

LORDS AND LIBERTY

Table of Contents

Mankind

Humanity

Eternity

Mother Earth

Universal Truth

Infancy

Hellenization

Empire

Rise of the Eastern Sun

Crusaders

Horde of Temujin

Black Death and Renaissance

Science and Industry

Great War and Rise of the Dark Knight

War to End All Wars Revisited

Cold & Limited Wars

Motivation & the Birth of Gods

Evolution of the Gods

Mirage in the Desert

Enslavement

Savage Lord

True Worth

Copyright 2009 and 2019 by Bill W Davis
Cover image of the sun courtesy of NASA images.

Mankind

Thunderous hoof beats echoed through the great forest. “Faster! Faster!” yelled a cloaked captain heading the entourage racing along a darkening road: little more than a sunken path beaten down through eons of travel under a towering canopy. Clods of rich soil and leaf litter flew high into the air behind charging steeds. Vines of ivy fluttered in spring air caught up in the rush to judgment, as road was enveloped by ageless forest in the intruders’ wake.

Rocks and dirt tumbled down a steep hill face behind Joshua as he scrambled forward on his hands, clawing toward the summit. Fingernails dug into the thin soil for extra grip but Joshua was oblivious to the scraping and tearing of sharp stones. Under threat of death he endured excruciating pain and fatigue. But, despite Joshua’s desperate breathing and ear-pounding heartbeat, the muscles in his legs were getting tight. Even terror couldn’t keep exhaustion from paralyzing his burning calves and thighs.

The charging horses started to flank him and it was becoming quite evident that he couldn’t beat them to the ridge. Slowing, he turned onto a rock outcrop to his left. Backed into a corner, it wasn’t a question of if the inquisitors would catch up with him, the question became what would happen when they did? Anxiety flooded his mind as he hoped for his legs to recover in the few seconds before the nearest pursuer arrived.

As horse and master ascended near the side of the outcrop, Joshua picked up a fist-size stone, turned, and hurled it at the aggressor. Startled, the inquisitor ducked his head and the rock glanced off his left shoulder; it wasn’t a debilitating blow, but it created the opening Joshua needed to get past the steel of the assailant’s sword. Seizing the opportunity, Joshua leapt off the boulder and kicked at the rising head of his pursuer.

Falling to the ground, the man dropped his sword and tumbled down the hill. Joshua fell opposite the horse from the master and slid a number of feet before righting and scrambling to catch the retreating horse. As he leapt on the back of the sliding brown stallion, Joshua grabbed a handful of fluttering mane and willed the frantic steed reach flat ground to mount an escape before the relentless mob closed in. Unfortunately, being front heavy and hind strong, the horse was more adept at ascent, while being relatively slow to descend the steep hill. Hot on his heels, the officer he had kicked from the stirrups raced down the hill after Joshua, grasping onto him before they could reach the bottom.

Joshua fought with all his might. Kicking and punching, he struggled to free himself and stay on the steed. But, with arms clamped around Joshua’s waist, the posse member jerked and twisted until Joshua could no longer stay on the horse. Salvation slipped from his fingertips as he lost grasp of the long, muscular equine neck.

Elbowing his assailant fiercely on the side of the head, Joshua twisted around to straddle him and drive his own weight down to the ground. Pressing left knee against soft ribs and grabbing the round-faced deputy by the hair, Joshua struck with all his might, again and again he raised his right hand and drove it down about the aggressor’s left eye until his enemy’s deadly clutch was broken.

But the delay was too great and reinforcements arrived. One, then another, and another piled on, clutching and wrapping and clinging to Joshua; pressing him to the ground. They squeezed his arms and legs until he couldn’t move. Then a heavy-set marauder wrapped his arm around Joshua’s neck and began choking him. The warring gang squeezed and pressed harder, and harder, until Joshua couldn’t roll, or twist, or wriggle, or even breathe.

Principle waned, and panic gripped Joshua. He couldn’t breathe! The chase robbed him of oxygen, every fiber of his being burned for air. He tried to bite, to spit; to scream, jerk, kick and twist, but nothing was working, he couldn’t break free of the relentless, cruel mob; he couldn’t breathe. His lungs and stomach were on fire. Oh God help me, he thought. Help Me!

His lungs pulled and pulled for air; the spasms uncontrollable. His diaphragm convulsed, squeezing the churning stomach until vomit spilled into his esophagus. The acid too burned, and the

taste of bitter soiled Joshua's mouth. But air was all he could think about, the squeezing, burning, crushing pain in his chest was spreading, he had to have air, it was the only thing that could put the fire out. How could something taken for granted every moment of every day cause such a horrible pain in absence?

He only felt the pain, every nerve burned a smoldering death. Air! Air! was his only thought. At last, looking for it, he could only see black. His eyes were fading. And finally, after what seemed an eternity, thank God, his mind was going black as well.

Panic for air filling his brain finally drained away as his brain shut down. And his body followed. Resistance ceased and the fight left his body. Joshua's limits of mortality were at once starkly apparent.

The inquisitors relaxed their grip. Letting go of Joshua's neck, the man that was choking the life from him, literally destroying Joshua, rolled over and pressed to his feet. All was quiet in the solemn, ancient forest except the heavy panting of men and horses. Even sunlight was muffled by the canopy as it trickled through to divide shadow from shadow.

But then, in a life extending instant, a sudden gasp shook Joshua, followed by a cough projecting vomit on the dark forest leaf litter, then more gasping and more coughing. The coughing grew regular and Joshua started to regain consciousness. He could feel again, he could feel the fire all over his body, especially in heaves of his chest. Arterial pulses throbbed in his head with heartbeats pounding the mind like a hammer striking an anvil.

Despite the horrid, unbearable pain, Joshua yet lived. Was it a miracle? No it was not, though alive, it was by design, not good fortune or divine interference. His captors didn't want him dead, yet. No, it wasn't their purpose to go around killing just for the sake of killing, for they stood for something. They represented righteousness in the Lord's service. Their purpose was to teach Joshua a lesson, to extract a confession, to be acknowledged and gratified, and finally, they wanted to make an example of him.

The flamboyant captain of the troop stood and started down the hill. "Get some rope," he ordered the stocky man that had been choking Joshua. "Secure the heretic."

Having received his order, the choker lumbered the rest of the way down the hill to the waiting horses where he grabbed a rope from one of the saddles and started back up toward Joshua. Upon arrival, he proceeded to tie Joshua's hands together behind his back. Then he tied Joshua's feet as well, pulling hard on every loop and knot.

With the captive secure, the inquisitors pulled him down the hill on his stomach, head first. The captain led the party to the bottom of the hill and then out to a small clearing in the tall woods. There, putting fingers to his cracked lips, he whistled for the horses.

"Tie him to Carlton's horse," he ordered.

"The devil's powerful in this one," declared a tall, black haired member of the clan with deep-set, droopy eyes and pock-marked pale skin partially hidden by a thin unkempt beard hanging like a cobweb. "Shall the demon have chance to kill?" he asked, stepping into the light.

"Suffer the witch not torment God's people another night," added the wrinkled, leather-faced one they called Carlton.

"Every second he's alive poses a grave risk. Look what harm he has caused Laurentin," puffed another of Joshua's captors, still taxed in his breathing by the struggle of good versus evil.

Forthwith the group looked at the one known as Laurentin, standing a comfortable distance from the man kneeling in their midst that caused him such considerable fear only moments before on the side of the hill. Laurentin's face and sleeve were blood-smeared, having wiped the trickle from his nose. And his cheek was swollen, nearly to the point of closing his left eye.

Rolling the reigns of a large bay between his fingers, the heavy-set officer that had choked Joshua stroked his free left hand through dirty blonde hair to pull it from his freckled face. "Dispatch him now and be done with it," he urged, stepping forward, "before he summons additional demons, or

departs the body.”

“You fools are the demons,” Joshua managed to reply in his own defense. “You cover the continent in blood with the lust of your own ignorance, while I harm nothing. By what right can you declare me evil?”

You’re blinded by your own vision. You’re too busy looking at others to recognize your own evil. Step back now! Step back I ask you, and imagine how you must look in the eyes of others right now; in the eyes of the Lord.”

“Enough!” rumbled the captain, his long gray hair flipping in the afternoon breeze with the sudden turn of his head. “I’ve heard enough.” He walked toward Joshua, stopping one pace distant, and looking down on the defenseless mason he hissed: “With hostility and a wicked tongue you’ve proven your pact with the devil.

“You’re charged with sins against God and crimes against the King. You show familiarity with spirits, for you’re known to speak with animals, and to propose their equality with the children of God – heirs to his kingdom; denying his very image on Earth. You deny the workings of Satan by announcing, in great contradiction of the spirit of heaven, that plague and sickness are born of their own seeds; not the works of the devil’s familiars. And you stand accused of the practice of sorcery, afflicting man and crops with disease, as you’ve been seen by credible and virtuous witnesses to handle corpses and diseased plants in various stages of decay and affliction.”

Joshua was by this time leaned back in a sitting position with his feet under his hands, working frantically to loosen the knots of his bindings. He knew that reason was lost on his captors and that his judgment was passed when first accused. I need time, he thought to himself.

“While these charges may seem legitimate on the surface,” he began, “any vague appearance of merit therewith is mere illusion, as all have goodly and reasonable explanation. I am but a servant of God, his office on Earth, and servant to the King. I seek knowledge, not to further Satan’s desire, but to assist mankind, so that more time may be devoted to glorifying the Father, the Son and the Holy Ghost, and doing the work of the Almighty.”

“The Almighty needs no help from you,” charged the captain.

“Nor from you”, Joshua came back.

Continuing on, Joshua began to recite the Lord’s Prayer. “Our Father which art in heaven, hallowed be thy name. Thy kingdom come. Thy will be done in Earth as it is in heaven. Give us this day our daily bread. And forgive us our trespasses, as we forgive them that ...”

“Enough of this blasphemy you demon!” the gray headed leader ingloriously interrupted. “Admit your nature and be spared a gruesome and horrifying ordeal. Confess your dealings with the devil and you’ll receive a quick and honorable death.”

Joshua gripped and pulled at the rope until the nails were pulled back on his middle fingers. But he looked past the pain to those he held dearest. Anything – he would do anything to be there for them.

“Death would be a dishonor, sir. The Lord has blessed me with a beautiful wife and children. Allow me to honor the Lord by preserving and advancing his blessing”

The leader didn’t pretend to entertain Joshua’s plea. “I shan’t be the fool for your trickery, Devil, your speech is clearly the cunning work of Satan spoken through the mouth of a warlock.” Then, pointing to an oak about five hands across at the chest, he added, “Bind his feet to this tree. We shall force the devil from this body.”

With that Joshua was jerked up on his feet. And his captors were occasioned to notice that his leg bindings were partially loosed. “Deceit! Deceit!” cried Laurentin. “He speaks lies to distract us as he attempts to circumvent God’s justice.”

As soon as the escape attempt was known all of the captors clamored for Joshua’s utter destruction.

“Help!” Joshua screamed into the vast, stoic forest with all his might in utter desperation. “Help!”

He prayed that somebody, anybody, would hear his plea for help so as to save him, and save his family and friends the sorrow and hardship of losing him, and save his work in understanding life and the diseases that afflict the world. Don't let my love and my work die, he prayed.

But, his oppressors would accept no variance, and vowed silence for any voices other than their own. They threw him to the ground by the oak tree. Then the choking man jumped on Joshua's back, settling between Joshua's restrained arms. Slamming his hands down on Joshua's head, he bounced it against the ground before reaching around Joshua's face and pulling back with force so immense as to make Joshua instantly scream in agony with the feeling that his neck was surely broken.

While Joshua's neck was being so terribly wrenched, the man called Laurentin approached with his knife drawn, having a contemptuous look of revenge about him, and thrust it at Joshua's mouth attempting to force it open. Laurentin had snapped from the stress imposed by a resistant quarry, blood was not to be shed, the body was to remain intact. The knife point, however, gashed through Joshua's lower lip, and lodged below his teeth. Having failed thus in his first attempt to sever the vulnerable captive's tongue, Laurentin pulled the knife back and thrust it up under Joshua's chin back near the throat, all the way to the soft palate above the tongue, and then proceeded to rip it side to side to render Joshua dumb in a fit of frenzied rage.

Searing, was the pain from the slicing blade, as it caused blood to squirt from the soft undermouth, reddening the steel of apathy. Blindness from hands clinched across his eyes, coupled with the shocking pain in his neck and mouth, overwhelmed Joshua with terror again. His whole body stiffened, his legs kicked against the restraints, and he loosed all the scream he could muster with his head cocked back and the weight of a heavy man bearing upon his chest.

Reacting to prevent another such scream of pain and fright, the choking man moved his thick hands down across Joshua's mouth and nose, and returned to the cradle position with his elbows on his knees as he sat on Joshua's back. The strain on Joshua's neck caused the gash under his mouth to gape open, allowing a great amount of blood to flow down his neck and chest, with much more blood pouring directly onto the stained ground. Still yet, his throat was filling with blood, further hindering the breath of life. It suddenly flashed through his mind that he was in hell, in the hands of a vengeful Beelzebub himself. Again his lungs burned, much as his neck burned under the intense, crushing pressure on the nerves, ligaments and vertebrae.

Without a conscious thought to his action he opened his mouth until he felt something between his teeth. And suddenly his jaw snapped shut like a trap, with all the grit and determined force he could manage. Bone splintered and ligament tore in the small finger of the choking man's left hand and he immediately leapt up off of Joshua, pulling to free his finger and nearly tearing it clean from his hand in the process. As it tore from the clinch of Joshua's teeth only a few strands of stretched skin attached the dangling appendage to the hand.

A new and greater rage came over the red-faced choking man. "The devil bit me!" he bellowed. And in throes of fury the wild-eyed monster kicked at Joshua with great savagery, as Joshua lay coughing blood and gasping for breath. With feet tied securely to the tree, Joshua could only shift his body trying to deflect the punishing blows as they came one after another at his head and abdomen.

"Tie him to the tree," the leader commanded, having exhausted all patience, "prepare a fire".

At once, the quiet, curly-haired one who lacked expression on his plain, pale, hairless face began to obediently untie the harness he had been fashioning from rope. Other members of the party fanned out through the deep forest in search of all manner of fuel to burn.

In their agitation, the posse of inquisition had interrupted their plan to tear Joshua's arms from their sockets and break scapulas and tear ligaments by harnessing his hands, still bound together behind his back, to a pair of pulling horses straining to rip him from the anchor that was the tree that had stood for decades in the rocky soil. No, the time and effort to secure a confession became unnecessary formality to the mob in their wild state, unaccustomed as they were to contesting of their authority and always inclined, as they also were, to displays of dramatic cruelty. Instead, they moved

to the final act in this repugnant, morbid play. Evidence of what they considered to be the devil's attack on their group was more than proof enough to condemn Joshua.

When the harness rope was unraveled and Joshua's hands were untied, he was stood and his hands bound around the oak tree. His shirt stained red from the blood of his slashed mouth. What blood wasn't draining from the long cut near his throat was pouring over his lower lip and running down his chin with every labored breath exhaled.

I'm running out of chances, he thought to himself. Though possibly futile, screaming for help seemed to offer his only hope, faint as it was, that someone would hear him, and, although even less likely, that someone would be willing and able to help him. He took a few deep breaths, more painful after being kicked so forcefully in the ribs. Holding back a cough brought on by the irritation of stomach acid or blood sunk deep in his lungs, he constricted his diaphragm with all his might and screamed past his severed tongue for as long and hard as he could push the air out. He screamed not as a coward, but as a man desperate to return to his young son Samuel and daughter Elizabeth: shining lights in a world of bitter darkness.

Before he could get it all out, he was struck hard on the side of his face by the tall man with the dimpled complexion, who was holding tightly to Joshua's left arm. Again Joshua screamed. And the pock-marked man put his left hand on Joshua's throat, squeezing the trachea shut to muffle the cry.

Then the curly-haired man that was missing some teeth in front, passed his rope across Joshua's eyes and pulled hard around the tree, tying a tight knot in back; cinching Joshua's head fast against the tree, and causing stars to flutter in his eyes.

Joshua tried to conquer the utter despair of his situation with thoughts of reflection and wishes for his beautiful, innocent family. I love you Samuel, he told his young son in silence as the rope man circled round him, drawing him tighter against the unfeeling tree with every pass. And he thought of his tender daughter, so sweet and pure, I love you Elizabeth. And, I love you Sarah, he said to his adoring wife. Lord, care for my angels! he prayed. His fear was coming true. What he prayed to avoid every night was coming true, and despite the perverse agony he was subjected to, his greatest distress was that he wouldn't be there to care for, and to laugh and love and play with his precious family.

As Joshua prayed for his family, the rope man soon had him bound in a deadly, unbreakable embrace with the tree, having passed twice over Joshua's throat to quiet any further cries for help. And the rest of the hunters of men were piling a large assortment of limbs, twigs, and leaves around Joshua and the huge living stake to which he was bound.

Too soon the order was given, "Light the fire." Then the one they called Carlton, with the weathered, hardened face, removed two flint stones and some dry grass from his travel bag, walked over to Joshua's feet, squatted down, and began striking the stones onto dry grass placed among some brittle leaves. When one of the sparking flakes caused a smolder in the grass, Carlton blew gently to feed oxygen to the infant flame so that it might grow to consume the accused heretic fastened tight to what would soon be known in those parts as the burning tree.

With rope pressed tightly across his eyes, Joshua couldn't see the tiny flame as it fed on the fuel piled all around him. But he could hear the light cracking and popping of boiling sap in the burning twigs. Gingerly at first, the wisps of smoke wafted up in a deadly sway around him, before disappearing in the shadows of the forest air. Then higher and higher the thickening smoke climbed into the canopy, swirling and blowing amongst the upper branches after escaping searing, leaping flames dancing all about.

Joshua tried to block the growing monster of hades from his mind and re-live his fondest memories. Maybe someone would yet come to stop this horrid atrocity and deliver him from the netherworld madness. Maybe it was all a horrible nightmare that he would wake from any moment. Hast thou forsaken me? he asked his lord.

But his mind was not to be separated from the body. The building heat in his legs and foul gases in his nostrils began to take control of his thoughts. As the flames grew higher and hotter, and

the pain grew ever more intense, and the smoke grew from irritating to choking; terror and panic began to again spread through his mind like an unchecked poison.

Shortly, he had lost his ability to look to the future or remember the past. As the pain mounted to unbearable intensity, he lost sight of what was important. In frantic fervor, pain was again all he could see, and survival all he could seek. The fire attacked Joshua's body with ferocity unknown to all but a few unlucky men. Smoke burned his nose, throat and lungs; again robbing him of precious air. Stop! Stop! Oh stop! his mind cried out as the skin of his feet and legs began to blister. The hair burned away as he steadily descended into hell. He strained against the bondage, shaking to and fro with feverish violence. The constant muffled screaming past the choking rope was involuntary and beyond his control; being, as it was, but an avenue for pain seeking its own escape from a doomed body.

Stronger and hotter the fire grew. It roared through the leaves and branches overhead, billowing dark smoke high into the dreary sky; demonstrating domination of the condemned through its absolute destructive power. Joshua was on fire! The pain was unimaginable, as testified by delirious cries to the heavens. The hair of his head burned, along with his clothes. He shook, and tore back and forth in the burning rope, biting as a crazed beast at his constraints as he trembled all over. But the rope was thick and still strong, too strong to succumb to Joshua's will. It held him to burn. Like an evil embrace, it held him in submission to a supreme deadly torture; while his utterly cruel attackers mocked his agony.

Joshua sucked in toxic smoke and searing gases trying to get air. The burn on the inside reflected the vicious burning of his flesh. Merciless fire was all consuming as the raging flame enveloped, with lances of heat shooting into his core, boiling blood and igniting his emotions as well as his tortured body. The searing gases broiled his lungs, it was as though there was no air; he was breathing fire. And it burned! Oh how it burned! Joshua's world was ablaze; the fire was a supreme pain that couldn't be extinguished. Joshua's whole world was reduced to pain, but not reduced in experience, as he felt more than he had ever felt before, but it was only incredible, agonizing pain; all love, all hope, all reason was gone.

Alas, as the violent, violent end drew nigh the war for survival was lost. Fire killed the parts of the whole one by one. Cells burst from the boiling of life's fluids. Skin swelled and split in the heat; exposing fatty oils to ignition. Joshua's mind, almost dead from heat, poison gas and pain, ceased to think; it could only suffer under complete, unbearable, utter pain. Fire filled his mind and he couldn't see past it; not one thought dare even escape complete combustion. The brain was reduced to a receptor; incapable of reason, unable to contemplate or reflect. His muscles flexed and strained in defiance, his screams overpowered the roar of the fire.

His life became the fire, and a doomed resistance to the fire... until finally only the fire remained.

In the end; the agonizing, horrific end; even the resistance and pain died: life was gone. Joshua was gone. His golden voice was silenced as his body fell limp and continued to burn. All his knowledge and all of his memories and all his capacity for love and kindness burned away. As his body was consumed by the fire, so with it the love, hope and dreams of a family drifted away with the vanishing smoke. As mankind's legacy of self-righteous cruelty played on, the light of a generation was extinguished.

Humanity

As evening wore on, Joshua's wife Sarah began to worry for her husband. His wasn't the custom to be out late unannounced. The children too, grew curious, asking why father wasn't home for supper.

"Father must have got caught up in something," Sarah assured the children. "Not to worry."

After supper, Sarah busied herself cleaning their two room stone house. Samuel and Elizabeth occupied themselves outside in the twilight. Elizabeth piloted a great imaginary ship in front of the house, while Samuel ascended the magnificent central mast. Perched high in the crow's nest of the upper branches, Samuel trained keen eyes on the horizon, alert for plundering marauders and signs of friendly life. Only faint plumes of smoke from the direction of the village rose to the level of the birds and puffy clouds in the evening sky.

Time passed, and the glow of the western sun faded to black. Sarah came outside to gather the children for bed. "Any sign of the admiral, Matey?" she called up to Samuel.

"No ma'am," Samuel replied as he climbed down the tree.

"Come inside," Mother encouraged. "It's bedtime."

Elizabeth toddled forward and wrapped her arms around her mother, looking up with big doe eyes. "Can't we wait for father?"

"We'll see him when we wake up, darling," Sarah whispered, leaning over and kissing Elizabeth's forehead.

Walking back to the house Sarah stopped and looked down the long winding trail to the village. All was dark in the forest; still, she was compelled to look. As night covered the land, Sarah led the children inside and tucked them in bed.

After prayers, Sarah moved a lit lamp out to hang beside the door. There she sat to wait for Joshua.

Crickets and tree frogs called for their mates in the night, capturing Sarah's attention. Who else is calling in darkness, she wondered? For many minutes she put faces to the sounds as fireflies shown briefly bright on occasion only to disappear in the void.

Sarah was near to turning into bed herself when footsteps sounded on the trail coming nearer to the house. Joshua! Sarah thought. She felt a grand relief that he was home at last. Quickly she rose and walked to meet him.

"Where have you been?" she asked, causing the still wakeful Samuel to spring from bed and rush to the door.

"Sarah," a voice replied.

Sarah stopped in her tracks. She was startled that the shadowy figure walking toward her wasn't her husband.

"It's me, Gene," the voice came again.

Sarah recognized her neighbor's voice. His house was on the way to the village. "Hello Gene."

"I've got bad news," Gene continued. "Is Joshua here?"

"No, he went to the village this morning. What's wrong?" Sarah asked, but she grew lightheaded and didn't really want to hear the answer.

"I think I've found him," Gene reported. "Somebody's been murdered on the road to town."

Immediately Sarah's knees buckled and she fell to the ground like a severed vine, with trembling hands clutched to her face. Her shock and horror was so great that she didn't notice Samuel race past, down the trail toward town.

"Father!... Father!..." he cried; tears streaming down his tender face as he charged into the darkness with his heart on his sleeve. "Father!!!..."

What manner of idea could cause such despair?

Eternity

Searching for answers, Sarah asked why? as she looked to the vast black void of heaven speckled with the faint light of distant stars on that moonless night. Wondering if she had a purpose, or if she was as a speck of dust blowing in a cold cosmic wind, she begged God to reveal himself; or, in the alternative, reveal some just cause or meaning for her family. How, she asked, could God purposefully will harm to the innocent, or ignore their cries for mercy?

Quiet hung in the air, as no response came forth. There, exposed to infinite space with a cool breeze on her cheek, Sarah changed. As the tears fell she finally came to a realization, an awakening. Things began to make sense to her, unlike all that she was told in the past. Sarah's revelation did, however, run directly contrary to beliefs she had held deeply since childhood. Much of what she believed was, by all appearances, a grand illusion.

There in the empty night shadow some of her emotion died. Lost in the thin air was some capacity to love, and to fear. Gone was happiness and hope. All that remained, by only a tenuous grip, was resolve; resolve now inspired only by her love of Samuel, that felt like a stone in her stomach; cold, hard and detached; a force without direction.

For all of the great distance of space she beheld, there was sign of neither paradise nor magic. Like all that had come before, she saw only specks of light in a sea of black. Was it the mystery of the unknown that made room for rampant hypothesis? Or did the mystery of space demand explanation: even absolute explanations?

As long as mankind has reasoned and questioned the nature of things, people have sought to understand; or in the least, explain what's not easily known. And as until recently men could neither reach out to space nor see details beyond primitive perspective; they were left to theorize the forms, motions, substance and breadth of the overworld.

Although theories and practices often lacked both understanding and good judgment, reverence for the sky and celestial bodies is easily understood. For unlike today, our ancestors weren't isolated and insulated from their environment. When it rained they were wet, when bitterly cold winds blew, they shivered and froze; and in times of drought they died of thirst. Today people view the world through glass windows in cozy houses and cars. It's more of a rarity today to hear the rush of wind through branches reaching overhead to the dark sky and feel the chill in one's bones; but for billions of years that was the way, day after day after day.

In a world of marginal survival it's easy to see why people sought favor and were captivated by the mystery of the sky. As lord to the subjects, how great the wrath of the fickle beast has been as it unleashed howling typhoons and roaring tornados, flooding rains, searing lightning and ground shaking thunder to accompany bitter cold and sweltering heat. But, despite the thorough immersion, the universe and man's relationship to it has proven remarkably difficult to understand.

Though for most aspects of daily lives and survival it hasn't been necessary to know the secrets of space, people have systematically studied and observed the sky, notably the night sky, for thousands of years. It wasn't necessity, but curiosity and the desire to advance knowledge that led people to make some of the most basic, yet startling discoveries. Surprisingly, the shape and motion of our own world was so long a mystery, due in no small part to man's conviction of his own intelligence. How could man learn the truth of an orbiting planet when he knew he was standing on unmoving ground like he knew the nose on his face?

No matter of reason could teach so many people what they thought they already knew. That the sun orbited Earth was a fact even god was sure of. And because life giving sunshine and rain come from above and people placed their dead friends and relatives in the ground that occasionally erupted with fiery violence, it was easy to imagine a heaven above and sulfurous, fiery world of the dead below.

Generation after generation wondered what form of matter held the stars in the sky, be it aether

or crystal globes, and on what occasion the stars fell to Earth and died in a sudden, brief blaze of glory. As mankind yearned to explain those and other matters not understood, various myths evolved to explain the flat, motionless world, the underworld below, and firmament above.

As the sun is far and away the most important celestial body to earthlings, it's been the subject of a great many theories that proved false in time. One of the ancient religions that attempted to explain the universe developed in Egypt. The Egyptians believed the sun god Ra crossed the sky in a boat called a barque before entering the underworld at night to travel back to the east for the next day's journey. In similar fashion Celtic tribes of Europe applied their technology and customs to model the sun being pulled across the sky in a horse-drawn chariot.

Unlike those ideas, other celestial beliefs, deeply rooted in struggle and conquest, were more reflective of savage ferocity. Take, for example, sun worship by the Aztecs of Mexico. Aztec priests ritually sacrificed many thousands of people in ceremonies designed to feed the sun god. Without human blood, it was alleged, the sun god would die, and all earthly life with it, as happened to the four previous worlds. With knives of chipped obsidian or other stone, priests cut open the abdomens of the living sacrifices, reached inside the victims and ripped out their still beating hearts to offer to the sun.

Though the Aztecs knew nothing of the sun's life cycle, they really didn't need to, since their simple, brutal way of life had no more bearing on the sun than animal sacrifices to the god of the Jews and later Christians and Muslims. Like all of man's gods, it was a mystery whether Huitzilopochtli was a savage beast born to serve his creators, or they him. The Aztecs created a bloodthirsty god lusting for conquest by a warrior nation. But in the end, Huitzilopochtli was slain not by truth, but was conquered by a god pledged to devour all the earth with the fire of his jealousy.

Despite often repressive cultures of learning and fixation on magic, as opposed to objective observation, there was, in time, occasional, if rare, breakthroughs of discovery that eventually changed human perception of the world and man's place in the universe. A combination of curiosity and quest for privilege kept pushing people to explore and observe. Not only did they seek the truth for the sake of knowledge, they ever hoped to discover secrets otherwise unknown, and find their own destiny in cosmic alignments and constellations. If not for that desire to gain advantage people may have been satisfied with the popular theories. But, in observing and learning, it became more and more impractical to correlate fantasy and reality. One by one, implausible foundations of the massive pyramid of ideology crumbled under the weight of scientific discovery.

Through the ages numerous societies in the Middle East, India, China and elsewhere contributed to astronomy: the study of the physical universe. Though many of those societies were more interested in correlating celestial events with their own lives through religion and astrology than understanding the true functions of the universe, they nonetheless contributed to a growing body of celestial knowledge. However, much of the information they gathered through the ages was of little use at the time because they didn't yet understand what their observations revealed about space. More often they contributed to a growing base of data that could be used to chart celestial motion and track changes in time.

Chinese astronomers noted such memorable events as solar eclipses, meteor showers, and supernova explosions (which they noted as temporarily visible guest stars), going back as far as 4,000 BC. And by approximately 1,000 BC people living in what is now China had measured the angular difference between the equatorial plane and Earth's orbital plane. That difference, called the obliquity of the ecliptic, is the cause of seasonal variation as the Earth orbits the sun, although at the time the Chinese didn't necessarily realize the Earth orbits the sun. If the equatorial and orbital planes were the same, the equator would always be oriented toward the sun, so from Earth the sun would appear directly over the equator all year and there would be no annual seasonal variation of summer and winter, other than imperceptible variance due to the slightly elliptical shape of Earth's orbit.

And Babylon contributed a great deal to early space study, with their sexagesimal (base 60) number system still used in time and geometric measurements. That's the origin of today's 60 minute

hours and angular degrees, and 60 second minutes. Chaldeans of Mesopotamia also had a strong foundation of mathematics that helped contribute to their discovery that eclipses recurred in a repeating cycle known as a saros.

By observing and recording star positions over long periods of time, early astronomers noticed that most stars remained in fixed positions relative to the other stars. However, like the moon and sun, five stars appeared to move relative to the others, and they came to be called planets after the Greek term *planetai*, meaning wanderers. That relative motion was recognized as orbits by Babylonian and Chinese astronomers as early as 750 BC. And by approximately 500 BC the Babylonian astronomer Naburiannuto was predicting future positions of the sun, moon and planets.

To understand the significance ancient society associated with objects in the sky, consider that days were dedicated to the Sun, Moon and five known planets: Mercury, Venus, Mars, Jupiter and Saturn; resulting in the seven day week.

One of the most influential of ancient civilizations, the Greeks; and Hellenistic culture in general; also contributed much to the basic framework of modern astronomy. Considerable dialect in the learning institutions fostered a more scientific approach involving systematic study that developed hypotheses to be tested and debated for soundness. Some Greeks surmised that the sun, moon and stars are spheres formed by a convergence toward the center, what's known as gravity today, and some even considered the stars more distant versions of the sun. In more technical work they also estimated precession and the circumference of the Earth.

Earth's precession involves the slight change in direction of its rotational axis, like the wobble of a spinning top. And just as the Earth spins on its axis about once every 24 hours, that axis of rotation also slowly moves, or wobbles. Slight movement of Polaris, the north star, away from the north pole, and changes in the maximum and minimum inclination of the sun during summer and winter solstice over the years indicated Earth was wobbling. Modern scholars estimate the time for our planet to complete one of these cycles, or wobbles, to be about 25,800 years.

Ptolemy devised a solar system model in Hellenistic Egypt in the second century that could predict the positions of planets in the sky on any given date. It was apparently fairly accurate even though it was based on the erroneous geocentric (Earth centered) theory. Some Hellenistic thinkers, like counterparts in India, even developed theories of a heliocentric, or sun-centered, planetary system. But the concept of Earth and the other planets orbiting the sun didn't gain acceptance; partially due to the fact that the theory's detractors didn't see the shift in the alignment of the stars that they expected to see if Earth was sweeping around the sun in orbit. Unfortunately, at the time they didn't realize that the stars were much too distant to enable them to detect such minute deviation with the unaided eye.

Though they were 93 million miles short in their estimates, it's no exaggeration that a lot of people used to think that the sun barely rose above the peaks of mountains. And even when astronomers began to understand that the sun and other objects visible in the sky were a lot larger and farther away than traditionally believed, they still had little idea just how big and how far away those objects were.

But still, the concept of a stationary Earth was the greatest single obstacle to astronomical understanding. It would take serious proof for people to believe that while standing apparently still on the face of the Earth they actually traveling at a very high rate of speed. For thousands of years raged the debate of a moving Earth. And even today people are still astonished to find out how fast they're traveling. Man's home planet orbits the sun at the average rate of approximately 66,615 mph. And because Earth spins, in addition to flying around the sun in orbit, a point on the equator is moving approximately 1,040 mph due to planetary rotation alone. That velocity due to rotation, of course, decreases toward the axis of rotation at the north and south poles to a negligible amount.

The very concept of their own velocity causes people to doubt and ask how it's possible they don't notice they're moving so fast. The answer to that question is quite simple. We don't notice Earth's velocity, and our own, because they're the same, and motion is relative. The planet and

everything on it, including the atmosphere around it, is traveling together, so that it all moves as one.

We're accustomed to thinking of velocity in absolute terms, such as a 55 mph speed limit. But that speed is actually relative to the surface of the planet on which people are driving, it doesn't take into account the velocity of Earth itself. That's fine however, because motion relative to the local environment is the motion relevant to driving. In fact, all observed motion is relative, for if there is no point of reference such as the case would be in an infinite void of space, there can be no observed motion and no way of knowing speed, distance or direction. Since Earth's motion is smooth and steady, because forces affecting that motion are essentially in equilibrium, there's normally no occasion to notice movement relative to the rest of the universe except the apparent movement of celestial objects.

After the decline of Hellenistic study, astronomy work continued in Persia and India, as it had for many generations, adding to mathematical calculations and helping to keep progressive ideas afloat. Although time and vagueness of reference obscure the exact meaning of ancient writings, traditions and teachings, enough variety of thought survived the centuries to keep the fires of advancement and alternative theory stoked. Some of that knowledge was transferred to Muslim Spain, and some was picked up by traders and travelers to be diffused through Europe when the arts and sciences finally began to blossom during the period which came to be known as the Renaissance.

Through the ages revolving Earth and heliocentric models sporadically popped up in scientific circles, only to be rejected by the mainstream. Even the publication of Nicolaus Copernicus' *On the Revolution of Heavenly Bodies* in 1543, the year of his death, didn't convert the masses to believing in an orbiting Earth. Added to people's natural objection to the idea of living on a speeding planet was the Roman Catholic Church's insistence on an unmoving, central Earth.

Pope Alexander VII declared in a Papal Bull that "the Pythagorean doctrine concerning the mobility of the Earth and the immobility of the sun is false and altogether incompatible with divine Scripture" and he went on to say the principles advocated by Copernicus on the position and movement of the Earth were "repugnant to Scripture and to its true and Catholic interpretation." Well, when the Pope, the man in communication with the all-knowing, all-powerful God, gives infallible word that the Earth is indeed the stationary center of the universe, around which all else revolves, the case was closed. At least it was for the population conditioned to believe in gods and popes. But some people weren't satisfied with myth and wanted to find the truth of the matter.

When the famous scientist and philosopher Galileo Galilei, the first man to study the sky with a telescope, championed the Copernican heliocentric model, his work was added to the Index of Forbidden Books along with the work of Copernicus; and in 1615 he presented himself to Rome for interrogation by the Inquisition. In 1616 he was ordered not to advocate Copernicism as truth. But after his book *Dialogue Concerning the Two Chief World Systems* was published in Florence in 1632 he was again ordered before the inquisition and tried by the Holy Office in 1633 for heresy; the contradiction of accepted church doctrine. As a result, Galileo, a man that knew more than all the church officers combined, was made to recant his position and sentenced to life imprisonment, dying under house arrest in 1642.

Johannes Kepler, a contemporary of Galileo whose product, not surprisingly, was also banned by the church, explained planetary orbits and the attractive force of the sun in works published from 1596 to 1619. Kepler's efforts involving motion and attraction between bodies influenced the famous English physicist Isaac Newton. Like astronomers before them, Kepler and Newton applied the most advanced mathematics available to their work and significantly contributed to the field of mathematics themselves, notably in the field of calculus which Newton is credited with introducing. Newton helped prove Kepler's rules of orbital motion and further described the attractive force between bodies that he called gravity, even demonstrating its universal effect. With that revelation objects no longer simply fell down, but were attracted to other objects.

As technological advancements continued to add to man's ability to see farther and with more

precision, the astronomical community was finally able to apply the concept of parallax to measure star distance in 1838. After almost two thousand years, the proof of stellar parallax predicted by heliocentric models was observable with the aid of telescopes. Today, powerful telescopes bring phenomena billions of light-years away into focus.

Light reflected from objects all around allows man to distinguish shapes, textures and colors; but light can tell so much more. When light passes through a prism it spreads into different color bands like a rainbow. But not all bands of the color spectrum are present. When light from space is compared with charts produced by the heating of known elements it can be determined what element produced the sample light. Further study of the light can help identify the temperature, size, age, distance and even relative motion of the star or other object that created it.

Considering that visible light is but one source of astronomical information, other phenomena also provide valuable clues to the workings of the universe. Scientists study many forms of space born energy, including all the regions of the electromagnetic spectrum from radio waves to gamma rays, to aid in determining such matters as distance, motion and composition of celestial bodies. Though all of the astronomical study and effort isn't without error and contested theories, what shouldn't be doubted is the enormous magnitude of the universe.

It's with good reason people look deep into the night sky and marvel at their own insignificance, gazing upon the splendor and vastness of space knowing they'll never touch its wonders or travel its reaches. The scale of the universe is so great that this big, beautiful world with its deep, vast oceans, great deserts, huge ice sheets and majestic mountains is smaller than the persistent cyclonic storm called the great red spot in Jupiter's atmosphere, and that disturbance is about half as large as it was a hundred years ago. Jupiter itself is 317 times more massive than Earth.

As massive as Jupiter is, the sun is the dominant body of its namesake system; containing more than 99% of the matter in the solar system and being more than a million times larger than Earth. As a main sequence star, meaning it's in the long hydrogen fusion stage of its life cycle, it radiates approximately four million tons of matter into space every second as light and other energy. Given its awesome mass and prolific radiation, the sun is estimated to be about half way through a 10 billion year life span, roughly 133 million times as long as the life of a modern person. Even though some of the stars seen flickering in the night sky are larger than the sun, they're but tiny specks of light in the vast, cold, black sea of space.

The sun's light travels approximately 93 million miles to Earth (the distance varies due to our planet's slightly elliptical orbit) in a little over 8 minutes at about 186,000 miles per second. In little more than the time it takes the fastest human to run 100 meters light travels almost 2 million miles. A light-year, the distance light travels through space in a year, is about 5,879,000,000,000 (almost 6 trillion) miles. Even at such astonishing speed the faint light of Proxima Centauri, a red dwarf and the nearest star to our sun, takes more than four years to reach Earth.

Proxima Centauri and the other stars of the constellation Centaurus, and all of the stars visible to our unaided eyes belong to our local galaxy, the Milky Way, along with hundreds of billions more stars. The Milky Way is believed to span a distance of 80,000 – 100,000 light-years. And this massive conglomeration of nebulae, stars and their planetary systems, and a possible black hole, and various other bodies and matter, is but one of countless such galaxies. Scientists estimate that the universe thus far observed is 28 billion light-years across. But, regardless of the accuracy of such measurements, people will always be left asking what's beyond? With no limit to space, any exercise to quantify the bodies or distance or scale of space is an exercise in futility. What is infinite cannot be measured. And, conversely, what can be measured, like a lifespan, is limited.

For all of the apparent vast, cold, nothingness; space is animated with motion and energy. Even that which seems void, such as the space between planets, isn't entirely empty. Certainly, such space contains passing light and other energy, and possibly matter too faint to detect, through which gravitational and magnetic forces might act. Some areas of space are occupied by clouds of matter,

similar to clouds of water vapor in the sky.

Like water molecules combining and eventually forming raindrops, matter as fine as gas and dust accrete, or coalesce, in gigantic debris clouds to form objects of increasing mass. While the initial attraction may be electrical attraction on a molecular scale, gravitational pull increases as objects grow larger. As more distant matter and objects are attracted to the growing mass, gravity squeezes the internal matter, deforming and compacting it, and generating frictional heat to which may be added heat from meteor impacts. As objects reach the size of large asteroids and small moons, internal temperatures and pressures can become great enough to plasticize the aggregate matter into a spherical shape with the appearance of a dwarf planet.

For some of the largest bodies, internal pressure becomes so great that atoms in the molten core begin to fuse and trigger an expanding nuclear reaction, giving birth to a star – a great ball of luminous plasma. As stars radiate energy by fusing elements into heavier elements, they eventually reach a point where they don't have enough heat and pressure to fuse the newer, heavier elements. Some of those heavy elements, like iron, are very stable and require much greater energy to fuse together to form even heavier elements.

When the nuclear fusion reaction fades it's believed that some stars slowly burn out, while in more massive stars the force of gravity is believed to overwhelm the declining expansive forces of heat and radiation causing an implosion with accompanying shockwaves so violent they cause supernova explosions in which star matter is ejected into space. Eventually much of the matter that coalesced from the debris cloud to first form the star is returned to space through radiation or explosive force to possibly contribute to another object in the circle of cosmic life.

Astronomers and physicists wonder at the incredible forces necessary to manifest such spectacular phenomena as supernova, quasars and even black holes. Ironically, all the great bodies and massive objects of the known universe are made of tiny subatomic particles too small to see with even our most advanced technology. And all of the incredible force and energy produced by the largest, brightest stars, exploding supernova, and colliding galaxies derives from the same invisible forces of attraction and repulsion of those tiny particles. Though the variety of sub-atomic particles responsible for phenomenal cosmic power and enormous size may be quite limited, the variety of the universe is born of differing arrangements of those parts, with every combination possessing a different quality; much in the same way that different combinations of a few simple elements gives such phenomenal characteristics to life.

Can the same silent force of gravity that binds objects to Earth and holds planets in orbit grow to such incredible power that entire galaxies are pulled into black holes where even light can't escape? And could that power of contraction concentrate the matter of the known universe in one compact ball of matter so dense Earth would be pressed to the size of a pea or even a grain of sand? And could that ultramass be triggered to suddenly, somehow, overcome the squeeze of gravity in a big bang that expands and redistributes matter through space?

Those questions make for interesting speculative discussion, the answers to which are far from being understood, as forces are still a great mystery. Surprisingly, energy, or force, gives matter its form. For, what appears solid actually isn't; as even a heavy metal such as lead, a pure element, is made of those tiny particles called atoms that are said to be mostly empty space, with the radius of the electron orbit estimated to be about 10,000 times as wide as the nucleus of an atom. Furthermore, the electrons, protons, and neutrons appear to be comprised of smaller particles which themselves may not be solid.

Maybe one day people will see the smallest particles and be able to determine how much matter is the illusion of force. If subatomic particles are also hollow or partially hollow is it conceivable that the smallest, seemingly indivisible particle is nothing more than opposing forces at equilibrium which give the appearance of solid matter? Knowing the answer to such questions would have dramatic implications. However, man may never know the mechanism of invisible forces and scores of other

mysteries, and admitting what one doesn't know can be as important as what one does know.

Mother Earth

Radiometric dating indicates the solar system formed approximately 4.6 billion years ago. However, long after a massive debris cloud gradually coalesced into the sun and planets, the compacting Earth was very far from being hospitable to life. As the sun grew in size and energy output, Earth was being pummeled by meteors that added to immense heat from internal friction. It's said that molten lava covered the surface of young Earth for many millions of years in the forming stage.

Eventually the Hades-like surface of the evolving Earth cooled and water accumulated on the surface. Though wind and radiation may have been extreme, and the atmosphere may have lacked significant oxygen, conditions for life were improving. With abundant elements and water warmed by the sun, the stage was set for an amazing odyssey of chemical development, that would one day produce the only known meaning in our limited observance of the universe. The tremendous variety in the world today illustrates the myriad of possible atomic, molecular, compound, mixture and environmental combinations that shape elaborate and very different forms from the same basic building blocks.

A simplified view of atomic structure is represented by a nucleus of protons and neutrons that's orbited by electrons. A negative charge of electrons and positive charge of protons is reportedly responsible for attraction and repulsion among atoms. Hydrogen, the lightest element, usually consists of one proton orbited by one electron. Occasionally the proton is joined in the hydrogen nucleus by one or two neutrons, and those isotopes of hydrogen are known as deuterium and tritium respectively.

And hydrogen, the simplest element is also believed to be the most abundant element in the universe, just as it's very abundant on Earth, though mostly in the form of compounds with other elements. While people are familiar with the characteristics of gaseous hydrogen at room temperature and atmospheric pressure, it can also take the form of metal in low temperature and high pressure environments, like that believed to exist within the giant gas planet Jupiter, for example.

The formation of water molecules provide a simple example of how atoms, such as hydrogen and oxygen, combine to form molecules and release energy at the same time. Two molecules of hydrogen, consisting of two atoms each, combine with one molecule of oxygen, also containing two atoms, to form two molecules of water, with each molecule consisting of two hydrogen atoms attached to one oxygen atom. When hydrogen and oxygen atoms bond they fit together in less space than they occupied separately, making compact molecules that weigh more than oxygen or hydrogen, and releasing excess energy from smaller electron orbits as heat. The liberated energy is actually so significant that the combination of hydrogen and oxygen is used as rocket fuel.

Going back in history, some societies actually believed that fire was alive. They saw that fire did work and that it transformed matter; both the matter of its fuel source and substances affected by the heat energy and smoke it released. They also saw the birth and death of fire as it sparked to life and when it was extinguished.

At the time it wasn't understood that what they were witnessing was a chemical reaction; the rapid oxidation of a fuel substance resulting in heat, light and chemical compounds of drastically altered property. Oxidation and reduction: common transformations that result in change of electric charge, affect many kinds of substances, and can occur with many substances, such as iron in the process is known as rust. And in providing our own internal energy and growth the processes are known as respiration and metabolism.

While humans are dependent on free oxygen in the air to combine with fuel molecules like glucose and amino acids to release energy, some life forms, such as bacteria and yeast utilize a less efficient metabolism that, although depending on oxygen containing compounds to break down, doesn't require the input of free oxygen. Despite the amazing complexity of modern animals like humans, and actually owing to that complexity, animals are utterly dependent on a great number of

environmental conditions.

As illustrated by the story of Joshua earlier in this book, people can't survive for more than a few minutes without breathing free oxygen – though some exceptional individuals can hold their breath for considerably longer. Man's persistent reliance on oxygen, a simple gas essential to some highly complex life functions, demonstrates both man's basic chemical nature and the fantastic realities of material animation known as chemistry. Common elements like oxygen are found in astounding numbers of combinations that give form and substance to the world.

Carbon, like oxygen, is another element vitally important to life, and it's believed to appear in more compounds than any other element on Earth, with nearly 10 million combinations. Carbon containing compounds are so prevalent, and carbon is so versatile, that it's found in all known living things, giving rise to the expression "carbon-based life."

Hydrogen, added to oxygen and carbon combine to form many types of biological compounds including sugar, cellulose, lignin, chitin, alcohol, fat and ester. Added to those elements, nitrogen allows formation of alkaloids; and sulfur, combined with hydrogen, oxygen, carbon and nitrogen can create amino acids and proteins. Deoxyribonucleic acid (DNA) and ribonucleic acid (RNA); the complicated genetic codes for reproducing organisms; consist of only phosphorous, sulfur, nitrogen, carbon, oxygen and hydrogen. Together, these compounds are some of the essential substances of living organisms.

Carbon not only occurs in a huge variety of combinations with other elements, it also represents how environmental conditions affect substance formation, with pure carbon appearing in such diverse forms as graphite and diamonds. Graphite conducts electricity and is the soft gray/black substance used as "lead" in pencils. While diamond, in striking contrast, is brilliantly clear, doesn't conduct electricity, and is the hardest known natural substance.

And that dramatic difference is due to the high temperatures and pressures deep underground that transform the loose mass structure of graphite into a dense cubic structure that provides both exceptional hardness and the fascinating ability to pass light. Though natural diamonds are rare and quite expensive relative to graphite and coal, today diamonds are made much more abundant through synthetic mass production; and some mature star cores are even thought by some to be solid diamond. In fact, the high quality and abundance of diamonds produced in modern facilities is causing the mystique of rarity so long prized by the public to slowly lose its luster; an environmentally beneficial side effect.

For all of the elemental potential it possessed, however, young Earth was vastly different than what we're familiar with today. The planet looked barren, with a lonely quiet, save for the whistle of wind, splash of water and other elemental noises. For a long time rocks lay plain and dull, splashed by sterile waters. Though like its neighbors, barren Earth had yet to give birth to life, it did have amazing potential. There was tremendous potential for wondrous, new life. In the water and the soil and the sunlight there was unusual possibility.

Like jigsaw puzzles being pulled together by invisible forces, elements formed various combinations through internal attractions, with the aid of external stimuli; and as individual combinations produced or consumed energy at the molecular level they also made possible a growing range of alternative combinations. And like falling dominoes, particular events triggered further actions in chain reactions of growing duration. Action at the molecular level occurring constantly inside animate beings work together like cogs in extremely complex machines to enable the activity of life. But even when chemical combinations and reactions produce large amounts of energy or perform other substantial resource conversions, they may not produce repeatable or controlled results. Many action sequences "play out" like a dying fire when the necessary combinations of inputs and circumstances become unbalanced, but certain complex molecular sequences arrange to form circular systems that result in consistent sustainable actions or production based on persistent resource availability.

Thank You for previewing this eBook

You can read the full version of this eBook in different formats:

- HTML (Free /Available to everyone)
- PDF / TXT (Available to V.I.P. members. Free Standard members can access up to 5 PDF/TXT eBooks per month each month)
- Epub & Mobipocket (Exclusive to V.I.P. members)

To download this full book, simply select the format you desire below

