehistoric superwave events. Astronomers had previously believed that the solar system resided in a relatively dust-free region of space.

1984—Verification: The IRAS satellite infrared images show that the solar system is surrounded by nearby "cirrus" dust cloud wisps.

1988—Verification: The astronomer H. Aumann's observations indicate that the solar system is surrounded by a dust envelope 500 times denser than previously thought.

1992–95—Verification: Telescope observations reveal the presence of the Kuiper belt, a dense population of cometary bodies encircling the solar system, beginning just beyond the orbit of Neptune.

2003—Verification: Observations with the Ulyesses spacecraft indicate that a ring of interstellar dust orbits the solar system beginning just beyond the orbit of Saturn. The concentration of dust in this is estimated to be 10,000 times higher than is found in the vicinity of the Earth.

Sept. 1979—Prediction No. 5: Cosmic dust influx. LaViolette theorizes that if a cosmic ray volley (superwave) passed by at the end of the ice age, it would have pushed nearby interstellar dust into the solar system. To test this, he began a plan to analyze ice-age polar ice for traces of cosmic dust. Astronomers previously believed that cosmic dust particles have been entering the solar system at a nearly constant low rate for millions of years.

1981–82—Verification: LaViolette is the first to measure the cosmic dust content of prehistoric polar ice. Using the neutron activation analysis technique, he finds high levels of iridium and nickel in six out of the eight dust samples filtered from Greenland polar ice (35,000 to 73,000 years B.P.), an indication that they contain high levels of cosmic dust. This shows that galactic superwaves may have affected our solar system in the recent past.

1984—Verification: The IRAS satellite observations indicate that the zodiacal dust cloud is tilted 3 degrees relative to the ecliptic with ascending and descending ecliptic nodes at 87° and 267°. LaViolette realizes that the nodes are aligned with the Galactic center/anticenter direction and constitute evidence supporting his earlier prediction that interstellar dust has recently entered the solar system from the Galactic center direction. 1987: He reports this in a paper published in the journal *Earth, Moon, and Planets*.

April 1993—Verification: Observations made by NASA's Ulysses spacecraft indicate that interstellar dust is entering the solar system from the Galactic center direction (from the direction the interstellar wind blows toward us) and hence that most of the dust outside the asteroid belt is of interstellar origin. These findings were predicted by LaViolette in 1983 and 1987.

1995—Verification: Observations show that helium-3 concentrations in ocean sediments, an indicator of extraterrestrial dust influx, changed

by more than threefold on a 100,000-year cycle between 250,000 and 450,000 years ago.

1996—Verification: The AMOR radar in New Zealand detects a strong flux of interstellar meteoroid particles, measuring 15 to 40 microns in size, entering the solar system from the Galactic center direction.

1997— Verification: In their studies of the Byrd Station ice core, glaciologists Hammer and Clausen discover an acidity feature called the “Main Event.” In 2000–2005 LaViolette shows that these acid concentrations vary with an 11.5-year solar cycle suggesting an interstellar origin, evidence of a nebular incursion that occurred about 15,800 years B.P.

2004— Verification: Gabrielli et al. publish data that shows that the concentrations of iridium and platinum in Greenland polar ice were two to three times higher during the last ice age.

1981—Prediction No. 6: Tin isotopic anomaly. Finding high concentrations of tin in a 50,000-year-old ice core dust sample along with iridium, nickel, and gold, LaViolette theorizes that this tin-rich dust is of interstellar origin and that the tin should contain an isotopic anomaly.

Jan. 1984—Verification: Geochemists at Curtin University (Australia) in collaboration with LaViolette use a mass spectrometry technique to determine the isotopic ratios of a portion of the tin-rich dust sample and find significant isotopic anomalies in four isotopes. This confirms LaViolette’s prediction that the tin is of extraterrestrial origin and also marks the first time that tin isotopic anomalies have been discovered.

1989—Verification: Cosmochemist F. Rietmeijer discovers tin oxide grains inside interplanetary dust particles, with tin abundances much higher than typically found in chondritic meteorites.

1983—Prediction No. 7: Prehistoric global warming. In his dissertation, LaViolette demonstrates that the last ice age was ended by a 2000-yearlong global warming that he calls the Terminal Pleistocene Interstadial (TPI), identified with the Alleröd-Bölling interstadial in the north. He also proposes that this was followed by a global return to

glacial conditions, identified with the Younger Dryas in the north. He shows that the melting of the ice sheets was synchronous in the Northern and Southern Hemispheres and was brought about by cosmic causes. At the time of this prediction, climatologists believed that there was no global warming at the end of the ice age, that the ice sheets did not melt synchronously.

1987–96—Verification: Climatologists publish temperature profiles from various parts of the world showing the presence of this same climatic oscillation, but do not connect their data with the idea of global climatic shifts.

1998—Verification: Steig et al. correlate the Greenland and Taylor Dome Antarctica ice core records and demonstrate that the Alleröd-Bölling-Younger Dryas climatic oscillation occurred synchronously in both hemispheres.

1983—Prediction No. 8: Prehistoric conflagration. In chapter 4 of his dissertation, LaViolette proposes the idea that the Earth and Moon were engulfed by a large prominence remnant or “fireball” thrown out by the Sun during a period of particularly intense solar activity. He interprets the findings of Zook and Gold as evidence that the Sun had been in a highly active T Taurilike flaring state and that at times its flaring activity had been as much as 1000 times that currently observed. He suggests that these fireballs scorched the surface of the Earth in ancient times, inducing high temperatures, rapid ice sheet melting, global flooding, and mass animal extinction. At the time of his prediction, the general opinion was instead that the Sun has remained in its present quiescent solar cycle state for hundreds of millions of years. Only a small group of astronomers dissented with this view.

1997—Verification: Satellite observations show solar flares ejecting expanding balls of plasma away from the Sun and show that these were able to travel outward beyond the Earth’s orbit. These are called coronal mass ejections (CMEs). This verifies LaViolette’s idea that a large plasma “fireball” thrown off by a mega solar flare scorched the Earth and Moon in ancient times. In 2000, astronomers discover evidence that successive CMEs can merge to produce a single giant

CME.

1999—Verification: Astronomers announce that they have observed large explosive outbursts from the surfaces of nearby normal sunlike stars. These “superflares” are observed to range from 100 times to 10 million times the energy of the largest flare ever detected on the surface of the Sun. They estimate these superflares are occurring about once every hundred years in these stars. This increases the plausibility of LaViolette’s suggestion that the Sun was producing mega solar flares and intense plasma fireballs at the end of the last ice age.

1983—Prediction No. 9: Geomagnetic reversals. LaViolette proposes that geomagnetic reversals are induced by solar cosmic ray storms. He proposes that at times when invading cosmic dust causes the Sun to become very active and engage in continual flaring activity, major solar outbursts could occur that are a thousand times more intense than those currently observed. He further proposes that solar cosmic rays from such a mega flare could impact the Earth’s magnetosphere, become trapped there to form storm-time radiation belts, and generate an equatorial ring current producing a magnetic field opposed to the Earth’s. If sufficiently intense, this ring current magnetic field could cancel out the Earth’s own field and flip the residual magnetic field pole to an equatorial location. From this position it could later either recover or adopt a reversed polarity. He proposes that this geomagnetic excursion would be very rapid. At the time of LaViolette’s prediction, geophysicists believed that field excursions took hundreds of years to occur and were brought about by instabilities in the slow movement of the Earth’s core material.

1989–95—Verification: Coe et al. report the discovery of a geomagnetic reversal recorded in the Steens Mountain lava formation, which conclusively demonstrates that during this reversal the Earth’s magnetic pole changed direction as fast as 8 degrees per day. This overthrows the conventional geocentric view, which is unable to account for such rapid changes with internal motions of the Earth’s core dynamo. It confirms Dr. LaViolette’s rapid-acting solar flare mechanism.

1995—Concurrence: Unaware of LaViolette’s publications, two

French geophysicists P. Utré-Guérard and J. Achache, publish a paper that seeks to explain the Steens Mountain polarity reversal as being due to a solar cosmic ray cause. Their mechanism is the same as that which LaViolette had proposed six years before the Steens Mountain discovery. Their independent arrival at the same idea is evidence of parallel idea development and consensus with LaViolette's earlier theory.

1983—Prediction No. 10: Radiocarbon date anomalies. In chapter 10 of his dissertation, LaViolette proposes that a solar cosmic ray conflagration caused the demise of these mammals and their subsequent burial by the action of glacier meltwater waves. He suggests that the neutron shower produced by the intense solar cosmic ray storm (coronal mass ejection) that engulfed the Earth would have radiogenically changed nitrogen atoms in animal collagen into carbon-14 atoms. He proposes that this in situ radiocarbon generation could have made the radiocarbon dates on exposed organic matter anomalously young. Anomalously young radiocarbon dates are frequently found in fossil remains of Pleistocene megafauna that became extinct at the end of the last ice age. However, paleontologists believed that these overly young dates were due to samples being contaminated with younger carbon having a higher C-14 content.

1998—Verification: After seven years of research, the archaeologist William Topping proposes that the abnormally young radiocarbon dates of ice-age Paleo-Indian sites (ca. 12,400–13,000 calendar yrs B.P.) could be explained if a major solar flare cosmic ray storm had caused in situ carbon-14 production from nitrogen in the organic remains of those strata. His conclusion of heavy particle bombardment in Paleo-Indian times is partly supported by his discovery of particle tracks and micrometeorite craters in artifacts. This in situ C-14 production mechanism is the same that LaViolette had earlier proposed to explain the young dates for Pleistocene mammal remains dating from a similar period. Like Topping, LaViolette had concluded that the demise of the large mammals at that time was due to a solar flare conflagration. Because Topping was probably not aware of LaViolette's dissertation, his work would constitute independent

corroboration.

1995–98—Concurrence: Researchers report the discovery that there had been a sudden increase in atmospheric radiocarbon levels at the Alleröd/ Younger Dryas transition boundary. Over a 300-year period between the time of the IntraAlleröd Cold Peak and the beginning of the Younger Dryas, atmospheric C-14 levels rose from 3 to 7 percent and subsequently declined during the course of the Younger Dryas.

1983—Prediction No. 11: Gamma ray bursts. In his dissertation, LaViolette proposes that a superwave produced by an explosion of our Galaxy's core could be immediately preceded by a very strong gamma ray pulse, 10,000 times stronger than what could come from a supernova explosion. He points out that upon impacting our upper atmosphere, this burst could strip electrons and induce a powerful electromagnetic pulse, which, like a high-altitude nuclear EMP, could have serious consequences for modern society. It could knock out satellites; interrupt radio, TV, and telephone communication; produce electrical surges on power lines causing widespread black outs; and possibly trigger the inadvertent launching of missiles. He is among the few to suggest that Galactic core explosions could produce high-intensity gamma ray outbursts that could affect the Earth.

In 1989, under the sponsorship of the Starburst Foundation, LaViolette initiates an international outreach project to warn about the dangers of such astronomical phenomena. He points out that our Galactic center could produce seriously disruptive low-intensity outbursts as frequently as once every 500 years and that we are currently overdue for one. This is the first time a widespread gamma ray pulse warning of this sort has been made.

1997—Verification: In December 1997, astronomers for the first time pinpoint the source of a gamma ray burst and find that it originated from a galaxy lying billions of light-years away. This leads them to conclude that these are mostly extragalactic events having total energies millions of times greater than they had previously supposed, thereby confirming LaViolette's earlier proposal of the existence of high-intensity gamma ray bursts. If this particular outburst had originated from our Galactic center, it would have delivered 100,000

times the lethal dose to all exposed Earth life forms.

1998—Verification: Some months later, in August 27, 1998, a 5-minutelong gamma ray pulse arrived from a galactic source located 20,000 light-years away in the constellation of Aquila. The event is strong enough to ionize the upper atmosphere and seriously disrupt satellites and spacecraft. It triggers a defensive instrument shutdown on at least two spacecraft. Astronomers acknowledge that this marks the first time they became aware that energetic outbursts from distant astronomical sources could affect the Earth's physical environment. These events reaffirm the warnings LaViolette made nine years earlier about the potential hazards of such gamma ray bursts.

1980–83—Prediction No. 12: Galactic morphology. In his dissertation, LaViolette proposes that quasars and blazars are the bright cores of spiral galaxies in which the light from the core is so bright that it masks the dimmer light coming from the galaxy's disk. He suggests that quasars and blazars are essentially the same core explosion phenomena that are seen in Seyfert galaxies and N-galaxies. He predicts that when it eventually becomes operational, the Hubble Space Telescope will resolve the disks around these bright cores. He also suggests that edge-on spiral galaxies with active cores will give the appearance of being giant elliptical galaxies due to synchrotron radiation emitted from their outward-streaming cosmic rays. In connection with this, he predicts that when active giant ellipticals are imaged with the Hubble Space Telescope, spiral arm dust lanes oriented edge-on will be detected. At the time LaViolette was writing in 1983, most astronomers believed that quasars and blazars were very different from most other galaxies and in a class of their own.

1995 and 1997—Verification: Astronomers Bahcall et al. publish the results of a Hubble Space Telescope survey of quasars. These luminous star-like sources (active Galactic cores) are seen to be surrounded by spiral arm disks, just as LaViolette had predicted. Earlier, in 1982, a group of astronomers resolved galactic light fuzz around quasar 3C273 using a special imaging technique. This was published after the date of this prediction. In 1997, astronomer P. Crane publishes a high-definition Space Telescope photo of an active

giant elliptical galaxy that resolves its equatorial dust lane and shows that the galaxy is oriented edge-on, as LaViolette had predicted.

For updates of this list, see

www.etheric.com/LaViolette/predictions.html.

APPENDIX D

CHRONOLOGIES

TABLE D.1. CONVERSIONS FROM RADIOCARBON TO CALENDAR DATES

	YEARS B.P.	CORRECTION
Calendar	C-14	(years)
10,100	9,000	1,100
11,050	9,500	1,550
11,550	10,000	1,550
12,100	10,500	1,600
12,700	11,000	1,700
13,300	11,500	1,700
13,700	12,000	1,700
14,200	12,500	1,700
14,500	13,000	1,500
15,100	13,500	1,600
15,600	14,000	1,600
16,000	14,500	1,500
16,600	15,000	1,600
17,200	15,500	1,700
17,900	16,000	1,900
19,100	17,000	2,100
20,300	18,000	2,300
21,500	19,000	2,500
22,500	20,000	2,500

27,500	25,000	2,500
32,500	30,000	2,500

TABLE D.2. SCANDINAVIAN CLIMATIC ZONE DATES

Zone	Calendar Years B.P.	C-14 Years B.P.
PB	11,550 – 11,300	10,000 – 9,700
YD	12,700 – 11,550	11,000 – 10,000
AL	13,800 – 12,700	12,000 – 11,000
OD	13,870 – 13,800	12,150 – 12,000
BO	14,500 – 13,870	13,000 – 12,150
LI	14,850 – 14,500	13,500 – 13,000

PB: Preboreal warming, YD: Younger Dryas Stadial, AL: Alleröd Interstadial, OD: Older Dryas Stadial, BO: Bölling Interstadial, LI: Lista Stadial.

Conversion of radiocarbon dates to calendar dates was arrived at by correlating climatic horizons in radiocarbon-dated land profiles with similar climatic horizons evident in the GRIP (Greenland) ice core record that are dated with an absolute chronology (available on the Internet at <http://arcss.colorado.edu/data/icecore1.html>). For conversions of dates earlier than 14,500 ^{14}C years B.P., the ice core chronology is smoothed into the radiocarbon-dated uranium/thorium chronology of Bard et al. (*Nature* 345 [1990a]: 405–410). The radiocarbon dates for the climatic zones are those presented in figure 15 of Björck and Möller (“Late Weichselian environmental history in southeastern Sweden during the deglaciation of the Scandinavian ice sheet,” *Quaternary Research* 28 [1987]: 1–37).

FOOTNOTES

- *1. When a proton and an electron are bound together to form a hydrogen atom, they align their spin axes either antiparallel or parallel, these two orientations being indicated on the Pioneer 10 plaque by two circles each having flags at their center and periphery. When the spin axes are aligned antiparallel, the electron's potential energy is slightly higher as compared with when they are aligned parallel. Thus, when a hydrogen electron flips from an antiparallel orientation (left circle) to its ground-state parallel orientation (right circle), it releases an energy quantum in the form of a radio wave having a specific wavelength (21 centimeters) and a period of oscillation (0.7040241836 billionths of a second).
- *2. The recipient would be able to locate our position more exactly by viewing the set of circles along the bottom of the diagram, which show that Pioneer 10 originated from the third planet in a solar system that has a total of nine planets. Binary codes give each planet's distance from the Sun based on a unit of measure equal to one tenth of the semimajor axis of Mercury's orbit about the Sun. From this, the recipient could get an idea of the relative spacing of the planets.
- *3. Each zodiac sign is also assigned one of four elements (fire, air, water, and earth), but the elements do not rearrange into an ordered pattern when the signs are so rearranged. Perhaps they were not intended to be part of the zodiac's cryptographic check feature.
- *4. Actually, the cosmic ray explanation of the microwave background's origin antedates the big bang theory's prediction by about fifteen years. In 1933, the German physicist E. von Regener predicted that interstellar dust particles warmed by high-energy cosmic rays would thermally radiate microwave background radiation at a temperature of 2.8 Kelvin. Interestingly, his estimate was off from the true value by

just 3 percent! By comparison, big bang cosmologists incorrectly predicted it to be 28 Kelvin, ten times too high.

- *5. One light-year, the distance that a beam of light travels in one year, is equivalent to about ten trillion kilometers. The nearest star, Alpha Centauri, lies 4.3 light-years away. If this distance were scaled down to one centimeter, the corresponding distance to the Galactic center would be about fifty meters.
- *6. The lines drawn to connect these stars with the Galactic center understandably do not appear on constellation maps, as the Galactic center is normally invisible. Although the Galactic center may at one time have been considered to be part of Scorpio, such is not the case presently. In selecting the formal positions of the constellation boundaries, modern astronomers have chosen the Sagittarius–Scorpio boundary line such that the Galactic center today lies in Sagittarius.
- *7. A celestial coordinate sky map, such as that shown in figure 2.3, plots stellar positions in terms of right ascension (RA) and declination (d). Right ascension measures out the object's bearing along the celestial equator, the projection of Earth's equator onto the celestial sphere, and declination measures its elevation relative to the celestial equatorial plane. In a galactic coordinate map, such as that shown in figure 2.4, galactic longitude (l) measures an object's bearing along the galactic equator and galactic latitude (b) measures its angular elevation relative to the galaxy's equatorial plane.

On both kinds of maps, the lines of right ascension (or galactic longitude), which normally converge at the celestial poles (or galactic poles) are normally plotted parallel to one another as a cylindrical projection map. Consequently, the farther a constellation lies from the map's equator, the more it will be distorted from the way it normally appears in the sky. Since Scorpio and Sagittarius lie within fifteen degrees of the galactic equator but thirty degrees from the celestial equator, their distortions may be minimized by mapping them in galactic rather than celestial coordinates.

In determining the Sagittarius arrow trajectory, I removed any residual position errors inherent in using the galactic coordinate system

by use of aberration correction formulas. The arrow sighting is based on star position and proper motion data found in the 1988 FK-5 star catalog. I performed other star sightings using data given in earlier star catalogs. Appendix A lists the position coordinates and proper motions (RA and d change per century) for some important stars. The Galactic center lies close to the galactic coordinate origin at $(359.944^\circ, -0.046^\circ)$.

*8. It is the convention to reference these dates to the time that light waves from this distant ejection event would have first arrived at the solar system. To get the date when the ejection actually took place at the Galactic center one should add another 23,000 years, the time required for light to travel from the Galactic center to Earth.

†9. A supernova is the explosion of an unstable star that results in the star's destruction.

*10. First magnitude stars comprise the 20 brightest stars in the sky. Stars about $2^{1/2}$ times fainter are categorized as "second magnitude," stars about $2^{1/2}$ times fainter still are categorized as "third magnitude," and so on up to sixth magnitude, which are at the limit of naked-eye visibility. In general, a fivefold increase of magnitude corresponds to a hundredfold decrease in apparent brightness. This logarithmic magnitude system was established 2000 years ago by Hipparchus and Ptolemy as a way of classifying stars.

*11. The scientists who discovered these pulsing cosmic ray showers held the belief that charged particles such as cosmic ray protons cannot traverse interstellar space along straight-line paths and hence cannot produce pulses at such a great distance. However, their conviction to rule out charged particles left them quite puzzled, because the particles in these bursts acted just like protons. Like protons, they produced showers of muon particles when they struck Earth's atmosphere. High-energy gamma rays and cosmic ray neutrons also had to be ruled out. Although they would be able to travel rectilinearly from these pulsing sources, gamma rays do not produce atmospheric muon showers, and neutrons, due to their inherent instability, would have suffered radioactive decay well before they had completed their journey. As a

last resort, the scientists went to the extreme of suggesting that they might have discovered a new kind of long-life neutral particle that was able to survive the long journey through space. Omni magazine picked up on their conclusions and proclaimed that Earth is being struck by a “mysterious beam of energy that appears to violate current theories about energy and matter” (Omni, June 1989, p. 37)

Such radical revisions of physics are entirely unnecessary if one is willing to admit that charged cosmic ray particles are able to traverse interstellar space along straight-line paths without interference by intervening magnetic fields. In such a case, the “mysterious” particles these physicists were observing turn out to be ordinary cosmic ray protons, the same high-energy particles that make up 99 percent of the cosmic ray background radiation that continually showers the Earth. Rather than heralding the discovery of a new kind of particle, these cosmic ray pulses simply confirm what the Portland superwave investigation and the Star Wars particle beam experiments had already demonstrated years before—cosmic ray particle volleys can travel long distances through interstellar space along straight-line trajectories.

*12. Beryllium, the fourth element in the chemist’s periodic table, is one of the lightest known metals. Although it can adopt a number of different isotopic forms, only its stable form, beryllium-9, occurs naturally in terrestrial minerals. The other isotopes of beryllium are produced only through the action of cosmic rays. Most of these have such a short half-life that they disappear shortly after being formed. Beryllium-10, on the other hand, has a half-life of 1.5 million years, allowing it to be detected even several million years after its formation.

*13. By convention, B.P. dates (years before present) are referenced from 1950 A.D.

*14. Actually the pyramids do not exactly reproduce the arrangement of these stars. The ratio of the separation of the pyramids (Cheops–Chephren:Chephren–Menkaure) is 10 percent larger than the corresponding ratio of their stellar counterparts in Orion ($\xi-\epsilon:\epsilon-\delta$). Also, the angular deviation of the smallest pyramid from the line

connecting the peaks of the two largest pyramids is 32 percent larger than the deviation of δ Orionis from the line connecting ξ and ϵ Orionis. The discrepancies cannot be resolved by relative movement of the stars because all three stars have very low proper motions. Knowing that the Egyptians were quite adept at astrometry and masonry, the reason for this discrepancy needs to be resolved.

*15. During that early epoch at the beginning of the Age of Leo, the Sun at vernal equinox would have been located beneath Leo's hindquarters. Interestingly, in that position it would have coincided with the ecliptic longitude of the nearby hot pole of the cosmic microwave background radiation (see figure 1.11).

*16. The ice core tube numbers of the samples and their revised depths and ages are: 949: 1212 m, 35.3 kyrs B.P.; 955: 1221 m, 41.3 kyrs B.P.; 959: 1226.2 m, 46.2 kyrs B.P.; 960: 1227.7 m, 47.7 kyrs B.P.; 962-1: 1230.5 m, 50.3 kyrs B.P.; 962-2: 1231.5 m, 50.7 kyrs B.P.; 969: 1241 m, 54.6 kyrs B.P.; 992: 1275 m, 73.1 kyrs B.P. These utilize the depth assignments of S. Johnsen.

*17. Unfortunately, at the time of this writing, beryllium-10 data is not available for earlier portions of the Camp Century ice core. Thus, we do not presently know how cosmic ray levels were changing at the times of the other cosmic dust peaks in this series.

†18. The other three Camp Century ice core dust samples that I analyzed I had filtered from ice samples sent to me from the National Science Foundation ice storage facility in Buffalo, New York. Thompson's samples came from core tube numbers 962-1 and 1038, which he had listed as having depths of 1234.7 and 1345.4 meters. These depth assignments should be corrected here to 1230.7 and 1341.4 meters to be in accordance with the more accurate depth assignments used by S. J. Johnsen.

*19. The dust particle was a conglomerate of grains of varying compositions, some of which were tiny crystal platelets of pure tin oxide that measured a few tenths of a micron in size and had a shape very similar to the platelets found in the 50,000-year-old tin-rich polar ice sample. Quite possibly, interstellar dust from this same tin-rich

interstellar source that spawned the 50,000-year-old tin particles may currently be entering the solar system, but in very small amounts and aggregated with other types of cosmic material.

*20. The outward pressure that the solar wind exerts on a dust particle depends upon the particle's cross-sectional area, whereas the gravitational force pulling the particle toward the Sun depends upon the particle's mass (or volume). Consequently, when a dust particle reaches a sufficiently small size, the outward solar wind pressure will exceed the inward pull of gravity and the particle will be expelled.

*21. *In Worlds in Collision*, Immanuel Velikovsky presents many ancient references to Venus appearing with "hair," a "beard," or "horns." He interprets these accounts quite differently, believing them to be evidence that Venus was once a giant comet that had entered the inner solar system and that it had caused terrestrial upheavals while passing near the Earth. However, as discussed in chapter 8 (pp. 249–50), his theory would predict that Venus should have a very eccentric orbit, whereas Venus's orbit is instead highly circular.

*22. Cosmochemists G. Kocharov and C. P. Sonett (*Eos* 72 [1991]: 72) have cited a much younger date of 75,000 years B.P. for the North Polar Spur supernova explosion, proposing that the cosmic ray blast wave from this explosion might have produced the 35,000-year-old beryllium-10 peak found in the polar ice. But it is unlikely that the North Polar Spur could be so young. Also, explosions this close to the solar system occur very rarely, about once every hundred million years, so while such an event might explain a single beryllium-10 peak, it is unable to account for the many other beryllium-10 peaks observed in the ice core record. In this respect, galactic superwaves offer a more reasonable explanation.

*23. Stadials are cold periods when the ice sheets remained stationary or advanced southward; interstadials are warm periods when they receded northward.

*24. Prior to discovering Gold's work on glazed lunar soil samples and the work of Zook et al. on solar flare tracks, I had similarly concluded that the Sun must have been active in glacial times. I made this inference

after finding high cosmic dust concentrations in polar ice. It is interesting that various research groups independently arrived at similar conclusions based on different sets of data.

*25. Radiocarbon dates can be up to a few thousand years too young due to the lower atmospheric CO₂ concentrations and higher carbon-14 production rates that prevailed during and shortly after the last ice age. Thus, here and elsewhere in the book radiocarbon dates have been converted to calendar dates using the method set forth in table D.1 of appendix D.

*26. Glacial meltwater normally contains a greater abundance of the relatively light oxygen-16 isotope as compared with the oxygen-18 isotope. The rapid influx of this isotopically light water into the Gulf caused a change in the seawater's oxygen isotope ratio, which in turn became registered in calcium carbonate making up the shells of these sea creatures.

*27. In the 1980s, when I first proposed the theory that solar cosmic ray events could flip the Earth's magnetic pole, geophysicists instead believed that geomagnetic reversals were brought about by instabilities in the rotation of the Earth's slowly moving core dynamo and that reversals should take hundreds of years to complete. However, my solar cosmic ray theory began to receive confirmation in the early 1990s with the discovery of a polar reversal recorded in the Steens Mountain lava formation, which showed that pole direction changed as fast as eight degrees per day (T. Appenzeller, "A conundrum at Steens Mountain," *Science* 255 [1992]: 31; R. S. Coe et al., "New evidence for extraordinarily rapid change of the geomagnetic field during a reversal," *Nature* 374 [1995]: 687). Such rapid flips could not be accounted for by slow movements of the Earth's core. Unaware of my previously published theory, two French geophysicists published a paper that attributed the Steens Mountain polarity reversal to the same sort of solar cosmic ray cause (P. Utré-Guérard and J. Achache, "Core flow instabilities and geomagnetic storms during reversals: The Steens Mountain impulsive field variations revisited," *Earth and Planetary Science Letters* 135 [1995]: 91–99).

*28. In the past, several authors have claimed that there was no significant increase in the rate of small animal extinction. However, they assumed that the Rancholabrean extinctions took place over a much longer time, since they misidentified the Rancholabrean 1, 2, and 3 phases with the Illinoian glacial, Sangamon interglacial, and Wisconsin glacial. Radiocarbon dating, however, has now established that the entire Rancholabrean took place during the Wisconsin glacial period, its three phases probably correlating with the early, middle, and late Wisconsin stages (A. J. Sutcliffe, *On the Track of Ice Age Mammals* [Cambridge, Mass.: Harvard University Press, 1985], p. 180). This shortens the durations of these phases and increases the corresponding extinction rates.

*29. Toward the end of the account in the *Critias*, Atlantis is described as being 400 to 600 kilometers in size, several hundred times larger than the size given at the beginning of that myth. Hence, we may assume that over time its dimensions grew. This larger size, although being a bit on the low side, begins to approach the continent-like proportions that the *Timaeus* myth attributes to Atlantis.

*30. Knowing that the area of the Mediterranean comprises about 1.5% of the total ocean surface and assuming that about 6% of the glacial ice sheet runoff drained into this basin, the level would have risen by about 60 meters or four times the 15 meter increase in ocean level.

*31. Eccentricity, e , is given as $e = [1 - (b/a)^2]^{1/2}$, where b/a is the ratio of the orbit's semiminor and semimajor axis distances. For a perfect circle, eccentricity is zero.

*32. The psychic Edgar Cayce claimed a similar date of 12,600 years B.P. for the sinking of Atlantis. He also gave dates of 30,000 and 53,000 years B.P. for two earlier planetary catastrophes, which interestingly coincide with two key ice-age climatic demarcations—the stage 2/3 boundary separating the Mid and Late Wisconsin and the stage 3/4 boundary separating the Early and Mid Wisconsin.

*33. Remember that when designating directions in the sky, as we face south and look up, west appears to our right, and east appears to our left.

*34. Enoch did not die; God “took him.”

*35. The Crayfish, Armadillo, and Foam Egret lie off the Milky Way, but are included as part of the Star Path.

*36. Unaware of the Galactic center connection, Hugh-Jones has interpreted this directional discrimination differently. He suggests that constellations of the New Path were considered to be good because they are prominent in the sky during the summer, when food is abundant and when visiting and feasting takes place, and that constellations of the Old Path were considered to be bad because they are prominent during the winter, when food is scarce, social life reduced, and people are prone to illness. However, why should the Amazon winter be depicted in such a negative fashion? Surely it cannot be all that bad. Food gathering does not stop during that season. The Barasana collect an assortment of winter foods, such as the umari and inga fruits, palm fruits, forest fruits, ants, and caterpillars. Moreover, if these constellations were primarily intended to depict the passage of the seasons, why were they not chosen to lie along the Path of the Sun, which coincides with the ecliptic? The relation of the seasons to the constellations continuously changes due to the precession of the Earth’s poles, the seasonal cycle being displaced from its present position by one season every 6500 years, placing the Old Path constellations in the spring rather than the winter. Thus, the season argument presumes that the Barasana zodiac is relatively young. On the contrary, if certain Barasana legends report catastrophes from the end of the last ice age, this zodiac actually should be quite old.

*37. Many North American Indian tribes assign similar significance to these two areas of the sky. They conceive the Milky Way as a path along which the souls of the dead travel on their way to the heavens, the path having Stargates at both of its ends near the points where the galactic equator intersects the ecliptic (A. Gilbert and M. Cotterell, *The Mayan Prophecies* [Rockport, Mass.: Element Books, 1995], 155–57). The Southern Stargate is conceived to lie along the ecliptic above the constellation of Scorpio and the Northern Stargate to lie along the

ecliptic between the constellations of Taurus and Gemini above Orion's club.

*38. Before the present one, the Earth did not have a glacial epoch for a few hundred million years. Nevertheless, the climatic effects of the intervening galactic plane crossings may have been just as severe as those of the present ice epoch era. The difference is that currently the continents are particularly favorably placed for ice sheets to develop.

*39. Some sources give the length of the Yugas in terms of divine years, specifying one divine year as being equal to 360 human years and making one Mahayuga equal to 4,320,000 human years. However, the renowned scholar and swami Sri Yukteswar notes that this alternate system, which came into usage more recently, is incorrect and that the length of the Yugas intended to correspond to calendar years. Estimating the length of a Daiva Yuga cycle as 12,000 years, he dates the point of closest approach to the Grand Center instead at 11,501 B.C.E. Current observations of the rate of polar precession, however, indicate that his formula underestimates the length of a half precessional cycle by about 1000 years.

The mythologist Joseph Campbell has cited a Hindu scriptural source that begins the lawless terminal age of the Kali Yuga on February 17, 3102 B.C.E. (*The Mythic Image* [Princeton: Princeton University Press, 1974], pp. 142–43). Counting a duration of 1200 years, the Satya Yuga cycle would then have terminated in 1902 B.C.E.

*40. I first became aware of Mr. Stanford's book in the early 1980s, by which time I had already completed the draft of my Ph.D. dissertation on the superwave phenomenon. I was surprised to find that the superwave's effects were very similar to what was described in these channeled writings.

*41. Here, the Source refers to the apparitional event that occurred in Garabandal, Spain, in June 1962 in which four girls were given a glimpse of an extremely frightening impending catastrophe. In all, these girls experienced upward of 2000 ecstatic visions of the Lady between 1961 and 1965.

*42. It is also possible that part of this discrepancy is because the gravity wave pulse initially began its journey at a superluminal velocity and then gradually slowed down to light speed giving it a head start. Experiments conducted by Eugene Pudkletnov, as well as by Guy Obolensky and myself, suggest that sudden electric discharges give rise to gravity wave shocks that initially propagate faster than the speed of light.

*43. Later it was discovered that as many as 10 percent of all galaxies have active cores, so this early underestimated fraction further contributed to the extreme overestimate of time between galactic explosions.

*44. The Starburst Foundation, e-mail address: Starcode@aol.com

ENDNOTES

1. Cipher in the Sky

1. O. E. Scott, *Stars in Myth and Fact* (Caldwell, Idaho: Caxton Printers, 1947), 66.
2. P. Watzlawick, *How Real Is Real: Confusion, Disinformation, Communication* (New York: Vintage Books, 1976).
3. C. Sagan and F. Drake, "A Message from Earth," *Science* 175 (1972): 881–84.
4. P. A. LaViolette, *Genesis of the Cosmos: The Ancient Science of Continuous Creation* (Rochester, Vt.: Bear & Co., 1995, 2004).
5. P. A. LaViolette, "The alpha and the omega" (unpublished paper, University of Chicago, 1973).
6. P. A. LaViolette, "An introduction to subquantum kinetics," parts 1, 2, 3, *International Journal of General Systems* 11 (1985): 281–345.
7. P. A. LaViolette, *Subquantum Kinetics: A Systems Approach to Physics and Cosmology* (Niskayuna, N.Y.: Starlane Publications, 1994, 2003).
8. R. Lefever, "Dissipative structures in chemical systems," *Journal of Chemical Physics* 49 (1968): 4977–78.
9. I. Prigogine, G. Nicolis, and A. Babloyantz, "Thermodynamics of evolution," *Physics Today* 25, no. 11 (1972): 23–28; 25, no. 12 (1972): 38–44.
10. LaViolette, *Subquantum Kinetics*.
11. P. Christian, "The mysteries of the pyramids," in *The History and Practice of Magic*, vol. 1, book 2, trans. J. Kirkup and J. Shaw, ed. R. Nichols (New York: Citadel Press, 1870, 1963), 86.

- [12.](#) P. D. Ouspensky, *A New Model of the Universe* (New York: Vintage Books, 1931, 1971), 320.
- [13.](#) Christian, *The History and Practice of Magic*, 89.
- [14.](#) G. H. Mees, *The Book of Stars* (Deventer, Netherlands: N. Kluwer, 1954), 233.
- [15.](#) A. Le Floch and F. Bretenaker, “Early cosmic background,” *Nature* 352 (1991): 198.
- [16.](#) E. Lerner, “Radio absorption by the intergalactic medium,” *Astrophysical Journal* 361 (1990): 63–68.
- [17.](#) R. Muller, “The cosmic background radiation and the new aether drift,” *Scientific American* (May 1978): 64–74.
- [18.](#) R. Muller, “Radiometer system to map the cosmic background radiation,” *Review of Scientific Instruments* 49 (1978): 440–48.
- [19.](#) C. Sagan, *The Cosmic Connection* (New York: Anchor Press, 1973), 205.

2. The Galactic Connection

- [1.](#) R. L. Brown and K. L. Johnston, “The gas density and distribution within 2 parsecs of the Galactic center,” *Astrophysical Journal* 268 (1983): L85–L88.
- [2.](#) K. I. Kellerman et al., “The small radio source at the Galactic center,” *Astrophysical Journal* 214 (1977): L61–L62.
- [3.](#) P. A. LaViolette, *Genesis of the Cosmos: The Ancient Science of Continuous Creation* (Rochester, Vt.: Bear & Co., 1995, 2004), 164–65.
- [4.](#) L. W. King, *The Seven Tablets of Creation* (London: Luzac and Co., 1902), 214–15.
- [5.](#) *Ibid.*, 83, 208.
- [6.](#) LaViolette, *Genesis of the Cosmos*, 256–57.
- [7.](#) *Ibid.*, 155–59.
- [8.](#) J. Jeans, *Astronomy and Cosmogony* (London: Cambridge University Press, 1928).

- [9.](#) V. A. Ambartsumian, *The Structure and Evolution of Galaxies*, Proceedings of the 13th Solvay Conference, University of Brussels (New York: Wiley Interscience, 1965), 241.
- [10.](#) W. H. McCrea, “Continual creation,” *Monthly Notices of the Royal Astronomical Society* 128 (1964): 335–44.
- [11.](#) F. Hoyle and J. V. Narlikar, “On the effects of the nonconservation of baryons in cosmology,” *Proceedings of the Royal Society A* 290 (1966): 143–61.
- [12.](#) G. R. Burbidge, E. M. Burbidge, and A. R. Sandage, “Evidence for the occurrence of violent events in the nuclei of galaxies,” *Reviews of Modern Physics* 35 (1963): 947–72.
- [13.](#) G. R. Burbidge, “The nuclei of galaxies,” *Annual Review of Astronomy and Astrophysics* 8 (1970): 369–460.
- [14.](#) J. A. Tyson, W. A. Baum, and T. Kreidl, “Deep CCD images of 3C 273.” *Astrophysical Journal* 257 (1982): L1–L5.
- [15.](#) J. N. Bahcall, S. Kirhakos, and D. P. Schneider, “The apparently normal galaxy hosts for two luminous quasars,” *Astrophysical Journal* 457 (1996): 557–64.
- [16.](#) S. L. Shapiro and S. A. Teukolsky, “Formation of naked singularities: The violation of cosmic censorship,” *Physical Review Letters* 66 (1991): 994–97.
- [17.](#) P. A. LaViolette, “An introduction to subquantum kinetics: III. The cosmology of subquantum kinetics,” *International Journal of General Systems* 11 (1985): 329–45.
- [18.](#) P. A. LaViolette, *Subquantum Kinetics: A Systems Approach to Physics and Cosmology* (Niskayuna, N.Y.: Starlane Publications, 1994, 2003), ch. 8.
- [19.](#) P. A. LaViolette, “The planetary-stellar mass-luminosity relation: Possible evidence of energy nonconservation?” *Physics Essays* 5 (1992): 536–44; erratum: *Physics Essays* 6, no. 4 (1993): 616.
- [20.](#) LaViolette, *Subquantum Kinetics*, ch. 9.
- [21.](#) Brown and Johnston, “The gas density and distribution within 2 parsecs of the Galactic center,” L85–L88.

- [22.](#) C. H. Townes, and R. Genzel, “What is happening at the center of our Galaxy?” *Scientific American* (April 1990): 46–55.
- [23.](#) C. H. Townes, J. H. Lacy, T. R. Geballe, and D. J. Hollenbach, “The centre of the Galaxy,” *Nature* 301, no. 5902 (1983): 661–66.
- [24.](#) J. Oort, “The Galactic center,” *Annual Review of Astronomy and Astrophysics* 15 (1977): 295–362.
- [25.](#) *Ibid.*, 347.

3. *The Charge of the Bull*

- [1.](#) J. Oort, “The Galactic center,” *Annual Review of Astronomy and Astrophysics* 15 (1977): 295–362.
- [2.](#) C. H. Townes, J. H. Lacy, T. R. Geballe, and D. J. Hollenbach, “The centre of the Galaxy,” *Nature* 301, no. 5902 (1983): 661–66.
- [3.](#) P. A. LaViolette, “Galactic explosions, cosmic dust invasions, and climatic change,” Ph.D. dissertation, Portland State University, 1983, ch. 1.
- [4.](#) *Ibid.*, ch. 3.
- [5.](#) M. L. Marshak et al., “Evidence for muon production by particles from Cygnus X-3,” *Physical Review Letters* 54 (1985): 2079–2082.
- [6.](#) B. L. Dingus et al., “High-energy pulsed emission from Hercules X-1 with anomalous air-shower muon production,” *Physical Review Letters* 61 (1988): 1906–1909.
- [7.](#) B. Schwarzschild, “Are the ultra-energetic cosmic gammas really photons?” *Physics Today*, November 1988: 17.
- [8.](#) R. T. Rundle Clark, *Myth and Symbol in Ancient Egypt* (New York: Thames and Hudson, 1959), 181–82.
- [9.](#) P. A. LaViolette, *Genesis of the Cosmos: The Ancient Science of Continuous Creation* (Rochester, Vt.: Bear & Co., 1995, 2004), ch. 6.
- [10.](#) Rundle Clark, *Myth and Symbol in Ancient Egypt*, 221–23.
- [11.](#) J. A. West, *Serpent in the Sky: The High Wisdom of Ancient Egypt* (Wheaton, Ill.: Quest, 1993), 100–103.

- [12.](#) W. T. Olcott and E. W. Putnam, *Field Book of the Skies* (New York: Putnam's Sons, 1936).
- [13.](#) O. E. Scott, *Stars in Myth and Fact* (Caldwell, Idaho: Caxton Printers, 1947), 330.
- [14.](#) R. Burnham Jr., *Burnham's Celestial Handbook: An Observer's Guide to the Universe Beyond the Solar System*, vol. 3 (New York: Dover, 1978), 1868.
- [15.](#) Ibid., 1289.
- [16.](#) R. Graves, *The Greek Myths*, vol. 1 (New York: Penguin Books, 1955), 153.
- [17.](#) Rundle Clark, *Myth and Symbol in Ancient Egypt*, 88.
- [18.](#) L. Cottrell, *The Bull of Minos* (London: Pan Books, 1953, 1955), 123.
- [19.](#) Ibid., 151.

4. Cosmic Dust Invasions

- [1.](#) Bundahis, ch. 3, in *The Sacred Books of the East, Pahlavi Texts*, part 1, ed. F. M. Muller, trans. E. W. West (New York: Scribner's, 1901), 17–19.
- [2.](#) J. Bierhorst, *The Mythology of South America* (New York: William Morrow, 1988), 143–44.
- [3.](#) M. L'Abbé Brasseur de Bourbourg, *Sources de l'histoire primitive du Mexique* (Paris: Maisonneuve Et, 1864), 28.
- [4.](#) Ibid., 28–29.
- [5.](#) D. G. Brinton, *Myths of the New World* (New York: Henry Holt, 1876), 224–25.
- [6.](#) Brasseur de Bourbourg, *Sources de l'histoire primitive du Mexique*, 27–28.
- [7.](#) H. H. Bancroft, *The Native Races*, vol. 3, *Myths and Languages* (San Francisco, The History Company, 1886), 49–50.
- [8.](#) Ibid., 50.
- [9.](#) Ibid., 51.

- [10.](#) Brasseur de Bourbourg, *Sources de l'histoire primitive du Mexique*, 27.
- [11.](#) I. Donnelly, *The Destruction of Atlantis* (New York: Multimedia Publishing, 1883, 1971), 215.
- [12.](#) M. Miller and K. Taube, *The Gods and Symbols of Ancient Mexico and the Maya* (London: Thames & Hudson, 1993), 176.
- [13.](#) D. G. Brinton, *Myths of the New World*, 234–35.
- [14.](#) P. A. LaViolette, *Genesis of the Cosmos: The Ancient Science of Continuous Creation* (Rochester, Vt.: Bear & Co., 1995, 2004), 108–116.
- [15.](#) Plutarch, *Moralia*, trans. Frank C. Babbitt (Cambridge, Mass.: Harvard University Press, 1936), 35–49.
- [16.](#) R. Bauval and A. Gilbert, *The Orion Mystery: Unlocking the Secrets of the Pyramids* (New York: Crown Publishers, 1994), 138–196.
- [17.](#) R. Bauval and G. Hancock, *The Message of the Sphinx* (New York: Crown Publishers, 1996), 58–73.
- [18.](#) A. Berger, “Long-term variations of the earth’s orbital elements,” *Celestial Mechanics* 15 (1977): 53–74.
- [19.](#) Bauval and Hancock, *The Message of the Sphinx*, 238, 243.
- [20.](#) R. T. Rundle Clark, *Myth and Symbol in Ancient Egypt* (New York: Thames and Hudson, 1959), 192.
- [21.](#) P. A. LaViolette, “Galactic explosions, cosmic dust invasions, and climatic change,” Ph.D. dissertation, Portland State University, 1983.
- [22.](#) L. W. Alvarez, W. Alvarez, F. Asaro, and H. V. Michel, “Extraterrestrial cause for the Cretaceous-Tertiary extinction: Experimental results and theoretical interpretation,” *Science* 208 (1980): 1095–1108.
- [23.](#) Donnelly, *The Destruction of Atlantis*, 65–112.
- [24.](#) O. Muck, *The Secret of Atlantis* (New York: Pocket Books, 1978).
- [25.](#) I. Velikovsky, *Worlds in Collision* (New York: Pocket Books, 1950), 166–67, 182–83.
- [26.](#) P. A. LaViolette, “The terminal Pleistocene cosmic event: Evidence for recent incursion of nebular material into the Solar System,” *Eos* 64

- (1983): 286.
- [27.](#) P. A. LaViolette, “Elevated concentrations of cosmic dust in Wisconsin stage polar ice,” *Meteoritics* 18 (1983): 336–37.
 - [28.](#) P. A. LaViolette, “Evidence of high cosmic dust concentrations in Late Pleistocene polar ice,” *Meteoritics* 20 (1985): 545–58; erratum *Meteoritics* 20 (1985): 803. The diagrams for figures 1 and 2 in the original *Meteoritics* paper were mistakenly interchanged at the time of printing; see erratum. Also note that the ages assigned to the ice sample have since been revised, the sample date range now spanning the period 73,000 to 35,000 years B.P.
 - [29.](#) L. G. Thompson, “Microparticles, ice sheets and climate,” Institute of Polar Studies, Report No. 64, Ohio State University, 1977.
 - [30.](#) L. G. Thompson, “Variations in microparticle concentration, size distribution and elemental composition found in Camp Century, Greenland, and Byrd Station, Antarctica, deep ice cores,” in *Isotopes and Impurities in Snow and Ice*, proceedings of the Grenoble Symposium, 1975, IAHS Publication No. 118, 351–63.
 - [31.](#) Donnelly, *The Destruction of Atlantis*, 266.
 - [32.](#) P. Fraundorf, “Interplanetary dust in the transmission electron microscope: Diverse materials from the early solar system,” *Geochimica Cosmochimica Acta* 45 (1981): 915–43.
 - [33.](#) F. J. Rietmeijer, “Tin in a chondritic interplanetary dust particle,” *Meteoritics* 24 (1989): 43–47.
 - [34.](#) W. Dansgaard et al., “Speculations about the next glaciation,” *Quaternary Research* 2 (1972): 396–98.
 - [35.](#) C. U. Hammer, H. B. Clausen, and C. C. Langway, “50,000 years of recorded global volcanism,” *Climatic Change* 35 (1997): 1–15.
 - [36.](#) P. A. LaViolette, “Solar cycle variations in ice acidity at the end of the last ice age: possible marker of a climatically significant interstellar dust incursion,” *Planetary and Space Science* 53, no. 4 (2005): 385–93; erratum, 861. Eprint: arxiv.org/abs/physics/0502019.
 - [37.](#) P. A. LaViolette, *Galactic Superwaves and Their Impact on the Earth* (Niskayuna, N.Y.: Starlane Publications, 2003), appendix H.

- [38.](#) LaViolette, “Solar cycle variations in ice acidity . . . ,” 390.
- [39.](#) M. G. Hauser et al., “IRAS observations of the diffuse infrared background,” *Astrophysical Journal* 278 (1984): L15–L18.
- [40.](#) T. Kelsall et al., “The COBE Diffuse Infrared Background Experiment search for the cosmic infrared background. II. Model of the interplanetary dust cloud,” *Astrophysical Journal* 508 (1998): 44–73.
- [41.](#) P. A. LaViolette, “Cosmic-ray volleys from the Galactic Center and their recent impact on the Earth environment,” *Earth, Moon, and Planets* 37 (1987): 241–86.
- [42.](#) E. Grün et al., “Discovery of jovian dust streams and interstellar grains by the Ulysses spacecraft,” *Nature* 362 (1993): 428–30.
- [43.](#) P. A. LaViolette, “Anticipation of the Ulysses interstellar dust findings,” *Eos* 74 (1993): 510–11.
- [44.](#) M. Witte et al., “The ULYSSES neutral gas experiment: Determination of the velocity and temperature of the interstellar neutral helium,” *Advances in Space Research* 13, no. 6 (1993): 121–30.
- [45.](#) E. Grün et al., “Interstellar dust in the heliosphere,” *Astronomy and Astrophysics* 286 (1994): 915–24.
- [46.](#) H. J. Fahr, “The extraterrestrial UV-background and the nearby interstellar medium,” *Space Science Reviews* 15 (1974): 483–540.
- [47.](#) B. McCall et al., “An enhanced cosmic-ray flux towards zeta Persei inferred from a laboratory study of the $\text{H}_3^+ - \text{e}^-$ recombination rate,” *Nature* 422 (2003): 500–502.
- [48.](#) W. M. Napier and S. V. M. Clube, “A theory of terrestrial catastrophism,” *Nature* 282 (1979): 455–59.
- [49.](#) A. von Humboldt, *Researches Concerning the Institutions and Monuments of the Ancient Inhabitants of America*, vol. 2 (1814), 174, cited in Velikovsky, *Worlds in Collision*, 173.
- [50.](#) Brasseur de Bourbourg, *Sources de l’histoire primitive du Mexique*, 48, cited in Velikovsky, *Worlds in Collision*, 174.
- [51.](#) J. Scheftelowitz, *Die Zeit als Schicksalsgottheit in der iranischen Religion* (1929), 4, cited in Velikovsky, *Worlds in Collision*, 173.

- [52.](#) M. Jastrow, *Aspects of Religious Belief and Practice in Babylonia and Assyria* (New York: Benjamin Blom, 1911), 221.
- [53.](#) H. Winckler, *Himmels- und Weltenbild der Babylonier* (1901), 43, cited in Velikovsky, *Worlds in Collision*, 174.
- [54.](#) E. Nordenskiöld, *The Secret of the Peruvian Quipus* (1925), 533 ff., cited in Velikovsky, *Worlds in Collision*, 175.
- [55.](#) Brasseur de Bourbourg, *Sources de l'histoire primitive du Mexique*, 82.

5. The Age of Ice

- [1.](#) I. Donnelly, *The Destruction of Atlantis* (New York: Multimedia Publishing, 1883, 1971), 59.
- [2.](#) P. C. Frisch, "The nearby interstellar medium," *Nature* 293 (1981): 377–79.
- [3.](#) P. C. Frisch and D. G. York, "Synthesis maps of ultraviolet observations of neutral interstellar gas," *Astrophysical Journal* 271 (1983): L59–L63.
- [4.](#) J. Linsky, N. Piskunov, and B. Wood, "The size and extent of the interstellar gas cloud surrounding the Sun," June 10, 1996, press release.
- [5.](#) F. J. Low et al., "Infrared cirrus: New components of the extended infrared mission," *Astrophysical Journal* 278 (1984): L19–L22.
- [6.](#) M. G. Hauser et al., "IRAS observations of the diffuse infrared background," *Astrophysical Journal* 278 (1984): L15–L18.
- [7.](#) H. H. Aumann, "Spectral class distribution of circumstellar material in main-sequence stars," *Astronomical Journal* 96 (1988): 1415–19.
- [8.](#) "Cold cloud may contain unseen solar dust," *Science News* 134 (1988): 246.
- [9.](#) J. Horgan, "Beyond Neptune," *Scientific American* 273 (October 1995): 24–26.
- [10.](#) B. Branston, *Gods of the North* (New York: Thames and Hudson, 1980).
- [11.](#) H. A. Guerber, *The Norsemen* (New York: Avenel Books, 1985).

- [12.](#) Donnelly, *The Destruction of Atlantis*, 149.
- [13.](#) P. A. Munch, *Norse Mythology* (New York: The American-Scandinavian Foundation, 1926), 108–112.
- [14.](#) P. Colum, *Orpheus: Myths of the World* (New York: Grosset & Dunlap, 1930), 208–12.
- [15.](#) J. I. Young, *The Prose Edda of Snorri Sturluson: Tales from Norse Mythology* (London: Bowes & Bowes, 1954), 86–91.
- [16.](#) Donnelly, *The Destruction of Atlantis*, 152.
- [17.](#) J. Bierhorst, *The Mythology of South America* (New York: William Morrow, 1988), 143–44.
- [18.](#) C. Beals, *Stories Told by the Aztecs Before the Spaniards Came* (New York: Abelard-Schuman, 1970), 33–35.
- [19.](#) S. Begley, “The first Americans,” *Newsweek*, October 1991 (Special Issue): 15–20.

6. The Conflagration

- [1.](#) P. Freund, *Myths of Creation* (Levittown, N.Y.: Transatlantic Arts, 1964), 7.
- [2.](#) M. Davison, “On the Noachian deluge,” in *Journal of the Transactions of the Victoria Institute* 4, ed. J. Reddie (London: R. Hardwicke, 1869), 126.
- [3.](#) F. Hoyle and R. A. Lyttleton, “Variations in solar radiation and the cause of ice ages,” *Journal of Glaciology* 1 (1950): 453–55.
- [4.](#) P. A. LaViolette, “Galactic explosions, cosmic dust invasions, and climatic change,” Ph. D. dissertation, Portland State University, 1983, ch. 3.
- [5.](#) J. L. Greenstein, “A possible energy source for T Tauri stars,” *Astronomical Society of the Pacific Publication* 62 (1950): 156–62.
- [6.](#) L. H. Aller, *Gaseous nebulae* (New York: John Wiley and Sons, 1956).
- [7.](#) L. V. Kuhi, “Mass loss from T Tauri stars,” *Astrophysical Journal* 140 (1964): 1409–33.

- [8.](#) L. V. Kuhi, “T Tauri mass ejection,” in *Stellar Evolution*, ed. R. F. Stein and A. G. W. Cameron (New York: Plenum Press, 1966), 373–76.
- [9.](#) G. H. Herbig, “The youngest stars,” *Scientific American* 217 (August 1967): 30.
- [10.](#) E. E. Mendoza, “Infrared photometry of T Tauri stars and related objects,” *Astrophysical Journal* 143 (1966): 1010–14.
- [11.](#) G. F. Gahm, “X-ray observations of T Tauri stars,” *Astrophysical Journal* 242 (1980): L163–L166.
- [12.](#) M. Mizutani, T. Maihara, N. Hiromoto, and H. Tamaki, “Near-infrared observation of the circumsolar dust emission during the 1983 solar eclipse,” *Nature* 312 (1984): 134–36.
- [13.](#) S. Isobe, T. Hirayama, N. Baba, and N. Miura, “Optical polarization observations of circumsolar dust during the 1983 solar eclipse,” *Nature* 318 (1985): 644–46.
- [14.](#) K.-W. Hodapp, R. M. MacQueen, and D. N. Hall, “A search during the 1991 solar eclipse for the infrared signature of circumsolar dust,” *Nature* 355 (1992): 707–710.
- [15.](#) T. Gold, “Apollo II observations of a remarkable glazing phenomenon on the lunar surface,” *Science* 165 (1969): 1345–49.
- [16.](#) LaViolette, “Galactic explosions . . . ,” 272–73.
- [17.](#) V. R. Baker, “The Spokane Flood controversy and the Martian outflow channels,” *Science* 202 (1978): 1249–56.
- [18.](#) M. H. Carr, “The Geology of Mars,” *American Scientist* 68 (1980): 626–35.
- [19.](#) V. R. Baker, “Water and the martian landscape,” *Nature* 412 (2001): 228–36.
- [20.](#) G. G. Ori, L. Marinangeli, and A. Baliva, “Terraces and Gilbert-type deltas in crater lakes in Ismenius Lacus and Memnonia (Mars),” *Journal of Geophysical Research* 105 (2000): 17629–41.
- [21.](#) Baker, “Water and the martian landscape,” 228–36.
- [22.](#) “Mars Emerging from Ice Age, Data Suggest,” Web site: space.com/scienceastronomy/mars_ice-age_031208.html.

- [23.](#) Plato, *Timaeus*, 22b–22d, in *The Collected Dialogues of Plato*, ed. E. Hamilton and H. Cairns, trans. B. Jowett (Princeton, N.J.: Princeton University Press, 1961).
- [24.](#) Ovid, *The Metamorphoses*, book 11, fable 1, quoted in Donnelly, *The Destruction of Atlantis*, 158–63.
- [25.](#) E. E. Clark, *Indian Legends of the Pacific Northwest* (Berkeley: University of California Press, 1953), 53–55.
- [26.](#) S. Thompson, *Tales of the North American Indians* (Bloomington: Indiana University Press, 1971), 44–45, quoting F. Boas, *Jesup North Pacific Expedition*, vol. 1, 95.
- [27.](#) Ibid.
- [28.](#) D. G. Brinton, *Myths of the New World* (New York: Henry Holt, 1876), 226–27.
- [29.](#) Ibid., 165.
- [30.](#) Ibid.
- [31.](#) I. Donnelly, *The Destruction of Atlantis* (New York: Multimedia Publishing, 1883, 1971), 181–82.
- [32.](#) Le Jeune, in *Relations des Jesuits dans la Nouvelle-France*, vol. 1, 1637, p. 54; quoted in Donnelly, 182.
- [33.](#) J. Franklin, *Narrative of a Second Expedition to the Shores of the Polar Sea* (Rutland, Vt.: Charles Tuttle, 1971), 291–94.
- [34.](#) E. E. Clark, *Indian Legends of Canada* (Toronto: McClelland & Stewart, 1960), 17–19.
- [35.](#) *Popular Science Monthly*, October 1879: 799; quoted in Donnelly, 178.
- [36.](#) Brinton, *Myths of the New World*, 227.
- [37.](#) H. Fox, *First Fire: Central and South American Indian Poetry* (New York: Anchor Books, 1978), 56.
- [38.](#) D. A. Mackenzie, *Indian Myth and Legend* (London: Gresham Publishing, 1913), 142.
- [39.](#) Donnelly, *The Destruction of Atlantis*, 135.

- [40.](#) P. A. LaViolette, “Global warming at the Termination I boundary and its possible extraterrestrial cause.” Eprint: arxiv.org/abs/physics/0503158.
- [41.](#) P. A. LaViolette, “Cosmic-ray volleys from the Galactic center and their recent impact on the Earth environment,” *Earth, Moon, and Planets* 37 (1987): 241–86.
- [42.](#) A. T. Wilson and A. Long, “What was the carbon dioxide content of the glacial atmosphere,” *Eos* 74 (1993): 78; “New approaches to CO₂ analysis in polar ice cores,” *Journal of Geophysical Research* 102 (1997): 26601–06.
- [43.](#) A. Neftel et al., “CO₂ record in the Byrd ice core 50,000–5,000 years B.P.,” *Nature* 331 (1988): 609–611.
- [44.](#) J. B. H. Kloosterman, “An Alleröd conflagration? (Comments on Apophoreta-II),” *Catastrophist Geology* 2, no. 1 (1977): 13–15.
- [45.](#) J. B. H. Kloosterman, “The Usselo Horizon, a worldwide thin layer rich in charcoal of Alleröd age,” *New Solar System Models, Symposium Bérghamo, 1999*, 52–53.
- [46.](#) K. Hughen et al., “Deglacial changes in ocean circulation from an extended radiocarbon calibration,” *Nature* 391 (1998): 65–68.
- [47.](#) LaViolette, “Galactic explosions . . . ,” ch. 10.
- [48.](#) R. B. Firestone and W. Topping, “Terrestrial Evidence of a Nuclear Catastrophe in Paleoindian Times,” *Mammoth Trumpet* 16 (2001): 9–18; reprinted in *Infinite Energy* 40 (2001): 15–22.
- [49.](#) R. B. Firestone, “Response to the Comments by J. R. Southon and R. E. Taylor,” *Mammoth Trumpet* 17 (2002): 14; www.centerfirstamericans.com/mt.html?a=61.
- [50.](#) J. D. Dana, *Manual of Geology* (New York: American Book, 1880), 553.
- [51.](#) H. Heinrich, “Origin and consequences of cyclic ice rafting in the northeast Atlantic Ocean during the past 130,000 years,” *Quaternary Research* 29 (1988): 142–52.

- [52.](#) LaViolette, *Galactic Superwaves and Their Impact on the Earth* (Niskayuna, N.Y.: Starlane Publications, 2003), ch. 10.
- [53.](#) N. A. Mörner, “Annual and inter-annual magnetic variations in varved clay,” *Journal of Interdisciplinary Cycle Research* 9 (1978): 229–41.
- [54.](#) N. A. Mörner, “The Gothenburg magnetic excursion,” *Quaternary Research* 7 (1977): 413–27.
- [55.](#) Mörner, “Annual and inter-annual magnetic variations . . . ,” 229–41.
- [56.](#) Mörner, “The Gothenburg magnetic excursion,” 413–27.
- [57.](#) LaViolette, “Galactic explosions . . . ,” 192–93.
- [58.](#) LaViolette, “Cosmic-ray volleys . . . ,” 241–86.
- 59. J. Golden et al., “The generation and application of intense pulsed ion beams,” *American Scientist* 69 (1981): 173–83.

7. The Great Extinction

- [1.](#) C. V. Haynes, “Geochronology of man-mammoth sites and their bearing on the origin of the Llano Complex,” in *Pleistocene and Recent Environments of the Central Great Plains*, ed. W. Dort Jr. and J. K. Jones (Lawrence: The University Press of Kansas, 1970), 77–92.
- [2.](#) P. S. Martin, “Prehistoric overkill,” in *Pleistocene Extinctions: The Search for a Cause*, ed. P. S. Martin and H. E. Wright (New Haven: Yale University Press, 1967), 75–120.
- [3.](#) J. E. Guilday, “Differential extinction during Late-Pleistocene and recent times,” in *Pleistocene Extinctions: The Search for a Cause*, ed. P. Martin and H. E. Wright (New Haven: Yale University Press, 1967), 122.
- [4.](#) A. L. Wallace, *The Geographical Distribution of Animals*, vol. 1 (London: MacMillan, 1876), 150.
- [5.](#) D. K. Grayson, “Pleistocene avifaunas and the overkill hypothesis,” *Science* 196 (1977): 691–93.
- [6.](#) G. Haynes, “Mammoths of the Ice Age,” Nova TV documentary aired July 11, 1995.

- [7.](#) K. Kowalski, “The Pleistocene extinction of mammals in Europe,” in *Pleistocene Extinctions: The Search for a Cause*, ed. P. S. Martin and H. E. Wright (New Haven: Yale University Press, 1967), 349–64.
- [8.](#) N. K. Vereshchagin, “Primitive hunters and Pleistocene extinction in the Soviet Union,” in *Pleistocene Extinctions: The Search for a Cause*, ed. P. S. Martin and H. E. Wright (New Haven: Yale University Press, 1967), 388, 392.
- [9.](#) B. Slaughter, “Animal ranges as a clue to Late-Pleistocene extinction,” in *Pleistocene Extinctions: The Search for a Cause*, ed. P. S. Martin and H. E. Wright (New Haven: Yale University Press, 1967), 155–67.
- [10.](#) Guilday, “Differential extinctions . . . ,” 121–40.
- [11.](#) P. J. Mehringer, “The environment of extinction of the Late-Pleistocene mega-fauna in the arid southwestern United States,” in *Pleistocene Extinctions: The Search for a Cause*, ed. P. S. Martin and H. E. Wright (New Haven: Yale University Press, 1967), 247–66.
- [12.](#) H. H. Howorth, *The Mammoth and the Flood* (London: Sampson Low, Marston, Searle & Rivington, 1887), 306.
- [13.](#) R. Ward, *Floods: A Geographical Perspective* (New York: John Wiley & Sons, 1978), 34.
- [14.](#) S. Thorarinsson, “Some new aspects of the Grimsvötn problem,” *Journal of Glaciology* 2 (1953): 267–75.
- [15.](#) P. A. LaViolette, “Galactic explosions, cosmic dust invasions, and climatic change,” Ph.D. dissertation, Portland State University, 1983, ch. 10.
- [16.](#) J. Briggs and F. D. Peat, *Turbulent Mirror* (New York: Harper & Row, 1989), 119–23.
- [17.](#) D. Myles, *The Great Waves* (New York: McGraw-Hill, 1985), 37, 62.
- [18.](#) LaViolette, “Galactic explosions . . . ,” ch. 10.
- [19.](#) A. Kehew and L. Clayton, “Late Wisconsin floods and development of the Souris-Pembina spillway system in Saskatchewan, North Dakota, and Manitoba,” in *Glacial Lake Agassiz*, GSA paper 26, ed. J. T. Teller and L. Clayton (Washington, D.C.: Geological Society of America, 1983), 187–210.

- [20.](#) R. F. Flint, *Glacial Geology and the Pleistocene Epoch* (New York: J. Wiley & Sons, 1947), 124.
- [21.](#) J. Shaw, “Drumlins, subglacial meltwater floods, and ocean responses,” *Geology* 17 (1989): 853–56.
- [22.](#) J. Shaw, D. Kvill, and B. Rains, “Drumlins and catastrophic subglacial floods,” *Sedimentary Geology* 62 (1989): 177–202.
- [23.](#) Flint, *Glacial Geology and the Pleistocene Epoch*, 116–17.
- [24.](#) Ibid.
- [25.](#) Ibid., 119.
- [26.](#) J. D. Dana, *Manual of Geology* (New York: American Book, 1880), 548.
- [27.](#) H. Howorth, *The Glacial Nightmare and the Flood* (London: Sampson Low, Marston, 1893), 785–86.
- [28.](#) Ibid., 822.
- [29.](#) Myles, *The Great Waves*, 147.
- [30.](#) R. L. Jack, “Glacial drift in the northeastern Carpathians,” *Quarterly Journal Geological Society of London* 33 (1877): 673–81.
- [31.](#) J. Lubbock, *The Scenery of Switzerland and the Causes to Which It Is Due* (London, 1896), 125.
- [32.](#) C. Lyell, *Principles of Geology* (New York: D. Appleton, 1864), 78.
- [33.](#) D. S. Allan and J. B. Delair, *When the Earth Nearly Died* (Bath: Gateway Books, 1995), 86.
- [34.](#) F. C. Hibben, “Evidences of early man in Alaska,” *American Antiquity* 8 (1943): 254–59.
- [35.](#) T. L. Péwé, *Quaternary Geology of Alaska*, Geological Survey Professional Paper No. 835 (Washington, D.C.: U.S. Printing Office, 1975).
- [36.](#) T. L. Péwé, *Quaternary Stratigraphic Nomenclature in Unglaciated Central Alaska*, Geological Survey Professional Paper No. 862 (Washington, D.C.: U.S. Printing Office, 1975).

- [37.](#) I. P. Tolmachoff, “The carcasses of the mammoth and rhinoceros found in the frozen ground of Siberia,” *American Philosophical Society Transactions* 23 (1929): 51–71.
- [38.](#) S. Taber, “Perennially frozen ground in Alaska: Its origin and history,” *Bulletin of the Geological Society of America* 54 (1943): 1483–84.
- [39.](#) Howorth, *The Mammoth and the Flood*, 71.
- [40.](#) W. R. Farrand, “Frozen mammoths and modern geology,” *Science* 133 (1961): 729–35.
- [41.](#) Howorth, *The Mammoth and the Flood*, 96.
- [42.](#) Taber, “Perennially frozen ground . . . ,” 1489.
- [43.](#) Hibben, “Evidences of early man . . . ,” 254–59.
- [44.](#) Taber, “Perennially frozen ground . . . ,” 1489.
- [45.](#) R. W. Boyle, “The geochemistry of gold and its deposits,” *Geological Survey of Canada, Bulletin* 280 (1979): 381.
- [46.](#) *Ibid.*, 369.
- [47.](#) Howorth, *The Mammoth and the Flood*, 318, 358, 372.
- [48.](#) *Ibid.*, 53.
- [49.](#) D. G. Whitley, “The Ivory Islands in the Arctic Ocean,” *Journal of the Philosophical Society of Great Britain* 12 (1910): 35.
- [50.](#) F. P. Wrangell, *Narrative of an Expedition to Siberia and the Polar Sea* (1841), 173, cited in Velikovsky, *Earth in Upheaval*, 18.
- [51.](#) G. A. Erman, *Travels in Siberia*, vol. 2 (London: Longman, Brown, Green, and Longmans, 1848), 379–80, cited in Velikovsky, *Earth in Upheaval*, 19.
- [52.](#) T. L. Péwé, “Origin of the upland silt near Fairbanks, Alaska,” *Bulletin of the Geological Society of America* 67 (1955): 699–724.
- [53.](#) *Ibid.*
- [54.](#) *Ibid.*
- [55.](#) Taber, “Perennially frozen ground . . . ,” 1486.
- [56.](#) H. M. Eakin, “The Yukon-Koyukuk region, Alaska,” *U.S. Geological Survey* 631 (1916): 1–88.

- [57.](#) H. M. Eakin, “The Cosna-Nowitna region, Alaska,” *U.S. Geological Survey* 667 (1918): 1–54.
- [58.](#) *Ibid.*, 45.
- [59.](#) Péwé, “Origin of the upland silt . . . ,” 699–724.
- [60.](#) Erman, *Travels in Siberia*, 377–78.
- [61.](#) E. S. Thomas, “The Orleton Farms mastodon,” *The Ohio Journal of Science* 52 (1952): 1–5.
- [62.](#) Howorth, *The Mammoth and the Flood*, 183–184.
- [63.](#) *Ibid.*, 311.
- [64.](#) Howorth, *The Glacial Nightmare and the Flood*, 814–15.

8. Flood Legends and Ciphers

- [1.](#) D. W. Patten, *The Biblical Flood and the Ice Epoch* (Seattle: Pacific Meridian Publishing, 1966), 165.
- [2.](#) D. G. Brinton, *Myths of the New World* (New York: Henry Holt, 1876).
- [3.](#) Plato, *Timaeus*, section 22d–23c, in *The Collected Dialogues of Plato*, ed. E. Hamilton and H. Cairns, trans. B. Jowett (Princeton, N.J.: Princeton University Press, 1961).
- [4.](#) *Ibid.*, section 24e–25d.
- [5.](#) J. V. Luce, *The End of Atlantis: New Light on an Old Legend* (London: Thames and Hudson, 1969).
- [6.](#) R. Flem-Ath and R. Flem-Ath, *When the Sky Fell: In Search of Atlantis* (New York: St. Martin’s Press, 1995), 75–88.
- [7.](#) Plato, *Timaeus*, section 25b–25d.
- [8.](#) Plato, *Critias*, section 108e, in *The Collected Dialogues of Plato*, ed. E. Hamilton and H. Cairns, trans. A. E. Taylor (Princeton, N.J.: Princeton University Press, 1961).
- [9.](#) R. Fairbanks, “A 17,000-year glacio-eustatic sea level record: Influence of glacial melting rates on the Younger Dryas event and deep-ocean circulation,” *Nature* 342 (1989): 637–42.

- [10.](#) G. Hancock, *Underworld: The Mysterious Origins of Civilization* (New York: Crown Publishers, 2002), 1–6, 22–23.
- [11.](#) *Ibid.*, 309–51.
- [12.](#) Plato, *Critias*, section 111b–c.
- [13.](#) *Ibid.*, section 112a.
- [14.](#) Herodotus, book 2, 142, in *The History of Herodotus*, trans. D. Grene (Chicago: University of Chicago Press, 1921), 193.
- [15.](#) P. A. LaViolette and A. Long, unpublished data.
- [16.](#) P. A. LaViolette, *Genesis of the Cosmos: The Ancient Science of Continuous Creation* (Rochester, Vt.: Bear & Co., 1995, 2004), ch. 10.
- [17.](#) *Ibid.*, appendix.
- [18.](#) I. Donnelly, *The Destruction of Atlantis* (New York: Multimedia Publishing, 1883, 1971), 379.
- [19.](#) C. B. Snow and H. Wambach, *Mass Dreams of the Future* (New York: McGraw Hill, 1989), 61.
- [20.](#) J. Campbell, *The Mythic Image* (Princeton, N.J.: Princeton University Press, 1974), 200–203.
- [21.](#) P. Christian, “The mysteries of the pyramids,” in *The History and Practice of Magic*, vol. 1, book 2, trans. J. Kirkup and J. Shaw, ed. R. Nichols (New York: Citadel Press, 1870, 1963), 89–122.
- [22.](#) P. Freund, *Myths of Creation* (Levittown, N.Y.: Transatlantic Arts, 1964), 10.
- [23.](#) M. Beckwith, *Hawaiian Mythology* (Honolulu: University of Hawaii Press, 1970), 315–19.
- [24.](#) J. Isaacs, *Australian Dreaming: 40,000 Years of Aboriginal History* (New York: Lansdowne Press, 1980), 26.
- [25.](#) U. Holmberg, *The Mythology of All Races, vol. 4, Finno-Ugric, Siberian [Mythology]*, ed. L. H. Gray (Boston, Marshall Jones, 1927), 368–69.
- [26.](#) *Ibid.*, 368.

- [27.](#) I. Velikovsky, *Worlds in Collision* (New York: Pocket Books, 1950), 114–15.
- [28.](#) F. M. Muller, ed. *The Sacred Books of the East, vol. 12, Satapatha-Brahmana*, part 1, trans. J. Eggeling (Oxford: University Press, 1882), 216.
- [29.](#) A. Heidel, *The Gilgamesh Epic and Old Testament Parallels* (Chicago: University of Chicago Press, 1949), 248–49.
- [30.](#) L. Ginzberg, *The Legends of the Jews* (Philadelphia: The Jewish Publications Society, 1913), 158.
- [31.](#) *Ibid.*, 162.

9. Flood Legends from the Americas

- [1.](#) D. G. Brinton, *Myths of the New World* (New York: Henry Holt, 1876), 216.
- [2.](#) *Ibid.*, 185.
- [3.](#) I. Donnelly, *The Destruction of Atlantis* (New York: Multimedia Publishing, 1883, 1971), 204–205.
- [4.](#) R. B. Dixon, *The Mythology of All Races*, vol. 9, Oceanic [Mythology], ed. L. H. Gray (Boston: Marshall Jones, 1916), 279.
- [5.](#) H. H. Bancroft, *The Native Races*, vol. 3, *Myths and Languages* (San Francisco: The History Company, 1886), 81–82.
- [6.](#) E. E. Clark, *Indian Legends of the Pacific Northwest* (Berkeley: University of California Press, 1953), 11–12.
- [7.](#) *Ibid.*, 14–15.
- [8.](#) *Ibid.*, 31–32.
- [9.](#) *Ibid.*, 42–43.
- [10.](#) *Ibid.*, 44.
- [11.](#) E. E. Clark, *Indian Legends of Canada* (Toronto: McClelland and Stewart, 1960), 20–21.
- [12.](#) V. R. Baker, “The Spokane Flood controversy and the Martian outflow channels,” *Science* 202 (1978): 1249–56.

- [13.](#) Clark, *Indian Legends of the Pacific Northwest*, 74–75.
- [14.](#) Ibid.
- [15.](#) Ibid.
- [16.](#) Ibid., 45.
- [17.](#) E. E. Clark, *Indian Legends from the Northern Rockies* (Norman: University of Oklahoma Press, 1966), 90.
- [18.](#) Brinton, *Myths of the New World*, 219.
- [19.](#) Bancroft, *The Native Races*, 67–68.
- [20.](#) Ibid., 89–90.
- [21.](#) H. Osborne, *South American Mythology* (New York: Hamlyn Publishing, 1968), 95.
- [22.](#) H. Fox, *First Fire: Central and South American Indian Poetry* (New York: Anchor Books, 1978), 40–41.
- [23.](#) S. Hugh-Jones, “The Pleiades and Scorpius in Barasana Cosmology,” *Annals of New York Academy of Sciences* 385 (1982): 183–201.
- [24.](#) Ibid., 190.
- [25.](#) S. Hugh-Jones, *The Palm and the Pleiades: Initiation and Cosmology in Northwest Amazonia* (New York: Cambridge University Press, 1979), 267–68.
- [26.](#) Hugh-Jones, “Pleiades and Scorpius . . . ,” 200.
- [27.](#) Ibid.
- [28.](#) Hugh-Jones, *The Palm and the Pleiades*, 176–86.
- [29.](#) Ibid., 263.
- [30.](#) O. Muck, *The Secret of Atlantis* (New York: Pocket Books, 1978), 179.
- [31.](#) The Oregonian, November 16, 1985, A1, A6.
- [32.](#) D. S. Allan and J. B. Delair, *When the Earth Nearly Died* (Bath: Gateway Books, 1995), 114–18.
- [33.](#) T. D. Dillehay, “A late ice-age settlement in Southern Chile,” *Scientific American* 251, October 1984, 106–112.

- [34.](#) S. Porter, “Pleistocene glaciation in the southern lake district of Chile,” *Quaternary Research* 16 (1981): 263–92.
- [35.](#) C. J. Heusser and R. F. Flint, “Quaternary glaciations and environments of northern Isla Chiloe, Chile,” *Geology* 5 (1977): 305–308.

10. Testimony in the Sky

- [1.](#) P. A. LaViolette, “Galactic explosions, cosmic dust invasions, and climatic change,” Ph.D. dissertation, Portland State University, 1983, ch. 4.
- [2.](#) P. A. LaViolette, “Cosmic-ray volleys from the Galactic Center and their recent impact on the Earth environment,” *Earth, Moon, and Planets* 37 (1987): 241–86.
- [3.](#) D. Dixon, D. Hartmann, E. Kolaczyk, paper presented at the High Energy Astrophysics Division of the American Astronomical Society, Estes Park, Colo., November 4, 1997.
- [4.](#) LaViolette, “Cosmic-ray volleys . . . ,” 268–69.
- [5.](#) W. Reich et al., “Evidence for two young galactic supernova remnants,” *Astronomy and Astrophysics* 151 (1985): L10–L12.
- [6.](#) J. Bally et al., “G70.7+1.2: A nonthermal bubble in a globule—Nova, supernova remnant, or outflow?” *Astrophysical Journal* 338 (1989): L65–L68.
- [7.](#) R. S. Roger and A. Pedlar, “Atomic and ionized hydrogen associated with NGC 281 (S 184),” *Astronomy and Astrophysics* 94 (1981): 238–50.
- [8.](#) K. W. Weiler and N. Panagia, “Vela X and the Evolution of Plerions,” *Astronomy and Astrophysics* 90 (1980): 269–82.
- [9.](#) P. A. LaViolette, “An introduction to subquantum kinetics: III. The cosmology of subquantum kinetics,” *International Journal of General Systems* 11 (1985): 342–43.
- [10.](#) P. A. LaViolette, *Subquantum Kinetics: A Systems Approach to Physics and Cosmology* (Niskayuna, N.Y.: Starlane Publications, 1994, 2003).
- [11.](#) LaViolette, “Galactic explosions . . . ,” ch. 5.

- [12.](#) Ibid., 99–100.
- [13.](#) LaViolette, “Introduction to subquantum kinetics . . . ,” 130.
- [14.](#) LaViolette, “Galactic explosions . . . ,” appendix D.
- [15.](#) L. Van Speybroeck et al., “Observations of X-ray sources in M 31,” *Astrophysical Journal* 234 (1979): L45–L49.
- [16.](#) G. G. Pooley, “A radio continuum survey of M 31 and its neighborhood,” *Monthly Notices of the Royal Astronomical Society* 144 (1969): 101–127.
- [17.](#) P. A. LaViolette, “Galactic explosions . . . ,” ch. 2.
- [18.](#) D. Forbes et al., “A nuclear starburst ring in the spiral galaxy NGC 7552,” *Astronomical Journal* 107 (1994): 984–91.
- [19.](#) F. Schweizer and P. Seitzer, “Ripples in disk galaxies,” *Astrophysical Journal* 328 (1988): 88–92.
- [20.](#) D. F. Malin and D. Carter, “A catalog of elliptical galaxies with shells,” *Astrophysical Journal* 274 (1983): 534–40.
- [21.](#) D. F. Malin and D. Carter, “Giant shells around normal elliptical galaxies,” *Nature* 285 (1980): 643–45.
- [22.](#) D. F. Malin, P. J. Quinn, and J. R. Graham, “Shell structure in NGC 5128,” *Astrophysical Journal* 272 (1983): L5–L7.
- [23.](#) C. N. Tadhunter et al., “Detached nuclear-like activity in the radio galaxy PKS 2152-69,” *Nature* 325 (1987): 504–506.
- [24.](#) “Quasarlike activity discovered in fringes of radio galaxy,” *Astronomy*, May 1987: 74–75.
- [25.](#) R. W. Porcas, “Superluminal quasar 3C179 with double radio lobes,” *Nature* 294 (1981): 47–49.

11. Cycles of Destruction

- [1.](#) A. R. Loeblich Jr. and H. Tappan, “Foraminiferal facts, fallacies, and frontiers,” *Geological Society of America Bulletin* 75 (1964): 367–92.
- [2.](#) J. F. Simpson, “Evolutionary pulsations and geomagnetic polarity,” *Geological Society of America Bulletin* 77 (1965): 197–204.

- [3.](#) J. D. Hays and N. D. Opdyke, “Antarctic radiolaria, magnetic reversals and climatic change,” *Science* 158 (1967): 1001–11.
- [4.](#) J. D. Hays, “Faunal extinctions and reversals of the Earth’s magnetic field,” *Geological Society of America Bulletin* 82 (1971): 2433–47.
- [5.](#) A. N. Poulianos, *The Cave of the Petralonian Archanthropinae* (Athens: Anthropological Association of Greece, 1982), 33–37.
- [6.](#) C. J. Waddington, “Paleomagnetic field reversals and cosmic radiation,” *Science* 158 (1967): 913–15.
- [7.](#) C. G. A. Harrison, “Evolutionary processes and reversals of the Earth’s magnetic field,” *Nature* 217 (1968): 46–47.
- [8.](#) E. Mayr, *Systematics and the Origin of the Species* (Magnolia, Mass.: Peter Smith, 1942); *Animal Species and Evolution* (Cambridge, Mass.: Harvard University Press, 1963).
- [9.](#) V. Grant, *The Origin of Adaptations* (New York: Columbia University Press, 1963).
- [10.](#) H. Lewis, “Catastrophic selection as a factor in speciation,” *Evolution* 16 (1962): 257–71.
- [11.](#) H. Lewis, “Speciation in flowering plants,” *Science* 152 (1966): 167–72.
- [12.](#) P. A. LaViolette, “Galactic core explosions and the evolution of life,” *Anthropos* 12 (1987–1990): 239–55.
- [13.](#) M. R. Rampino and R. B. Stothers, “Terrestrial mass extinctions, cometary impacts and the Sun’s motion perpendicular to the galactic plane,” *Nature* 308 (1984): 709–12.
- [14.](#) P. C. Pal and K. M. Creer, “Geomagnetic reversal spurts and episodes of extraterrestrial catastrophism,” *Nature* 320 (1986): 148–50.
- [15.](#) Rampino and Stothers, *Nature*, 709–12.
- [16.](#) “The Search for Adam and Eve,” *Newsweek*, January 11, 1988, 46–52.
- [17.](#) F. M. Muller, ed., *The Sacred Books of the East, Pahlavi Texts*, part 5, trans. E. W. West (Oxford: University Press, 1897), 116.
- [18.](#) F. M. Muller, ed., *The Sacred Books of the East, Pahlavi Texts*, part 2, trans. E. W. West (New York: Scribner’s, 1901), 109.

- [19.](#) Ibid.
- [20.](#) G. Schlegel, *Uranographie Chinoise* (Librairie de M. Nijhoff, 1875), 740.
- [21.](#) H. Murray et al., *An Historical and Descriptive Account of China*, vol. 1, 2nd ed. (1836), 40; cited in I. Velikovsky, *Worlds in Collision* (New York: Simon & Schuster, 1950), 48.
- [22.](#) D. Bodde, “Harmony and conflict in Chinese philosophy,” in *Studies in Chinese Thought*, ed. A. F. Wright (Chicago: University of Chicago Press, 1953), 26.
- [23.](#) *Voluspa: The Song of the Sybil*, trans. P. B. Taylor and W. H. Auden (Iowa City: Windhover Press, 1968), stanza 6.
- [24.](#) M. L’Abbé Brasseur de Bourbourg, *Histoire des Nations Civilisées du Mexique et de l’Amérique Centrale durant les siècles antérieurs a Christophe Colomb*, vol. 1 (Paris: Libraire de la Société de Géographie, 1857), 206.
- [25.](#) R. B. Dixon, *The Mythology of All Races*, vol. 9, *Oceanic [Mythology]*, ed. L. H. Gray (Boston: Marshall Jones, 1916), 178.
- [26.](#) B. Steiger, *Worlds Before Our Own* (New York: Berkeley Books, 1978), 157–61.
- [27.](#) D. G. Brinton, *Myths of the New World* (New York: Henry Holt, 1876), 229–30.
- [28.](#) Ibid., 232.
- [29.](#) J. S. S. Yukteswar, *The Holy Science* (Los Angeles: Self-Realization Fellowship, 1974), x–xvi.
- [30.](#) H. C. Warren, *Buddhism in Translations* (New York: Atheneum, 1896, 1979), 321–28.
- [31.](#) F. Waters, *Book of the Hopi* (New York: Penguin Books, 1963), 12–22.
- [32.](#) Ibid., 16.
- [33.](#) Ibid.
- [34.](#) Ibid., 18.

12. Prophecies

1. P. A. LaViolette, “Galactic explosions, cosmic dust invasions, and climatic change,” Ph.D. dissertation, Portland State University, 1983, appendix D.
2. J. Weber, “Anisotropy and polarization in the gravitational-radiation experiments,” *Physical Review Letters* 25 (1970): 180–84.
3. T. T. Brown, “Anomalous diurnal and secular variations in the self-potential of certain rocks, 1975 (unpublished); “On the possibilities of optical-frequency gravitational radiation,” 1976 (unpublished); “Phenomenal variations in the self-potential of rocks,” 1985 (unpublished); “Phenomenal variations of resistivity and the petrovoltic effect,” (unpublished)—most may be viewed at the T. T. Brown Web site at www.brown.soteria.com/.
4. T. T. Brown, “Anomalous behavior of massive high-K dielectrics,” Naval Research Laboratories, 1931–1933 (classified).
5. G. Hodowanec, “All about gravitational waves,” *Radio-Electronics*, April 1986, 53–56.
6. R. Flem-Ath and R. Flem-Ath, *When the Sky Fell: In Search of Atlantis* (New York: St. Martin’s Press, 1995), 75–88, 108–109.
7. S. Epstein, R. P. Sharp, and A. Gow, “Antarctic ice sheet: Stable isotope analyses of Byrd Station cores and interhemispheric climatic implications,” *Science* 168 (1970): 1570–72.
8. P. M. Grootes and M. Stuiver, “Ross ice shelf oxygen isotope profile at J-9,” *Antarctic Journal of the U.S.* (1983): 107–109.
9. R. Stanford, *Fatima Prophecy* (New York: Ballentine, 1974, 1988), 143–53.
10. *Ibid.*, 143, 146, 153.
11. *Ibid.*, 154, 156–57.
12. *Ibid.*, 158.
13. *Ibid.*, 158–59.
14. *Ibid.*, 159.
15. *Ibid.*, 160–61.
16. *Ibid.*, 161–62.

- [17.](#) C. B. Snow and H. Wambach, *Mass Dreams of the Future* (New York: McGraw Hill, 1989), 61.
- [18.](#) J. Weidner and V. Bridges, *The Mysteries of the Great Cross of Hendaye* (Rochester, Vt.: Destiny Books, 2003), 333.
- [19.](#) J. M. Jenkins, *Maya Cosmogogenesis 2012* (Rochester, Vt.: Bear & Co., 1998), 327–32.
- [20.](#) P. A. LaViolette, “Detecting galactic superwaves: An appeal to scalar wave astronomers,” in *Proceedings of the 1990 International Tesla Symposium*, ed. S. Elswick (Colorado Springs: International Tesla Society, 1991), 5.21–5.27.
- [21.](#) P. A. LaViolette, *The Talk of the Galaxy: An ET Message for Us?* (Niskayuna, N.Y.: Starlane Publications, 2000), ch. 8.
- [22.](#) D. M. Pepper, “Applications of optical phase conjugation,” *Scientific American* 254 (January 1986): 74–83.
- [23.](#) R. Tang, K. M. Lee, R. Chu, and G. Howard, “Radar cross-section enhancement using phase conjugated impulse signals,” U.S. patent no. 5,223,838, June 29, 1993, assigned to Hughes Aircraft Co.

13. Requiem

- [1.](#) H. H. Bancroft, *The Native Races*, vol. 3, *Myths and Languages* (San Francisco: The History Company, 1886), 200–204.

Appendix C

- [1.](#) P. A. LaViolette, “The terminal Pleistocene cosmic event: Evidence for recent incursion of nebular material into the Solar System,” *Eos* 64 (1983): 286.
- [2.](#) P. A. LaViolette, “Elevated concentrations of cosmic dust in Wisconsin stage polar ice,” *Meteoritics* 18 (1983): 336–37.
- [3.](#) P. A. LaViolette, “Evidence of high cosmic dust concentrations in Late Pleistocene polar ice.” *Meteoritics* 20 (1985): 545–58; erratum *Meteoritics* 20 (1985): 803.
- [4.](#) L. G. Thompson, “Microparticles, ice sheets and climate,” Institute of Polar Studies, report no. 64, Ohio State University, 1977.

- [5.](#) L. W. Alvarez, W. Alvarez, F. Asaro, and H. V. Michel, “Extraterrestrial cause for the Cretaceous-Tertiary extinction: Experimental results and theoretical interpretation,” *Science* 208 (1980): 1095–1108.
- [6.](#) R. Hill, “Scientist to test galaxy theory with Soviet ice,” *The Oregonian*, June 9, 1988, E1–E2.
- [7.](#) R. Hill, “Theory waiting on ice,” *The Oregonian*, November 3, 1988, D1–D2.
- [8.](#) P. Gabrielli et al., “Meteoric smoke fallout over the Holocene epoch revealed by iridium and platinum in Greenland ice,” *Nature* 432 (2004): 1011–14.

BIBLIOGRAPHY

- Allan, D. S., and J. B. Delair. *When the Earth Nearly Died*. Bath: Gateway Books, 1995.
- Aller, L. H. *Gaseous nebulae*. New York: John Wiley and Sons, 1956.
- Alvarez, L. W., W. Alvarez, F. Asaro, and H. V. Michel. “Extraterrestrial cause for the Cretaceous-Tertiary extinction: Experimental results and theoretical interpretation.” *Science* 208 (1980): 1095–1108.
- Ambartsumian, V. A. *The Structure and Evolution of Galaxies*, Proceedings of the 13th Solvay Conference, University of Brussels. New York: Wiley Interscience, 1965.
- Appenzeller, T. “A conundrum at Steens Mountain.” *Science* 255 (1991): 31.
- Atkinson, T. C., K. R. Briffa, and G. R. Coope. “Seasonal temperatures in Britain during the past 22,000 years, reconstructed using beetle remains.” *Nature* 325 (1987): 587–92.
- Aumann, H. H. “Spectral class distribution of circumstellar material in main-sequence stars.” *Astronomical Journal* 96 (1988): 1415–19.
- Bahcall, J. N., S. Kirhakos, and D. P. Schneider. “The apparently normal galaxy hosts for two luminous quasars.” *Astrophysical Journal* 457 (1996): 557–64.
- Baker, V. R. “The Spokane Flood controversy and the Martian outflow channels.” *Science* 202 (1978): 1249–56.
- . “Water and the martian landscape.” *Nature* 412 (2001): 228–36.
- Bally, J., et al. “G70.7+1.2: A nonthermal bubble in a globule—Nova, supernova remnant, or outflow?” *Astrophysical Journal* 338 (1989): L65–L68.

- Bancroft, H. H. *The Native Races*, vol. 3, *Myths and Languages*. San Francisco: The History Company, 1886.
- Bard, E., et al. "Calibration of the ^{14}C timescale over the past 30,000 years using mass spectrometric U–Th ages from Barbados corals. *Nature* 345 (1990): 405–410.
- Bard, E., B. Hamelin, and R. G. Fairbanks. "U–Th ages obtained by mass spectrometry in corals from Barbados: Sea level during the past 130,000 years." *Nature* 346 (1990): 456–58.
- Bauval, R., and A. Gilbert. *The Orion Mystery: Unlocking the Secrets of the Pyramids*. New York: Crown Publishers, 1994.
- Bauval, R., and G. Hancock. *The Message of the Sphinx*. New York: Crown Publishers, 1996.
- Beals, C. *Stories Told by the Aztecs Before the Spaniards Came*. New York: Abelard-Schuman, 1970.
- Beckwith, M. *Hawaiian Mythology*. Honolulu: University of Hawaii Press, 1970.
- Beecroft, I. "Sediment transport during an outburst from Glacier de Tsidiore Nouve, Switzerland, 16–19 June 1981." *Journal of Glaciology* 29 (1983): 185–89.
- Beer, J., et al. " ^{10}Be peaks as time markers in polar ice cores." In *The Last Deglaciation: Absolute and Radiocarbon Chronologies*, Proc. NATO ASI Series, vol. 12, 140–53. Heidelberg: Springer-Verlag, 1992.
- Begley, S. "The first Americans." *Newsweek*, October 1991 (Special Issue): 15–20.
- Berger, A. "Long-term variations of the earth's orbital elements." *Celestial Mechanics* 15 (1977): 53–74.
- Berglund, B. E. "The deglaciation of southern Sweden 13,500–10,000 B.P." *Boreas* 8 (1979): 89–118.
- Bierhorst, J. *The Mythology of South America*. New York: William Morrow, 1988.
- Björck, S., and P. Moller. Late Weichselian environmental history in southeastern Sweden during the deglaciation of the Scandinavian ice

- sheet.” *Quaternary Research* 28 (1987): 1–37.
- Bodde, D. “Harmony and conflict in Chinese philosophy.” In *Studies in Chinese Thought*, edited by A. F. Wright. Chicago: University of Chicago Press, 1953.
- Boyle, R. W. “The geochemistry of gold and its deposits.” *Geological Survey of Canada, Bulletin* 280 (1979): 381.
- Branston, B. *Gods of the North*. New York: Thames and Hudson, 1980.
- Brasseur de Bourbourg, M. L’Abbé. *Histoire des Nations Civilisées du Mexique et de l’Amérique Centrale durant les siècles antérieurs a Christophe Colomb*, vol. 1. Paris: Libraire de la Société de Géographie, 1857.
- . *Sources de l’histoire primitive du Mexique*. Paris: Maisonneuve Et, 1864.
- Briggs, J., and F. D. Peat. *Turbulent Mirror*. New York: Harper & Row, 1989.
- Brinton, D. G. *Myths of the New World*. New York: Henry Holt, 1876.
- Broecker, W. S., et al. “Routing of meltwater from the Laurentide Ice Sheet during the Younger Dryas cold episode.” *Nature* 341 (1989): 318–21.
- Brown, R. L., and K. L. Johnston. “The gas density and distribution within 2 parsecs of the Galactic center.” *Astrophysical Journal* 268 (1983): L85–L88.
- Brown, T. T. “Anomalous behavior of massive high-K dielectrics.” Naval Research Laboratories, 1931–1933 (classified).
- . “On the possibilities of optical-frequency gravitational radiation.” 1976, unpublished paper.
- Burbidge, E. M., G. R. Burbidge, and K. H. Pendergast. “Motions in NGC 3646, a strange spiral galaxy.” *Astrophysical Journal* 134 (1961): 237.
- Burbidge, G. R. “The nuclei of galaxies.” *Annual Reviews in Astronomy and Astrophysics* 8 (1970): 369–460.
- Burbidge, G. R., E. M. Burbidge, and A. R. Sandage. “Evidence for the occurrence of violent events in the nuclei of galaxies.” *Reviews of*

- Modern Physics* 35 (1963): 947–72.
- Burnham Jr., R. *Burnham's Celestial Handbook: An Observer's Guide to the Universe Beyond the Solar System*, vol. 3. New York: Dover, 1978.
- Campbell, J. *The Mythic Image*. Princeton, N.J.: Princeton University Press, 1974.
- Carr, M. H. "The Geology of Mars." *American Scientist* 68 (1980): 626–35.
- Christian, P. "The mysteries of the pyramids." In *The History and Practice of Magic*, vol. 1, book 2, translated by J. Kirkup and J. Shaw, edited by R. Nichols. 1870. Reprint, New York: Citadel Press, 1963.
- Clark, E. E. *Indian Legends of the Pacific Northwest*. Berkeley: University of California Press, 1953.
- . *Indian Legends of Canada*. Toronto: McClelland and Stewart, 1960.
- . *Indian Legends from the Northern Rockies*. Norman: University of Oklahoma Press, 1966.
- CLIMAP Project Members. "Surface of ice age earth." *Science* 191 (1976): 1131–37.
- . "Seasonal reconstructions of the Earth's surface at the last glacial maximum." Map and Chart Series, MC-36. Washington, D.C.: Geological Society of America, 1981.
- Coe, R. S., M. Prévot, and P. Camps. "New evidence for rapid change of the geomagnetic field during a reversal." *Nature* 374 (1995): 687–92.
- "Cold cloud may contain unseen solar dust." *Science News* 134 (1988): 246.
- Colum, P. *Orpheus: Myths of the World*. New York: Grosset & Dunlap, 1930.
- Cottrell, L. *The Bull of Minos*. London: Pan Books, 1955.
- Dana, J. D. *Manual of Geology*. New York: American Book, 1880.
- Dansgaard, W., et al. "Speculations about the next glaciation." *Quaternary Research* 2 (1972): 396–98.

- Davison, M. "On the Noachian deluge." *In Journal of the Transactions of the Victoria Institute* 4, edited by J. Reddie, 121–46. London: R. Hardwicke, 1869.
- Dickel, J. R., and E. W. Greisen. "The evolution of the radio emission from Cas A." *Astronomy and Astrophysics* 75 (1979): 44–53.
- Dillehay, T. D. "A late ice-age settlement in Southern Chile." *Scientific American* 251 (October 1984): 106–112.
- Dingus, B. L., et al. "High-energy pulsed emission from Hercules X-1 with anomalous air-shower muon production." *Physical Review Letters* 61 (1988): 1906–1909.
- Dixon, D., D. Hartmann, and E. Kolaczyk. Paper presented at the High Energy Astrophysics Division of the American Astronomical Society, Estes Park, Colo., November 4, 1997.
- Dixon, R. B. *The Mythology of All Races*, vol. 9, *Oceanic [Mythology]*, edited by L. H. Gray. Boston: Marshall Jones, 1916.
- Donnelly, I. *The Destruction of Atlantis*. 1883. Reprint, New York: Multimedia Publishing, 1971.
- . *Atlantis: The Antediluvian World*. 1883. Reprint, San Francisco: Harper & Row, 1971.
- Downes, D., and A. Maxwell. "Radio observations of the Galactic center region." *Astrophysical Journal* 146 (1966): 653.
- Eakin, H. M. "The Yukon-Koyukuk region, Alaska." *U.S. Geological Survey* 631 (1916): 1–88.
- . "The Cosna-Nowitna region, Alaska." *U.S. Geological Survey* 667 (1918): 1–54.
- Emerson, D. T. "High-resolution observations of neutral hydrogen in M31 —II. Velocity field." *Monthly Notices of the Royal Astronomical Society* 176 (1976): 321.
- Epstein, S., R. P. Sharp, and A. Gow. "Antarctic ice sheet: Stable isotope analyses of Byrd Station cores and interhemispheric climatic implications." *Science* 168 (1970): 1570–72.

- Erickson, W. C., et al. "Very long baseline interferometer observations of Taurus A and other sources at 121.6 MHz." *Astrophysical Journal* 177 (1972): 101.
- Erman, G. A. *Travels in Siberia*, vol. 2. London: Longman, Brown, Green, and Longmans, 1848.
- Fagan, C. *Astrological Origins*. St. Paul, Minn.: Llewellyn Publications, 1971.
- Fahr, H. J. "The extraterrestrial UV-background and the nearby interstellar medium." *Space Science Reviews* 15 (1974): 483–540.
- Fairbanks, R. G. "A 17,000-year glacio-eustatic sea level record: Influence of glacial melting rates on the Younger Dryas event and deep-ocean circulation." *Nature* 342 (1989): 637–42.
- Farrand, W. R. "Frozen mammoths and modern geology." *Science* 133 (1961): 729–35.
- Firestone, R. B., and W. Topping. "Terrestrial Evidence of a Nuclear Catastrophe in Paleoindian Times." *Mammoth Trumpet* 16 (2001): 9–18; reprinted in *Infinite Energy* 40 (2001): 15–22.
- Firestone, R. B. "Response to the Comments by J. R. Southon and R. E. Taylor." *Mammoth Trumpet* 17 (2002): 14; www.centerfirstamericans.com/mt.html?a=61.
- Flem-Ath, R., and R. Flem-Ath. *When the Sky Fell: In Search of Atlantis*. New York: St. Martin's Press, 1995.
- Flint, R. F. *Glacial Geology and the Pleistocene Epoch*. New York: J. Wiley & Sons, 1947.
- Forbes, D., et al. "A nuclear starburst ring in the spiral galaxy NGC 7552." *Astronomical Journal* 107 (1994): 984–91.
- Fox, H. *First Fire: Central and South American Indian Poetry*. New York: Anchor Books, 1978.
- Franklin, J. *Narrative of a Second Expedition to the Shores of the Polar Sea*. Rutland, Vt.: Charles Tuttle, 1971.
- Fraundorf, P. "Interplanetary dust in the transmission electron microscope: Diverse materials from the early solar system." *Geochimica*

- Cosmochimica Acta* 45 (1981): 915–43.
- Freund, P. *Myths of Creation*. Levittown, N.Y.: Transatlantic Arts, 1964.
- Frisch, P. C. “The nearby interstellar medium.” *Nature* 293 (1981): 377–79.
- Frisch, P. C., and D. G. York. “Synthesis maps of ultraviolet observations of neutral interstellar gas.” *Astrophysical Journal* 271 (1983): L59–L63.
- Gabrielli, P., et al. “Meteoric smoke fallout over the Holocene epoch revealed by iridium and platinum in Greenland ice.” *Nature* 432 (2004): 1011–14.
- Gahm, G. F. “X-ray observations of T Tauri stars.” *Astrophysical Journal* 242 (1980): L163–L166.
- Gilbert, A., and M. Cotterell. *The Mayan Prophecies*. Rockport, Mass.: Element Books, 1995.
- Gingerich, P. D. “Pleistocene extinctions in the context of origination-extinction equilibria in Cenozoic mammals.” In *Quaternary Extinctions: A Prehistoric Revolution*, edited by P. S. Martin and R. G. Klein, 211–22. Tucson: University of Arizona Press, 1984.
- Ginzberg, L. *The Legends of the Jews*. Philadelphia: The Jewish Publications Society, 1913.
- Gold, T. “Apollo II observations of a remarkable glazing phenomenon on the lunar surface.” *Science* 165 (1969): 1345–49.
- Golden, J., et al. “The generation and application of intense pulsed ion beams,” *American Scientist* 69 (1981): 173–83.
- Grant, V. *The Origin of Adaptations*. New York: Columbia University Press, 1963.
- Graves, R. *The Greek Myths*, vol. 1. New York: Penguin Books, 1955.
- Grayson, D. K. “Pleistocene avifaunas and the overkill hypothesis.” *Science* 196 (1977): 691–93.
- Greenstein, J. L. “A possible energy source for T Tauri stars.” *Astronomical Society of the Pacific Publication* 62 (1950): 156–62.

- Grootes, P. M., and M. Stuiver. "Ross ice shelf oxygen isotope profile at J-9." *Antarctic Journal of the U.S.* (1983): 107–109.
- Grün, E., et al. "Discovery of jovian dust streams and interstellar grains by the Ulysses spacecraft." *Nature* 362 (1993): 428–30.
- . "Interstellar dust in the heliosphere." *Astronomy and Astrophysics* 286 (1994): 915–24.
- Guerber, H. A. *The Norsemen*. New York: Avenel Books, 1985.
- Guilday, J. E. "Differential extinction during Late-Pleistocene and recent times." In *Pleistocene Extinctions: The Search for a Cause*, edited by P. S. Martin and H. E. Wright, 121–40. New Haven: Yale University Press, 1967.
- Hammer, C. U., et al. "Continuous impurity analysis along the Dye 3 deep core." In *Geophysics, Geochemistry, and the Environment*, edited by C. C. Langway Jr. et al., AGU Monograph 33, 90–94. Washington, D.C.: American Geophysical Union, 1985.
- Hammer, C. U., H. B. Clausen, and C. C. Langway. "50,000 years of recorded global volcanism." *Climatic Change* 35 (1997): 1–15.
- Harrison, C. G. A. "Evolutionary processes and reversals of the Earth's magnetic field." *Nature* 217 (1968): 46–47.
- Hauser, M. G., et al. "IRAS observations of the diffuse infrared background." *Astrophysical Journal* 278 (1984): L15–L18.
- Haynes, C. V. "Geochronology of man-mammoth sites and their bearing on the origin of the Llano Complex." In *Pleistocene and Recent Environments of the Central Great Plains*, edited by W. Dort Jr. and J. K. Jones, 77–92. Lawrence: The University Press of Kansas, 1970.
- Hays, J. D. "Faunal extinctions and reversals of the Earth's magnetic field." *Geological Society of America Bulletin* 82 (1971): 2433–47.
- Hays, J. D., and N. D. Opdyke. "Antarctic radiolaria, magnetic reversals and climatic change." *Science* 158 (1967): 1001–1011.
- Heidel, A. *The Gilgamesh Epic and Old Testament Parallels*. Chicago: University of Chicago Press, 1949.

- Heinrich, H. "Origin and consequences of cyclic ice rafting in the northeast Atlantic Ocean during the past 130,000 years." *Quaternary Research* 29 (1988): 142–52.
- Herbig, G. H. "The youngest stars." *Scientific American* 217 (August 1967): 30.
- Herodotus. Book 2. In *The History of Herodotus*. Translated by D. Grene. Chicago: University of Chicago Press, 1921.
- Heusser, C. J., and R. F. Flint. "Quaternary glaciations and environments of northern Isla Chiloe, Chile." *Geology* 5 (1977): 305–308.
- Heusser, C. J., and S. S. Streeter. "A temperature and precipitation record of the past 16,000 years in Southern Chile." *Science* 210 (1980): 1345–47.
- Hibben, F. C. "Evidences of early man in Alaska." *American Antiquity* 8 (1943): 254–59.
- Hill, R. "Scientist to test galaxy theory with Soviet ice." *The Oregonian*, June 9, 1988, E1–E2.
- . "Theory waiting on ice." *The Oregonian*, November 3, 1988, D1–D2.
- Hodapp, K.-W., R. M. MacQueen, and D. N. Hall. "A search during the 1991 solar eclipse for the infrared signature of circumsolar dust." *Nature* 355 (1992): 707–710.
- Hodowanec, G. "All about gravitational waves." *Radio-Electronics*, April 1986: 53–56.
- Holmberg, U. *The Mythology of All Races*, vol. 4, *Finno-Ugric, Siberian*, edited by L. H. Gray. Boston: Marshall Jones, 1927.
- Horgan, J. "Beyond Neptune." *Scientific American* 273 (October 1995): 24–26.
- Howorth, H. H. *The Glacial Nightmare and the Flood*. London: Sampson Low, Marston, 1893.
- . *The Mammoth and the Flood*. London: Sampson Low, Marston, Searle & Rivington, 1887.

- Hoyle, F., and J. V. Narlikar. "On the effects of the nonconservation of baryons in cosmology." *Proceedings of the Royal Society A* 290 (1966): 143–61.
- Hoyle, F., and R. A. Lyttleton. "Variations in solar radiation and the cause of ice ages." *Journal of Glaciology* 1 (1950): 453–55.
- Hugh-Jones, S. *The Palm and the Pleiades: Initiation and Cosmology in Northwest Amazonia*. New York: Cambridge University Press, 1979.
- . "The Pleiades and Scorpius in Barasana Cosmology." *Annals of New York Academy of Sciences* 385 (1982): 183–201.
- Hughen, K., et al. "Deglacial changes in ocean circulation from an extended radiocarbon calibration." *Nature* 391 (1998): 65–68.
- Isaacs, J. *Australian Dreaming: 40,000 Years of Aboriginal History*. New York: Lansdowne Press, 1980.
- Isobe, S., T. Hirayama, N. Baba, and N. Miura. "Optical polarization observations of circumsolar dust during the 1983 solar eclipse." *Nature* 318 (1985): 644–46.
- Jack, R. L. "Glacial drift in the northeastern Carpathians." *Quarterly Journal Geological Society of London* 33 (1877): 673–81.
- Jastrow, M. *Aspects of Religious Belief and Practice in Babylonia and Assyria*. New York: Benjamin Blom, 1911.
- Jeans, J. *Astronomy and Cosmogony*. London: Cambridge University Press, 1928.
- Jenkins, J. M. *Maya Cosmogony* 2012. Rochester, Vt.: Bear & Co., 1998.
- Johnsen, S. J., et al. "Irregular glacial interstadials recorded in a new Greenland ice core." *Nature* 359 (1992): 311–13.
- Jouzel, J., et al. "Vostok ice core: A continuous isotope temperature record over the last climatic cycle (160,000 years)." *Nature* 329 (1987): 403–408.
- Kehew, A., and L. Clayton. "Late Wisconsin floods and development of the Souris-Pembina spillway system in Saskatchewan, North Dakota, and Manitoba." In *Glacial Lake Agassiz*, GSA paper 26, edited by J. T.

- Teller and L. Clayton. Washington, D.C.: Geological Society of America, 1983.
- Kellerman, K. I., et al. "The small radio source at the Galactic center." *Astrophysical Journal* 214 (1977): L61–L62.
- Kelsall, T., et al. "The COBE Diffuse Infrared Background Experiment search for the cosmic infrared background. II. Model of the interplanetary dust cloud." *Astrophysical Journal* 508 (1998): 44–73.
- King, L. W. *The Seven Tablets of Creation*. London: Luzac and Co., 1902.
- Kloosterman, J. B. H. "An Alleröd conflagration? (Comments on Apophoreta-II)." *Catastrophist Geology* 2, no. 1 (1977): 13–15.
- . "The Usselo Horizon, a worldwide thin layer rich in charcoal of Alleröd age." *New Solar System Models, Symposium Bérghamo*, 1999: 52–53.
- Kocharov, G. "On the great increase of radiation level on the Earth due to supernovae explosions and solar flares." *Eos* 72 (1991): 72.
- Kormendy, J. "A morphological survey of bar, lens, and ring components in galaxies: Secular evolution in galaxy structure." *Astrophysical Journal* 227 (1979): 714–28.
- Kowalski, K. "The Pleistocene extinction of mammals in Europe." In *Pleistocene Extinctions: The Search for a Cause*, edited by P. S. Martin and H. E. Wright, 349–64. New Haven: Yale University Press, 1967.
- Kuhi, L. V. "Mass loss from T Tauri stars." *Astrophysical Journal* 140 (1964): 1409–1433.
- . "T Tauri mass ejection." In *Stellar Evolution*, edited by R. F. Stein and A. G. W. Cameron. New York: Plenum Press, 1966.
- Lacy, J. H., et al. "Observations of the motion and distribution of the ionized gas in the central parsec of the Galaxy." *Astrophysical Journal* 241 (1980): 132–46.
- Landecker, T. L., and R. Wielebinski. "The Galactic meter wave radiation: A two-frequency survey between declinations +25° and -25° and the preparation of a map of the whole sky." *Australian Journal of Physics, Astrophysical Supplement* 16 (1970), 1.

- LaViolette, P. A. "The alpha and the omega." Unpublished paper, University of Chicago, 1973.
- . "Galactic explosions, cosmic dust invasions, and climatic change." Ph.D. dissertation #8324329, Portland State University, 1983.
- . "Elevated concentrations of cosmic dust in Wisconsin stage polar ice." *Meteoritics* 18 (1983): 336–37.
- . "The terminal Pleistocene cosmic event: Evidence for recent incursion of nebular material into the Solar System." *Eos* 64 (1983): 286.
- . "An introduction to subquantum kinetics." *International Journal of General Systems* 11 (1985): 281–345.
- . "Evidence of high cosmic dust concentrations in Late Pleistocene polar ice." *Meteoritics* 20 (1985): 545–58. Erratum: *Meteoritics* 20 (1985): 803.
- . "Cosmic-ray volleys from the Galactic center and their recent impact on the *Earth environment*." *Earth, Moon, and Planets* 37 (1987): 241–86.
- . "Galactic core explosions and the evolution of life." *Anthropos* 12 (1987–1990): 239–55.
- . "Detecting galactic superwaves: An appeal to scalar wave astronomers." In *Proceedings of the 1990 International Tesla Symposium*, edited by S. Elswick, 5.21–5.27. Colorado Springs: International Tesla Society, 1991.
- . "The planetary-stellar mass-luminosity relation: Possible evidence of energy nonconservation?" *Physics Essays* 5 (1992): 536–44. Erratum: *Physics Essays* 6, no. 4 (1993): 616.
- . "Anticipation of the Ulysses interstellar dust findings." *Eos* 74 (1993): 510–11.
- . *Subquantum Kinetics: A Systems Approach to Physics and Cosmology*. Niskayuna, N.Y.: Starlane Publications, 1994, 2003.
- . *Genesis of the Cosmos: The Ancient Science of Continuous Creation*. Rochester, Vt.: Bear & Co., 1995, 2004.

- . *The Talk of the Galaxy: An ET Message for Us?* Niskayuna, N.Y.: Starlane Publications, 2000.
- . *Galactic Superwaves and Their Impact on the Earth*. 2001 Ph.D. dissertation CD update. Niskayuna, N.Y.: Starlane Publications, 2003; www.etheric.com/books.html.
- . “Solar cycle variations in ice acidity at the end of the last ice age: Possible marker of a climatically significant interstellar dust incursion” *Planetary and Space Science* 53, no. 4 (2005): 385–93. Eprint:arxiv.org/abs/physics/0502019.
- Le Floch, A., and F. Bretenaker. “Early cosmic background.” *Nature* 352 (1991): 198.
- Ledru, M. P. “Late Quaternary environmental and climatic changes in central Brazil.” *Quaternary Research* 39 (1993): 90–98.
- Lefever, R. “Dissipative structures in chemical systems.” *Journal of Chemical Physics* 49 (1968): 4977–78.
- Leonard, P., and J. Bonneli. “Gamma ray bursts of doom.” *Sky and Telescope*, February 1998: 28–34.
- Lerner, E. “Radio absorption by the intergalactic medium.” *Astrophysical Journal* 361 (1990): 63–68.
- Lewis, H. “Catastrophic selection as a factor in speciation.” *Evolution* 16 (1962): 257–71.
- . “Speciation in flowering plants.” *Science* 152 (1966): 167–72.
- Lo, K. Y., and Clausen, M. J. “High-resolution observations of ionized gas in central 3 parsecs of the Galaxy: possible evidence for infall.” *Nature* 306 (1983): 647–51.
- Loeblich Jr., A. R., and H. Tappan. “Foraminiferal facts, fallacies, and frontiers.” *Geological Society of America Bulletin* 75 (1964): 367–92.
- Low, F. J., et al. “Infrared cirrus: New components of the extended infrared mission.” *Astrophysical Journal* 278 (1984): L19–L22.
- Lubbock, J. *The Scenery of Switzerland and the Causes to Which It Is Due*. London, 1896.

- Luce, J. V. *The End of Atlantis: New Light on an Old Legend*. London: Thames and Hudson, 1969.
- Lyell, C. *Principles of Geology*. New York: D. Appleton, 1864.
- Malin, D. F., and D. Carter. "Giant shells around normal elliptical galaxies." *Nature* 285 (1980): 643–45.
- . "A catalog of elliptical galaxies with shells." *Astrophysical Journal* 274 (1983): 534–40.
- Malin, D. F., P. J. Quinn, and J. R. Graham. "Shell structure in NGC 5128." *Astrophysical Journal* 272 (1983): L5–L7.
- Mackenzie, D. A. *Indian Myth and Legend*. London: Gresham Publishing, 1913. "Mars Emerging from Ice Age, Data Suggest." Web site: space.com/scienceastronomy/mars_ice-age_031208.html.
- Marshak, M. L., et al. "Evidence for muon production by particles from Cygnus X-3." *Physical Review Letters* 54 (1985): 2079–82.
- Martin, P. S. "Prehistoric overkill." In *Pleistocene Extinctions: The Search for a Cause*, edited by P. S. Martin and H. E. Wright, 75–120. New Haven: Yale University Press, 1967.
- . "Catastrophic extinctions and Late Pleistocene blitzkrieg: Two radiocarbon tests." In *Extinctions*, edited by M. H. Nitecki, 153–89. Chicago: University of Chicago Press, 1984.
- . "Late Quaternary extinctions: The promise of TAMS 14C dating." *Nuclear Instruments and Methods in Physics Research* B29 (1987): 179–86.
- Martin, P. S., and H. E. Wright, eds. *Pleistocene Extinctions: The Search for a Cause*. New Haven: Yale University Press, 1967.
- Mather, J. C., et al. "A preliminary measurement of the cosmic microwave background spectrum by the Cosmic Background Explorer (COBE) satellite." *Astrophysical Journal* 354 (1990): L37–L40.
- Matsumoto, et al. "Balloon observations of the central bulge of our Galaxy in near infrared radiation." In *The Galactic Center*, edited by G. R. Riegler and R. D. Blandford, 48–52. New York: American Institute of Physics, 1982.

- Mayr, E. *Systematics and the Origin of the Species*. Magnolia, Mass.: Peter Smith, 1942.
- . *Animal Species and Evolution*. Cambridge, Mass.: Harvard University Press, 1963.
- McCrea, W. H. “Continual creation.” *Monthly Notices of the Royal Astronomical Society* 128 (1964): 335–44.
- McCall, B., et al. “An enhanced cosmic-ray flux towards zeta Persei inferred from a laboratory study of the $H^+_3 - e^-$ recombination rate.” *Nature* 422 (2003): 500–502.
- Mees, G. H. *The Book of Stars*. Deventer, Netherlands: N. Kluwer, 1954.
- Mehring, P. J. “The environment of extinction of the Late-Pleistocene megafauna in the arid southwestern United States.” In *Pleistocene Extinctions: The Search for a Cause*, edited by P. S. Martin and H. E. Wright, 247–66. New Haven: Yale University Press, 1967.
- Meltzer, D. J., and J. I. Mead. In *Environment and Extinction: Man in Late Glacial North America*, edited by J. Mead and D. Meltzer, 145. Orono: Center for the Study of Early Man, University of Maine, 1985.
- Mendoza, E. E. “Infrared photometry of T Tauri stars and related objects.” *Astrophysical Journal* 143 (1966): 1010–1014.
- Miller, M., and K. Taube. *The Gods and Symbols of Ancient Mexico and the Maya*. London: Thames & Hudson, 1993.
- Mizutani, M., T. Maihara, N. Hiromoto, and H. Tamaki. “Near-infrared observation of the circumsolar dust emission during the 1983 solar eclipse.” *Nature* 312 (1984): 134–36.
- Mörner, N. A. “The Gothenburg magnetic excursion.” *Quaternary Research* 7 (1977): 413–27.
- . “Annual and inter-annual magnetic variations in varved clay.” *Journal of Interdisciplinary Cycle Research* 9 (1978): 229–41.
- Muck, O. *The Secret of Atlantis*. New York: Pocket Books, 1978.
- Muller, F. M., ed. *The Sacred Books of the East, vol. 2, Pahlavi Texts*, parts 1 and 2. Translated by E. W. West. New York: Scribner’s, 1901.

- . *The Sacred Books of the East*, vol. 12, *Satapatha-Brahmana*, part 1. Translated by J. Eggeling. Oxford: University Press, 1882.
- . *The Sacred Books of the East*, vol. 47, *Pahlavi Texts*, part 5. Translated by E. W. West. Oxford: University Press, 1897.
- Muller, R. “Radiometer system to map the cosmic background radiation.” *Review of Scientific Instruments* 49 (1978): 440–48.
- . “The cosmic background radiation and the new aether drift,” *Scientific American* (May 1978): 64–74.
- Munch, P. A. *Norse Mythology*. New York: The American-Scandinavian Foundation, 1926.
- Murray, H., et al. *An Historical and Descriptive Account of China*, vol. 1, 2nd ed. 1836.
- Myles, D. *The Great Waves*. New York: McGraw-Hill, 1985.
- Napier, W. M., and S. V. M. Clube. “A theory of terrestrial catastrophism.” *Nature* 282 (1979): 455–59.
- Neftel, A., et al. “CO₂ record in the Byrd ice core 50,000–5000 years B.P.” *Nature* 331 (1988): 609–611.
- Noorbergen, R. *Secrets of the Lost Races*. New York: Barnes and Noble, 1977.
- Obolensky, A. G. “The mechanics of time.” *Proceedings of the 1988 International Tesla Symposium*, edited by S. Elswick, 4.25–4.40. Colorado Springs: International Tesla Society, 1988.
- Olcott, W. T., and E. W. Putnam. *Field Book of the Skies*. New York: Putnam’s Sons, 1936.
- Olesen, B. W. “How many sites are necessary to estimate a mean skin temperature?” In *Thermal Physiology*, edited by J. R. S. Hales, 33–39. New York: Raven Press, 1984.
- Oort, J. “The Galactic center.” *Annual Review of Astronomy and Astrophysics* 15 (1977): 295–362.
- The Oregonian*, November 16, 1985, A1, A6.

- Ori, G. G., L. Marinangeli, and A. Baliva. "Terraces and Gilbert-type deltas in crater lakes in Ismenius Lacus and Memnonia (Mars)." *Journal of Geophysical Research* 105 (2000): 17629–41.
- Osborne, H. *South American Mythology*. New York: Hamlyn Publishing, 1968.
- Ouspensky, P. D. *A New Model of the Universe*. New York: Vintage Books, 1931, 1971.
- Pal, P. C., and K. M. Creer. "Geomagnetic reversal spurts and episodes of extraterrestrial catastrophism." *Nature* 320 (1986): 148–50.
- Patten, D. W. *The Biblical Flood and the Ice Epoch*. Seattle: Pacific Meridian Publishing, 1966.
- Pepper, D. M. "Applications of optical phase conjugation," *Scientific American* 254 (January 1986): 74–83.
- Péwé, T. L. "Origin of the upland silt near Fairbanks, Alaska." *Bulletin of the Geological Society of America* 67 (1955): 699–724.
- . *Quaternary Geology of Alaska*. Geological Survey Professional Paper No. 835. Washington, D.C.: U.S. Printing Office, 1975.
- . *Quaternary Stratigraphic Nomenclature in Unglaciated Central Alaska*. Geological Survey Professional Paper No. 862. Washington, D.C.: U.S. Printing Office, 1975.
- Piddington, J. H., and G. H. Trent. "A survey of cosmic radio emission at 600 Mc/s." *Australian Journal of Physics* 9 (1956): 481–93.
- Plato. *Timaeus*. In *The Collected Dialogues of Plato*, translated by B. Jowett, edited by E. Hamilton and H. Cairns. Princeton, N.J.: Princeton University Press, 1961.
- . *Critias*. In *The Collected Dialogues of Plato*, translated by B. Jowett, edited by E. Hamilton and H. Cairns. Princeton, N.J.: Princeton University Press, 1961.
- Plutarch. *Moralia*. Translated by Frank C. Babbitt. Cambridge, Mass.: Harvard University Press, 1936.
- Pooley, G. G. "A radio continuum survey of M 31 and its neighborhood." *Monthly Notices of the Royal Astronomical Society* 144 (1969): 101–

27.

- Porcas, R. W. "Superluminal quasar 3C179 with double radio lobes." *Nature* 294 (1981): 47–49.
- Porter, S. "Pleistocene glaciation in the southern lake district of Chile." *Quaternary Research* 16 (1981): 263–92.
- . "Some geological implications of average Quaternary glacial conditions." *Quaternary Research* 32 (1989): 245–61.
- Poulianos, A. N. *The Cave of the Petralonian Archanthropinae*. Athens: Anthropological Association of Greece, 1982.
- Powell, J. W. *First Annual Report of the Bureau of Ethnology*. Washington, D.C.: U.S. Printing Office, 1887.
- Price, R. M. "Continuum radio structure of the Galactic disk." *Astronomy and Astrophysics* 33 (1974): 33–38.
- Prigogine, I., G. Nicolis, and A. Babloyantz. "Thermodynamics of evolution." *Physics Today* 25, no. 11 (1972): 23–28; 25, no. 12 (1972): 38–44.
- "Quasarlike activity discovered in fringes of radio galaxy." *Astronomy* (May 1987): 74–75.
- Raisbeck, G., et al. "Evidence for two intervals of enhanced ^{10}Be deposition in Antarctic ice during the last glacial period." *Nature* 326 (1987): 273–77.
- Rampino, M. R., and R. B. Stothers. "Terrestrial mass extinctions, cometary impacts and the Sun's motion perpendicular to the galactic plane." *Nature* 308 (1984): 709–12.
- Rasio, F. A., et al. "An observational test for the existence of a planetary system orbiting PSR1257+12." *Nature* 355 (1992): 325–26.
- Reich, W., et al. "Evidence for two young galactic supernova remnants." *Astronomy and Astrophysics* 151 (1985): L10–L12.
- Rietmeijer, F. J. "Tin in a chondritic interplanetary dust particle." *Meteoritics* 24 (1989): 43–47.
- Roger, R. S., and A. Pedlar. "Atomic and ionized hydrogen associated with NGC 281 (S 184)." *Astronomy and Astrophysics* 94 (1981): 238–

- Rundle Clark, R. T. *Myth and Symbol in Ancient Egypt*. New York: Thames and Hudson, 1959.
- Sagan, C. *The Cosmic Connection*. New York: Anchor Press, 1973.
- Sagan, C., and F. Drake. "A message from Earth." *Science* 175 (1972): 881–84.
- Schlegel, G. *Uranographie Chinoise*. Librairie de M. Nijhoff, 1875.
- Schreve-Brinkman, E. J. "A palynological study of the upper Quaternary sequence in the El Abra corridor and rock shelters (Colombia)." *Paleogeography Paleoclimatology Paleoecology* 25 (1978): 1–109.
- Schwarzschild, B. "Are the ultra-energetic cosmic gammas really photons?" *Physics Today*, November 1988: 17.
- Schweizer, F., and P. Seitzer. "Ripples in disk galaxies." *Astrophysical Journal* 328 (1988): 88–92.
- Scott, O. E. *Stars in Myth and Fact*. Caldwell, Idaho: Caxton Printers, 1947.
- Shapiro, S. L., and S. A. Teukolsky. "Formation of naked singularities: The violation of cosmic censorship." *Physical Review Letters* 66 (1991): 994–97.
- Shaw, J. "Drumlins, subglacial meltwater floods, and ocean responses." *Geology* 17 (1989): 853–56.
- Shaw, J., D. Kvill, and B. Rains. "Drumlins and catastrophic subglacial floods." *Sedimentary Geology*, 62 (1989): 177–202.
- Simpson, J. F. "Evolutionary pulsations and geomagnetic polarity." *Geological Society of America Bulletin* 77 (1965): 197–204.
- Slaughter, B. "Animal ranges as a clue to Late-Pleistocene extinction." In *Pleistocene Extinctions: The Search for a Cause*, edited by P. S. Martin and H. E. Wright, 155–66. New Haven: Yale University Press, 1967.
- Smoot, G. F., et al. "Preliminary results from the COBE differential microwave radiometers: Large angular scale isotropy of the cosmic microwave background." *Astrophysical Journal* 371 (1991): L1–L5.

- Snow, C. B., and H. Wambach. *Mass Dreams of the Future*. New York: McGraw Hill, 1989.
- Sonett, C. P. "A local supernova model shock ensemble using Antarctic Vostok ice core ^{10}Be radioactivity." *Eos* 72 (1991): 72.
- Stanford, R. *Fatima Prophecy*. 1974. Reprint, New York: Ballentine, 1988.
- Steig, E. J., et al. "Synchronous climate changes in Antarctica and the North Atlantic." *Science* 282 (1998): 92–95.
- Steiger, B. *Worlds Before Our Own*. New York: Berkeley Books, 1978.
- Sutcliffe, A. J. *On the Track of Ice Age Mammals*. Cambridge, Mass.: Harvard University Press, 1985.
- Taber, S. "Perennially frozen ground in Alaska: Its origin and history." *Geological Society of America Bulletin* 54 (1943): 1483–84.
- Tadhunter, C. N., et al. "Detached nuclear-like activity in the radio galaxy PKS 2152-69." *Nature* 325 (1987): 504–506.
- Tauber, H. "The Scandinavian varve chronology and ^{14}C dating." In *Radiocarbon Variations and Absolute Chronology*, Nobel Symp. 12, edited by I. Olsson. New York: John Wiley & Sons, 1970.
- Taylor, A. D., W. J. Baggaley, and D. I. Steel. "Discovery of interstellar dust entering the Earth's atmosphere." *Nature* 380 (1996): 323–25.
- Taylor, K. C., et al. "The 'flickering switch' of late Pleistocene climate change." *Nature* 361 (1993): 432–36.
- Teichert, C. "Major features of cephalopod evolution." In *Essays in Paleontology and Stratigraphy*, edited by C. Teichert and E. Yochelson, 162–210. Lawrence: University of Kansas Press, 1967.
- "The Search for Adam and Eve," *Newsweek*, January 11, 1988: 46–52.
- Thomas, E. S. "The Orleton Farms mastodon." *The Ohio Journal of Science* 52 (1952): 1–5.
- Thompson, L. G. "Variations in microparticle concentration, size distribution and elemental composition found in Camp Century, Greenland, and Byrd Station, Antarctica, deep ice cores." In *Isotopes and Impurities in Snow and Ice*, Proceedings of the Grenoble Symposium, 1975. IAHS Publ. No. 118, 1977.

- . “Microparticles, ice sheets and climate.” Institute of Polar Studies, report no. 64. Columbus: Ohio State University, 1977.
- Thompson, S. *Tales of the North American Indians*. Bloomington: Indiana University Press, 1971.
- Thorarinsson, S. “Some new aspects of the Grimsvötn problem.” *Journal of Glaciology* 2 (1953): 267–75.
- Tolmachoff, I. P. “The carcasses of the mammoth and rhinoceros found in the frozen ground of Siberia.” *American Philosophical Society Transactions* 23 (1929): 51–71.
- Townes, C. H., and R. Genzel. “What is happening at the center of our Galaxy?” *Scientific American* (April 1990): 46–55.
- Townes, C. H., J. H. Lacy, T. R. Geballe, and D. J. Hollenbach. “The centre of the Galaxy.” *Nature* 301, no. 5902 (1983): 661–66.
- Tyson, J. A., W. A. Baum, and T. Kreidl. “Deep CCD images of 3C 273.” *Astrophysical Journal* 257 (1982): L1–L5.
- Utré-Guérard, P., and J. Achache. “Core flow instabilities and geomagnetic storms during reversals: The Steens Mountain impulsive field variations revisited.” *Earth and Planetary Science Letters* 135 (1995): 91–99.
- Van Speybroeck, L., et al. “Observations of X-ray sources in M 31.” *Astrophysical Journal* 234 (1979): L45–L49.
- Velikovsky, I. *Worlds in Collision*. New York: Pocket Books, 1950.
- . *Earth in Upheaval*. New York: Dell, 1955.
- Vereshchagin, N. K. “Primitive hunters and Pleistocene extinction in the Soviet Union.” In *Pleistocene Extinctions: The Search for a Cause*, edited by P. S. Martin and H. E. Wright, 365–98. New Haven: Yale University Press, 1967.
- Vogt, D., and G. Sultan. *Reality Revealed*. San Jose, Calif.: Vector Associates, 1977.
- Voluspa: The Song of the Sybil. Translated by P. B. Taylor and W. H. Auden. Iowa City: Windhover Press, 1968.

- Waddington, C. J. "Paleomagnetic field reversals and cosmic radiation." *Science* 158 (1967): 913–15.
- Wallace, A. L. *The Geographical Distribution of Animals*, vol. 1. London: MacMillan, 1876.
- Ward, R. *Floods: A Geographical Perspective*. New York: John Wiley & Sons, 1978.
- Warren, H. C. *Buddhism in Translations*. 1896. Reprint, New York: Atheneum, 1979.
- Waters, F. *Book of the Hopi*. New York: Penguin Books, 1963.
- Watzlawick, P. *How Real Is Real: Confusion, Disinformation, Communication*. New York: Vintage Books, 1976.
- Weber, J. "Anisotropy and polarization in the gravitational-radiation experiments." *Physical Review Letters* 25 (1970): 180–84.
- Weidner, J., and V. Bridges. *The Mysteries of the Great Cross of Hendaye*. Rochester, Vt.: Destiny Books, 2003.
- Weiler, K. W., and N. Panagia. "Vela X and the Evolution of Plerions." *Astronomy and Astrophysics* 90 (1980): 269–82.
- West, J. A. *Serpent in the Sky: The High Wisdom of Ancient Egypt*. Wheaton, Ill.: Quest, 1993.
- Whitley, D. G. "The Ivory Islands in the Arctic Ocean." *Journal of the Philosophical Society of Great Britain* 12 (1910): 35.
- Wilson, A. T., and A. Long. "What was the carbon dioxide content of the glacial atmosphere?" *Eos* 74 (1993): 78.
- Witte, M., et al. "The ULYSSES neutral gas experiment: Determination of the velocity and temperature of the interstellar neutral helium." *Advances in Space Research* 13, no. 6 (1993): 121–30.
- Wrangell, F. P. *Narrative of an Expedition to Siberia and the Polar Sea*. 1841.
- Young, J. I. *The Prose Edda of Snorri Sturluson: Tales from Norse Mythology*. London: Bowes & Bowes, 1954.

- Yuktswar, J. S. S. *The Holy Science*. Los Angeles: Self-Realization Fellowship, 1974.
- Yusef-Zadeh, F., M. Morris, and D. Chance. "Large, highly organized radio structures near the galactic centre." *Nature* 310 (1984): 557–61.
- Yusef-Zadeh, F., and M. Morris. "G0.18–0.04: Interaction of thermal and nonthermal radio structures in the arc near the Galactic center." *Astronomical Journal* 94 (1987): 1178–84.
- Zhao, J.-H., W. M. Goss, K. Y. Lo, and R. D. Ekers. "High-resolution VLA images of the Galactic Centre at 2 cm wavelength with large dynamic range." *Nature* 354 (1991): 46–48.
- Zook, H. A., J. B. Hartung, and D. Storzer. "Solar flare activity: Evidence for large-scale changes in the past." *Icarus* 32 (1977): 106–126.

Other books by Paul A. LaViolette

Galactic Superwaves and Their Impact on the Earth

Genesis of the Cosmos: The Ancient Science of Continuous Creation

Subquantum Kinetics: A Systems Approach to Physics and Cosmology

The Talk of the Galaxy: An ET Message for Us?

About the Author

[Paul A. LaViolette](#), Ph.D., is president of the Starburst Foundation, an interdisciplinary research institute, and holds advanced degrees in systems science and physics. The author of *Genesis of the Cosmos*, *Earth Under Fire*, *Decoding the Message of the Pulsars*, *Secrets of Antigravity Propulsion*, and *Subquantum Kinetics*, he lives in New York.

About Inner Traditions • Bear & Company

Founded in 1975, [Inner Traditions](#) is a leading publisher of books on indigenous cultures, perennial philosophy, visionary art, spiritual traditions of the East and West, sexuality, holistic health and healing, self-development, as well as recordings of ethnic music and accompaniments for meditation.

In July 2000, Bear & Company joined with Inner Traditions and moved from Santa Fe, New Mexico, where it was founded in 1980, to Rochester, Vermont. Together Inner Traditions • Bear & Company have eleven imprints: Inner Traditions, Bear & Company, Healing Arts Press, Destiny Books, Park Street Press, Bindu Books, Bear Cub Books, Destiny Recordings, Destiny Audio Editions, Inner Traditions en Español, and Inner Traditions India.

For more information or to browse through our more than one thousand titles in print, visit www.InnerTraditions.com.

BOOKS OF RELATED INTEREST

[Secrets of Antigravity Propulsion](#)

Tesla, UFOs, and Classified Aerospace Technology
by Paul A. LaViolette, Ph.D.

[Genesis of the Cosmos](#)

The Ancient Science of Continuous Creation
by Paul A. LaViolette, Ph.D.

[Decoding the Message of the Pulsars](#)

Intelligent Communication from the Galaxy
by Paul A. LaViolette, Ph.D.

[Science and the Akashic Field](#)

An Integral Theory of Everything
by Ervin Laszlo

[The Cycle of Cosmic Catastrophes](#)

How a Stone-Age Comet Changed the Course of World Culture
by Richard Firestone, Allen West, and Simon Warwick-Smith

[Cataclysm!](#)

Compelling Evidence of a Cosmic Catastrophe in 9500 b.c.
by D. S. Allan and J. B. Delair

[Galactic Alignment](#)

The Transformation of Consciousness According to Mayan, Egyptian, and
Vedic Traditions
by John Major Jenkins

The Basic Code of the Universe

The Science of the Invisible in Physics, Medicine, and Spirituality

by Massimo Citro, M.D.

Inner Traditions • Bear & Company

P.O. Box 388

Rochester, VT 05767

1-800-246-8648

www.InnerTraditions.com

Or contact your local bookseller

Bear & Company
One Park Street
Rochester, Vermont 05767
www.InnerTraditions.com

Bear & Company is a division of Inner Traditions International

Copyright © 1997, 2005 by Paul A. LaViolette

Originally published in 1997 by Starburst Publications as *Earth Under Fire: Humanity's Survival of the Apocalypse*

All rights reserved. No part of this book may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without permission in writing from the publisher.

Library of Congress Cataloging-in-Publication Data

LaViolette, Paul A.

Earth under fire : humanity's survival of the Ice Age / Paul LaViolette.
p.cm.

Originally published: Schenectady, NY : Starburst Publications, c1997.

Includes bibliographical references.

eISBN-13: 978-1-59143-897-7

1. Natural disasters—Miscellanea. 2. Cosmic rays—Miscellanea. 3. Mythology— Miscellanea. 4. Occultism and science. I. Title.

BF1999.L3168 2005

001.94—dc22

2005017275

Diagrams are by Paul A. LaViolette unless otherwise noted.

Electronic edition produced by
ePubNow!



www.epubnow.com
www.digitalmediainitiatives.com