CREATION AND CREATION MYTHS

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Abstract

A survey of creation and flood myths throughout the world was completed, finding that most contain a basic set of themes that indicate they all had their origin in a set of actual historical events. It was also concluded that we have more knowledge and understanding of the Hebrew creation account in Genesis than any other and it stands in stark contrast to all others. Because the source of most creation myths was oral transmission, many were likely corrupted yet maintained the basic elements which lends credence to the position that most all creation myths are based on a set of historical events which occurred early in the history of humankind and which were embellished and modified as they were passed from generation to generation.

Introduction

A common concern about teaching creationism in the public schools relates to the perception that numerous "creation myths" exist, and if the Judeo-Christian version is taught, the Babylonian, Syrian, American Indian and myriads of other creation myths should also be required. None of these myths, it is often argued, are based on "scientific" evidence and they are all scientifically inaccurate. Others conclude that they should be taught, but only in appropriate classes, such as social studies. Even here, they should be presented only as ancient stories void of factual content. Clark's (1981, p. 8) statement is typical of this position:

> If creationists merely desire to have both positions, religious and scientific, presented, they must in order to avoid hypocrisy insist that American Indian, Hindu, Buddhist, and all other religious concepts regarding the origin of life are presented as well. They do not. They believe their concept constitutes divine truth. Evolution is a theory, nothing more. Its adherents do not claim the mantle of divine truth. This is the crux of the matter.

This conclusion is extremely superficial. Although almost every culture has a creation myth, most all are basically variations of the core theme of the creation story found in Genesis. In Freund's (1965, p. 6) words all of the "origin myths, though from scattered regions, have haunting similarities." Several researchers have concluded that the source of all creation myths, or what Sproul calls *primal myths,* reflect a common human experience or some actual historical event (Van Over, 1980; Sproul, 1979; Colum, 1930). If their origin were from a single early source, oral transmission, time and local cultural circumstances would have embellished or modified them. We would therefore expect that the details in the creation myths would vary, but that the basic outline would be similar or, at the least, almost all of the stories would have common elements. Conversely, the Genesis account, partly due to what Hasel (1974) calls its "antimythical polemic," stands in stark contrast to most every one of the others (Guerber, 1986). Even evolution, what Fahs and Spoerl (1960, p. 53) call "the newest of all the stories of the beginnings of life" is classified as a "creation myth" by those who study the field of primal myths. It is, though, in contrast to most all of the others, in that it is a story that does not involve outside intelligence.

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The Problem of Similarity

Van Over, a leading "creation myth" researcher who refers to this type of narrative as "sun songs," concludes, "The surprising and perplexing fact is that the *basic* themes for [creation] myths in widely different geographical areas are strikingly similar" (1980, p. 10). Furthermore, these basic themes are all contained in the outline found in the second chapter of Genesis. This similarity has intrigued scholars or years (Leach, 1956). Typical is an analysis of 300 North American Indian creation myths which found them all "remarkably similar" (Rooth, 1957). Variations existed according to culture and other factors, but a few basic themes were commonly found in virtually all of them. Another extensive analysis of ancient African creation myths by Mbiti concluded that:

> Over the whole of Africa *creation* is the most widely acknowledged work of God. This concept is expressed . . . [in the teaching] that God created all things, through giving Him the name of Creator (or Molder, or Maker), and through addressing Him in prayer and invocations as the Creator. We have abundant examples of what African peoples say concerning the creative activity of God, and a few of these will suffice here.
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> The Akan title, *Borebore,* given to God means "Excavator, Hewer, Carver, Creator, Originator, Inventor, Architect," and the people hold firmly that it was God alone Who created the world. The universe is described as having its architectural origin and form from God, Who is there pictured as its Artist-in-Chief. Of the four most known Akamba names for God two mean "Creator" or "Maker" and "Cleaver" The second of these *(Mwatuangi),* is taken from the human act of slicing meat with a knife or splitting wood with an axe. So God first creates, originates, molds and makes; then He gives shape, supplies details and adds distinctiveness and character (1970, p. 50).

Pospisil, in his study of the Kapauku populations of New Guinea, found that they believe that:

> beyond the. . . sky exists another world that may be similar to ours, the abode of Ugatame, the Creator . . . Ugatame is omniscient, omnipotent, and omnipresent, credited with the creation of all things and with having determined all events. Strangely enough, however, he is believed not to exist himself [in the way we do] . . . "But how can

> he not exist when he created all existence?" Obviously Ugatame is beyond existence, because to the Kapauku all that exists must be of phenomenal nature; one must be able to either see, hear, smell, taste, or feel it. But Creator is beyond this phenomenal dimension, because of the simple reason that he created it. Because he is, so to speak, in the fifth dimension and is not of phenomenal nature, he is able to be omnipresent (1963, pp. 82-85).

As Van Over (1980, p. 11) queries, "Why such similarity of mythic ideas and images throughout these distant cultures?" The renowned Claude Levi-Strauss is among the many scholars who have puzzled over this phenomenon. After years of studying these myths, he concluded that there exists an "astounding similarity between myths collected in widely different regions [of the world]" (1963, p. 208). In Kluckhohn's words, creation myths throughout the world "resemble one another to an extraordinary degree" (1962, p. 53; see also Levi-Strauss, 1965, p. 83 and Kluckhohn, 1958). That the creation myths are remarkably similar is not debated; why they are so alike is the concern: "The scholarly argument [of why this similarity exists] has raged for decades and it continues to this day. No definite answer seems yet to have developed, but theories abound" (Van Over, 1980, p. 11).

One theory is that the source of all of the creation myths is from an original one which developed by various gratuitous factors in a very ancient culture (the first humans?). Another position is that, the origin of these myths is from actual historical events. Whether the myths were originally created by different groups in various places of the world and their similarity was because they were influenced by common psychological human needs or had their origin from an actual set of events, time would embellish, modify, romanticize, and tailor the original story to local needs, customs and traditions. Periodic influences from outside of the culture also likely occurred. For example, in China:

> Most, if not all, mythologies include an account of the creation of the world and its inhabitants, both human and animal . . . what we have is rudimentary and gives every appearance of being the product of scholarly compilers who were, generally, concerned to recount cosmogonies as parables. . . . The most extensive account of the creation, involving a giant called Phan-ku, has survived only in texts from the third to sixth centuries A.D. . . . There are, on the other hand, accounts of . . . creation which . . . are older than the Phan-ku myth and seem to belong to an original Chinese tradition (Christie, 1968, pp. 46-47).

The tendency for time and culture to embellish or modify affects most other historical accounts, and even themes and concepts, indicating that their source is from actual historical events or common human needs. One example, the *serpent myth* (see Gen. 3:1-15), was researched by Mundkur who concluded:

> The serpent commands an extraordinary degree of attention as a religious symbol in practically every society throughout history. Serpents impel . . . loathing. . . because of primordial sensitivities rooted in the [past]. . . . Unlike almost all other animals, the serpent provokes certain patterns of intuitive, irrational responses latent in human and non-human primates alike (1982, p. 1).

The serpent, as pictured in Genesis 3:1-4, 14-15, part of which says:

> Now the serpent was more subtle than any beast of the field which the Lord God had made. And he said unto the woman, Yea, hath God said, Ye shall not eat of every tree of the garden? And the woman said unto the serpent, "We may eat of the fruit of the trees of the garden: But of the fruit of the tree which is in the midst of the garden, God hath said, Ye shall not eat of it, neither shall ye touch it, lest ye die." And the serpent said unto the woman, "Ye shall not surely die." And the Lord God said unto the serpent, "Because thou hast done this, thou art cursed . . . upon thy belly shalt thou go, and dust shalt thou eat all the days of thy life, and I will put enmity between thee and the woman, and between thy seed and her seed; it shall bruise thy head, and thou shalt bruise his heel."

A study of serpent myths throughout the world lends support to the view that the events described in Genesis could have been their source. A major parallel was found in Rooth's study of 300 North American creation myths: "there is one type of creation that is found all over North America which emphatically asserts that there are two creators, or rather one creator and a companion" (1957, p. 507). These two creators are pictured as father-son or two gods, uncle and nephew for example. The Christian teaching is that God originated the creation and His son is the actual creator (John 1:1, 16). Further, the Hebrew writer in Genesis 1 refers to the creator in the plural form: "let us make man in *our* image." These striking similarities could hardly occur by chance.

The Problem of Meaning and Ancient Creation Myths

Of the major difficulties in understanding creation myths is answering the question "to what degree did the ancients understand them as literal?" If archeologists 10,000 years from now unearthed certain contemporary American civilization remains, they could easily assume, based only on this evidence, that Americans believed in a literal creature called Santa Claus or, flying reindeer, tooth fairies, and odd white men who wore the label, "Mr. Clean." Few persons today believe that the earth has four corners, the sun rises or sets, automobiles are "self movers," *(auto* = self, *mobile* = move), motion-pictures as pictures that move, or cameras "take" a picture (after the picture is "taken," it is obviously still there). No one, except possibly young children, interprets these common vivid figures of speech literally. We know that expressions as "I could die of embarrassment" or "I could just kill him for that" are not literal. Some future generation may have

a field day understanding a TV commercial which proclaims "My husband got grease on his pants, and I really could have killed him. But instead I used new Dynamo." Could some future anthropologist conclude that our "primitive values" equate life with grease stains?

These few examples illustrate the difficulty of understanding a culture from a few isolated artifacts, especially words (Woodcock, 1976). There likewise exists some evidence that many of the ancients did not literally believe that Zeus caused rain, the sun was a god, or any of the other myths that we enjoy today were literally true (Ellis, 1982; Sebeok, 1968). Our new understanding of the ancients has altered our picture of them drastically (Diamond, 1964). Steindl-Rast summarizes this new view as follows:

> As we study the world view of ancient peoples, going as far back as we can in history and prehistory, the picture of earliest religion thus revealed stands in sharp contrast to the . . . notions anthropologists had in the eighteenth and nineteenth centuries. They simply took it for granted that all religious notions and the human mind in general must have developed step by step in close parallel to physiological evolution from a "savage" stage to ever greater refinement. Within our century, however, a wealth of objective material has been accumulated which proves that the most ancient cultural stratum to which we can penetrate by anthropological methods is . . . by no means "savage" (1977, p. 7).

Of course, past generations believed much which we today recognize as wrong, but mankind has always loved stories, and most of the ancient myths are just this. And unless a compelling reason exists not to, myths should be viewed as stories to both entertain and, more importantly, to teach a lesson about life (Ohmann, 1962; Altizer, et al., 1962). Ellis concludes that:

> If one is acquainted with the nature of myth (even on an elementary level), one is aware that even the ancient peoples who constructed them did not subscribe to a "literal" interpretation of them. The truth content of myth was considered to be higher, in a moral or religious sense, than merely a description of physical reality. For anyone in the twentieth century to ascribe "literal" reality to these ancient myths is almost too comical in itself to need further ridicule (1982, p. 12).

Plato's writings, Aesop's fables and other literary works clearly demonstrate that the ancients had a tremendous amount of insight into life and living and, indeed, if the reader could understand Greek, he or she probably would feel at home in the company of the likes of Aesop, Plato, Aristotle and Socrates—and would no doubt learn much from them (Harrison, 1933). An English teacher was fired because he insisted that his students read and discuss the works of Plato and Aristotle, illustrating this. His 20 years of experience and high recommendation from his students not withstanding, the school board insisted that his high school students simply could not understand the profound wisdom elucidated by these ancient Greek philosophers—and the courts agreed (Bloom, 1987). Did these philosophers accept beliefs or ideas that historians today claim were in vogue at the time, such as the assumption that stones fall to the ground because they're "returning home" or water floats up into the heavens when it becomes steam because it is also returning home (the natural home of water is the heaven, of stones, the earth)? We do not know exactly how they understood these possibly poetic explanations, but they, as we clearly do today, used much metaphor and symbolism (Sproul, 1979). Most historians conclude that modern humans have no monopoly on wisdom, and that the greatest of the ancient scientists were "considering the handicaps under which they worked, fully the equals of any in our own time" (Jones, 1972, p. 53: Kramer, 1961). To assimilate into our world, the ancients would have to adapt to our technology, but not necessarily to our "worldly wisdom." In the words of Levi-Strauss viewing myths as only naive attempts to explain reality is incorrect:

> Some claim that human societies merely express, through their mythology, fundamental feelings common to the whole of mankind, such as love, hate, or revenge or that they try to provide some kind of explanations for phenomena which they cannot otherwise understand—astronomical, meteorological, and the like. But why should these societies do it in such elaborate and devious ways, when all of them are also acquainted with empirical explanations? (1963, p. 207)

Given evolutionary assumptions, one would assume that the farther back in time one travels, the more "primitive," less sophisticated and more foolish human beliefs about the natural world become. Where this is true, it is only because the accumulation of knowledge gives each generation a clear advantage over previous ones. And an ancient Greek or Roman would feel fully at home in our culture—if he or she were raised in it. No evidence exists of *brain* or *human intelligence* evolution since Catal Huyuk (Chiera, 1938). The benefits of accumulated knowledge of past generations, an advantage that has been especially true during the past several centuries in the west, tends to distort our evaluation of the ancients. The ancients had a tremendous amount of insight and knowledge, and we are selling them short in viewing their creation myths as the product of "ignorance" (Steindl-Rast, 1977). Chiera (1938, p. 110) notes that the Babylonian and Assyrian "Creation stories [were] ancient cosmogonies [with] sophisticated philosophical substratum." As Levi-Strauss (1963, p. 230) summarizes:

> Prevalent attempts to explain alleged differences between the so-called primitive mind and scientific thought have resorted to qualitative differences between the working processes of the mind in both cases, while assuming that the entities which they were studying remained very much the same . . . the kind of logic in mythological thought are as rigorous as that of modern science, . . . the

difference lies, not in the quality of the intellectual process, but in the nature of things to which it is applied. This is well in agreement with the situation known to prevail in the field of technology: What makes a steel axe superior to a stone axe is not that the first one is better-made . . . but steel is quite different from stone. In the same way . . . man has always been thinking equally well; the improvement lies, not in an alleged progress of man's mind, but in the discovery of new areas to which it may apply its unchanged and unchanging powers.

This increase in knowledge notwithstanding, many things exist about which we remain vastly ignorant. And there are many areas of knowledge which we are no closer to solving today than were the ancients. Speculations relative to the origin and establishment of the universe abound, and a study of many of the time-tested truths of the ancients helps us to realize that we have been meandering around the truth, and in some ways they were closer to it (Glotz, 1967; Carcopino, 1940). The solutions to major problems are sometimes quite simple, and seem to elude those who mysticize and complicate them (Bergman, 1992). Sometimes a child holds the answer to problems that adults insist on believing are manifoldly complex. A father asked his daughter why she loved him, and she replied, "Because you loved me first," an answer that conveyed more insight into human behavior and motivation than it may at first appear.

Life has not changed in many important ways since humans have been on this planet. Eating, sleeping, working, loving and hurting, aside from the influence of cultural variations, have all been much the same since recorded history. The ancient cities, we are now beginning to realize, were far more complex than we had assumed only a few years ago (Steind-Rast, 1977). Except for lacking modern gadgetry, they were in many ways identical to modern cities Hamblin, 1973).

The problem of understanding symbolism likewise exists in interpreting the Hebrew creation account found in the first few chapters of Genesis. We have a significant advantage in understanding the ancient Hebrew and Greek words because compared to the mythology of dead cultures the former is still a living culture (Graves and Patai, 1983). Further, thousands of ancient extant writings exist which discuss the various nuances and meaning of words that can be used to aid in understanding the biblical manuscripts. This is not true for many of the other myths. Many are far removed from Western civilization and culture, and in many cases their meaning was long ago lost in history. The Babylonian and many other cultures are dead and no wealth of information is available to help us understand them to the extent that exists for the Hebrew and early Christian culture and beliefs.

With Genesis, we also have the advantage that the extant manuscripts are far more complete and, as the record is an historical outline, it can be used to direct research. It has also been more extensively studied than any other ancient manuscript, enabling us to draw conclusions about the meaning of the Genesis account with far more assurance than the creation myths from other cultures. Genesis was not intended to be primarily a didactic story, but a matter-of-fact brief summary of the creation of the heavens and earth. Asimov (1981, p. 3) concluded that:

> The biblical writers . . . labored to produce something that was as reasonable and as useful as possible. In doing so, they succeeded wonderfully. There is no version of primeval history, preceding the discoveries of modern science, that is as rational and as inspiring as that of the first eleven chapters of the book of Genesis.

Further, the creation account was both validated and explained by Christ, the Apostles and the early church, and they did not live in a "primitive" civilization but in cities much like our own. Nonetheless, as is true of all creation myths, Genesis does use figures of speech and allegories. Its reference to the earth's four corners obviously does not refer to a physical, four-comer structure. The writer utilized an expression that was common at the time, and is still so today. The only problem is to determine which statements are literal and which are symbolic (Morris, 1976). Unfortunately, in order to reduce the credibility of the biblical record many critics try to literalize portions which are obviously not meant to be such, even assuming that certain allusions refer to ancient myths, such as claiming that the Genesis "firmament" is the metal dome that some ancients believed encircled the earth (Asimov, 1981).

The Epic of Gilgamesh

The most famous of all non-biblical creation myths, the *Epic of Gilgamesh* was not written to explain the story of creation but to convey the tragedy of life (Christie, 1968). Yet, its account of the Flood is roughly parallel to the biblical story of Noah and the Ark and many details are remarkably similar (Hoberman, 1983; Heidel, 1963). Sandars (1978, p. 7) summarized the story as follows:

> Gilgamesh is . . . the first tragic [non-biblical] hero of whom anything is known and [is about] . . . man in his search for . . . understanding, and of this search the conclusion must be tragic. It is perhaps surprising that anything so old as a story of the third millennium B.C. should still have power to move, and still attract readers in the twentieth century A.D., and yet it does. The narrative is incomplete and may remain so; nevertheless, it is today the first surviving epic poem from any period until the appearance of Homer's Iliad: and it is immeasurably older.

The Gilgamesh epic, although basically a tragic love story, is today most famous for its flood account (Gordon, 1965). The modern re-discovery of this account by George Smith stirred international attention. Smith, of the Society of Biblical Archeology, reported in 1872 that he located an "unknown" account of the flood among the Assyrian tablets in the British Museum (Hasel 1974). He soon published the *Chaldean Account of the Deluge* based on tablets that were very incomplete, encouraging a search for more tablets (Heidel, 1951). Smith later found many of the missing lines of the flood description which was then, and still is today, "the most complete and best preserved part of the whole Epic" (Sandars, 1978, p. 10).

Although it is often claimed that the biblical account of the deluge was derived from this Babylonian source,

it is more reasonable to conclude that both accounts came from an older source, possibly one of those that Moses used to write Genesis (Gordon, 1965 p. 50, see also Hasel, 1974; Morris, 1976, pp. 25-26). The Gilgamesh flood narrative is only a small part of the whole story, and is at best a background event of the story. Its inclusion in the Epic was primarily to help elucidate its theme: the struggle to find meaning and purpose in life. Even a cursory reading concludes that it was not meant to be an historical account, although its source was obviously history which was passed down from the survivors of "the great flood." Thus Sandars (1978, p. 40) notes:

> Although the gods play a great part in the epic. . . Gilgamesh appears to have been . . . a secular poem. . . there is no suggestion that it was recited as part of a religious ritual as was the great Babylonian poem of creation, *The Enuma Elish,* though it contained quasi-religious material in the laments over the dead, and in the set pieces of "wisdom." It is a separate narrative, divided into loosely connected episodes covering the most important events in the life of the hero.

In a study of flood legends from all over the world, Strickling concluded "nearly all of them are variations of the theme in the biblical account . . . however, a statistical analysis indicates the purity of the biblical account and reveals evidence of subsequent upheavals having corrupted in varying degrees all other accounts" (1972, p. 152). Among the similarities that Strickling found are in 32 of the flood accounts a favored family was saved, and in 21 survival was due to a boat. He concluded that a correlation exists between the favored family account with the following teachings: 1) survival by boat, 2) a forewarning, 3) one flood only, and 4) preservation of other types of life. The same correspondence with the biblical account is also found in world wide creation accounts.

The Purpose of Creation Myths

Many ancient "creation accounts" are, like the Gilgamesh epic, obviously didactic stories written not primarily to inform the reader of the means of physical creation, but to teach some moral principle via obvious folk hero stories or to instruct about some tradition (Hasel, 1974). In contrast to Genesis, many of the creation myths are written by "philosophers and teachers" and only incidentally refer to creation (Freund, 1965). Their primary purpose is clearly not to discuss origins, and often they only indirectly refer to it as a past event. Many, like *The Epic of Gilgamesh,* are concerned primarily with problems of living and life (Doria, 1976). There is, nonetheless, a strong similarity between most creation myths and Genesis.

Among the aspects of the early history of the world found in Genesis and the flood which also appear in many or most creation stories, are the confusion of tongues at Babel. Syrian, Sumerian, Greek, Babylonian, Chinese, Hindu, Persian and even the Estonian, Irish, American Indian, Toltecs' and Cholulans' creation stories all include this topic. In the Indian tradition the flood causes "Universal destruction" because the world grew "extremely sinful" (Mackenzie, 1987). As regards the great flood, Warshofsky (1977, p. 129) notes:

> With variations, that biblical account of a great, universal flood is part of the mythology and legend of almost every culture on earth. Even people living far from the sea—the Hopi Indians in the American Southwest, the Incas high in the Peruvian Andes-have legends of a great flood . . . covering the tops of the mountains and wiping out virtually all life on earth.

The Five Basic Classes of Creation Myths

Long (1963) has successfully classified creation stories into five basic types, and many individual myths contain elements of two or more of these themes. His grouping is evidence that most creation myths had their origin, although altered in time, from an actual set of events or records.

1. Creation From Nothing. The creator "called forth into being" the creation, and it came into existence totally as a result of His will. Christianity has traditionally taught that creation was from "nothing" or *ex-nihilo* and several Scripture verses support this view. Genesis states six times "and God said . . . and so it was" indicating creation *ex-nihilo* for at least part of the creation or, at some point in time, all physical reality. Steindl-Rast (1977, p. 7) notes:

> Sometimes the way in which this Supreme Being made the world is described in elaborate myths; sometimes only the fact of creation is stated, as when the Baining of New Britain say: "He brought all things into being by inexplicable ways." Frequently the Supreme Being is described as making the world by thinking it [into existence], by a word of command, by singing or by merely wishing it to be. The Wijot in northern California, for example, say: "The Old Man Above did not use earth and sticks to make men. He simply thought, and there they were."

2. Emergence Myths. Usually God creates the material *ex-nihilo,* then He forms or shapes it into useful forms. Humans and other parts of creation thus *emerge* from some other substances or preexisting material. Good examples include the formation of man from the dust of the earth, and of woman from a rib taken from Adam. God, as related in Genesis 1:11-12, also formed all plants from the existing earth (all quotes, unless noted, are from the Goodspeed version);

> Then God said, "Let the earth produce vegetation, seedbearing plants and the various kinds of fruit-trees that bear fruit containing their seed!" And so . . . the earth brought forth vegetation, the various kinds of seedbearing plants and the various kinds of trees that bear fruit containing their seed. And God saw that it was good.

The Scripture often calls God a *potter,* molding an existing substance into something else (Jeremiah 18:1-9). Creation myths commonly describe man's creation in this way. Mbiti (1970, p. 51) concludes that in ancient African creation myths:

> The metaphor of the potter is commonly used to describe God's creative activity. . . . The people hold that "there was nothing before God created

> the world." . . . God created out of nothing, in the original act of creation, though now He may use existing materials to continue His creative activities. This concept of creation *ex nihilo* is also reported among the Nuer, Banyarwanda and Shona, and undoubtedly a careful search . . . is likely to show that there are other peoples that also incorporated it into their cosmologies. . . . The Ila have three names for God by means of which they describe His creative work. They speak of Him as Creator, Molder, and Constructor. The Tiv, who are famed for their woodwork, think of God as the Carpenter Who "carves" the world giving it different forms and shapes. When the Lunda speak of God as "the Father Creator," they place Him on a parental level: He fathered all things, and exercises His fatherly care over them.

Parrinder adds that to the Africans the view of God is:

> As Molder of all, he shaped things, like a woman fashioning pots that she makes out of clay. He put things together and constructed them, like a builder making a house. . . . Some of the names given to God in African ritual, proverbs and myths, show what men think of his character and attributes. He is first of all Creator, Molder, Giver of Breath and Souls, God of Destiny . . . the work of making men was entrusted to Great God and he made human beings from the earth and molded their physical features. But the task of bringing these dummies to life was reserved for the Creator alone (1967, p. 19).

Another element that many myths have in common is that they imply or teach "creation through word or logos" (Doria et al., 1976: xxiii, see also John 1:1, 16) or a situation in which the God or Gods create through *sounds* such as verbal commands, or even coughs, crackles, or hisses. Genesis states that creation came about because God verbally ordered it to occur: "God *stated*, "Let there be, and there was!"

3. Parent Myths and World Separation Myths. In many myths, "mother-father" or "father-son" divisions or a separation of "parents" or something else occurs. Hasel (1974 p. 87) found that "the idea of the creation of heaven and earth by division is common to all ancient Near East cosmogonies" and in myths the world over. A Polynesian myth reads: "Darkness then rested upon the heaven an upon the earth and . . . [light and darkness] still both clung together, for they had not been made apart [yet]." Genesis contains several examples of separation, such as the division of the waters, and of night and day, but they all are, in Hasel's words "antimythical polemics," a simple description of events void of pagan embellishments (1974, p. 88). This is found among other places in Genesis such as 1:3-10, 14-19 which reads:

> Then God said, "Let there be light!" And there was light; and God saw that the light was good. God then separated the light from the darkness. God called the light day and the darkness night. . . .
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> Then God said, "Let there be a firmament in the middle of the water to divide the waters in two!" And so it was. God made the firmament, dividing the waters that were below the firmament from those that were above it; and God called the firmament sky. . . .
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> Then God said, "Let the waters below the sky be gathered into one place so that the dry land may appear!" And so it was. God called the dry land earth, and the gathered waters seas. God saw that it was good. . . .
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> Then God said, "Let there be luminaries in the firmament of the sky to separate day from night; let them serve for signs for fixed times, and for days and years; and let them serve as luminaries in the firmament of the sky to shed light on the earth!"

4. Creation From Chaos or from the Cosmic Egg Myths. These are actually two separate categories which Long (1963) combined. The first is the occurrence of creation from chaos, or producing structure from an undifferentiated material existence. Creation from chaos myths generally stress that creation is the process of forming the earth and living things from an existing chaos or mass of undefined, unstructured elements. From the beginning chaos, order was caused to occur as a result of some activity, force, or process. This is, of course, the theme of Genesis 1:1-2 which teaches that the earth was undifferentiated in the beginning or, as Gen. 1:1 says: "And the earth was without form and void," or in the words of the *Soncino Press Version* "unformed and void [empty]" a term Goodspeed translates "desolate waste." Christie (1968, p. 47) notes, "for the Chinese . . . creation was the act of reducing chaos to order, a theme which persists throughout Chinese thought."

Some of the myths also include the concept of a *Cosmic Egg* (or a raw material such as water or clay) which God created or which already existed, and from which He caused mankind, animals, plants, the earth or some other part of the universe to come. This *Cosmic Egg* concept is similar to that described in Genesis 1:11-13 when it states that God created "seeds," which in turn produced fruit. The production of "Seeds" is obvious in much of the creation account. Genesis 1:20-25 says:

> Then God said, "Let the waters teem with [or produce] . . . living creatures and let birds fly over the earth across the firmament of the sky!" And so it was. God created the great sea-monsters and all the various kinds of living, gliding creatures with which the waters teem, and all the various kinds of winged birds. God saw that it was good, and God blessed them . . .
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> Then God said, "Let the earth bring forth [or produce] the various kinds of living creatures, the various kinds of domestic animals, reptiles, and wild beasts of the earth!" And so it was. God made the various kinds of wild beasts of the earth, the various kinds of domestic animals, and all the various kinds of land reptiles; and God saw that it was good.

Interestingly, the cosmological view currently in usage, the big bang hypothesis (called the "standard model" because of its wide acceptance) postulates a "cosmic egg" from which the entire universe sprang (Lerner, 1991; Silk, 1989; Weinberg, 1977). Christie notes the Chinese myth:

> . . . of the third century A.D. [taught] Chaos was like a hen's egg. At this time neither Earth nor Heaven existed. From this egg, Phan-ku was born. The parts of the egg separated, the heavy elements forming the Earth, and the light, pure ones the sky. These were *yin* and *yang.* The concept of the world egg is not confined to China, nor to that of the primordial being from whom all else is derived. In classical Indian cosmogonies, a world egg occurs which opens to form the heavens from its upper part, earth from its lower [by] Brahma, the creator . . . these parallels . . . the result of direct influences between India and China or represent traditions deriving from a common source (1968, p. 49, 53-54).

5. The last group that Long identifies is the **Earth-Divider Myths** or where a divine being divides the water by bringing the land from the sea, permanently separating the two. Genesis 1:10 says God divided the land and water as follows:

> Let the dry ground appear [out from the sea] and it will sow; and God called the dry ground earth, and the basin of waters he called seas. (Byington Version).

The above outline of myth types illustrates that the essential categories of all creation myths are directly taught, or at least clearly reflected, in Genesis. Further, these concepts appear to have had their origin in a set of events which actually occurred, or from some ancient common source which was transmitted to later generations by the first humans. Adam and Eve, who gave their immediate descendants information which became part of later historical records, parts of which are found today in Genesis. As the descendants of Adam scattered, they would have carried what they remembered (the essential elements) of the history found in Genesis. This history, as it was oral in most cultures for years, would be altered, embellished and changed as society developed. The essential elements, though, have often remained the same. The currently available evidence as reviewed here is consistent with this view (Long, 1963). All of the creation myths appear to be basically derived from the events upon which Genesis is based, and in only a few cases do small remnants of the original story remain. This, though, is not the case with many of the accounts. Genesis contains none of the embellishments common to the others but only the bare outline of historical events (Guerber, 1986). For this reason, it stands in contrast to all of the other creation accounts.

Van Over (1980, pp. 15-16) also notes that, "an enormous number of creation myths . . . involve the sun," and that the "life-giving, regenerative properties of light . . . is almost universally identified with primarily creative forces. Everywhere the sun plays an important, if not a central role . . . [guiding] the dark cosmic chaos that existed before creation." Of course, the Scriptures also often use the word sun and light in this sense, even stating that "God is light" (1 John 1:5 see also Isaiah 2:4, Micah 7:8; John 1:7-9; 3:19; 8:12; 9:5; 12:36; Acts 13:47; 26:18; 26:23 and other verses). The term often refers not only to physical light but also to knowledge and insight. The first act of God after the creation of the heavens and earth noted in Genesis was, "Let there be light" (this was just after it was mentioned "there was darkness over the surface of the deep"). The importance of light (knowledge and wisdom) is likewise reflected in virtually all non-biblical creation stories. This view was expressed by Van Over as follows, "My personal view after studying [creation] myths for many years is that creation myths seem to rise from the depths of the human psyche [or experience]" and this explains their similarity. Van Over adds that:

> They clearly carry an intense human desire to shape and structure a confusing and troublesome reality to give meaning and insight where before only shadows reigned. This seems . . . [to be one] impulse that guided the . . . myths, and thus they became a necessary human function, for they give shape and meaning to our lives. They also serve the needs of our age and our personal spirits (1980, p. 11).

The need to understand our origins is manifestly basic to humans, and seeking an answer does not fully explain the similarity of the creation accounts or even the source of this common need and why it is universal.

Summary

A major problem in understanding the non-Hebrew creation myths is that many of them are nonsensical and difficult to understand today. This does not mean that the non-Hebrew creation myths were not understandable at one time, only that the difficulties in translation and understanding the meaning of the phraseology and symbols used by various ancient cultures must be studied for them to be understood today.

For this reason, specific interpretation of the various non-Genesis creation stories is often fraught with difficulties. Thus, the conclusions of some, such that it is "plain from the evidence of the *Epic* of *Gilgamesh* that the Babylonians were social evolutionists," is unwarranted (Sandars, 1978, p. 31). While similar themes and the basic skeletons make up all creation myths, the Hebrew account stands apart from all others in many other ways (see Doria, 1976). As Hasel summarizes:

> This investigation of . . . the creation account of Gen. 1 in conjunction with a comparison of respective ancient Near Eastern analogues has repeatedly pointed into one direction. . . . With a great many safeguards Gen. 1 implies certain terms and motifs, . . . partly chosen in deliberate contrast to comparable ancient Near Eastern concepts, and uses them with a meaning and emphasis not only consonant with but expressive of the purpose, world-view and understanding of reality as expressed in this Hebrew account of creation . . . the Genesis cosmology represents not only a "complete break" with the ancient Near Eastern mythological cosmologies but represents a parting of the spiritual ways brought about by a conscious and deliberate antimythical polemic which meant an undermining of the prevailing mythological cosmologies (1974, p. 1).

As the Hebrew creation account is only one of many ancient myths, and if one teaches the Judeo-Christian story of creationism, it is argued that the myths of

other cultures should also be taught. It is apparent from our review that a comparative study of creation myths can be—and has shown to be—a beneficial part of the school curriculum (Fahs and Spoerl, 1957, 1960). Research of ancient cultures finds that stories which attempt to explain the existence of humans, animals, plants, the world and the universe "are found in almost every culture in the world, both in the religions of archaic peoples and in the greatest civilization religions" (Long, 1963, p. 19). The universality of creation myths points to a basic psychological need for a *causal* explanation of our world and public schools have an obligation to deal with this need.

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Quote

To say "God is," affirms, in the first place, that man is not a cosmic accident. Life is not a mere fluke, an offshoot of matter. Life, as a matter of fact, is primordial energy, using matter for its own ends, shaping and reshaping it purposefully. Life is a dynamic transformer of the raw materials of this planet. Theism gives life a primary role, especially life in its human manifestation.

The human person occupies a unique place among living forms. He shares some features in common with the other primates, but no other organism can match his capacity for abstract thought. We have the ability to generalize and classify; we are uniquely able to know and understand. And the universe we live in is infinitely intriguing, exciting our curiosity, inviting us to learn and feel the sheer pleasure of knowledge for its own sake.

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PANORAMA NOTES

Underwater "Mudcracks"

Have you ever wondered why there were so many shallow seas in the past? There are hundreds of meters of flat-lying sediments covering hundreds of square kilometers, all deposited in a shallow sea. This is based on environmental indicators, using the uniformitarian principle. For instance, if you find a clam fossil, the rock represents a shallow sea, probably close to the beach. If you find a dinosaur fossil, the rock represents a terrestrial environment. If both a clam and dinosaur fossil are found in close proximity, the dinosaur "obviously" lived at the beach. Environmental analysis is not only deduced from the fossils, but also from the characteristics of the rock. In a Flood model, many of these environmental indicators are meaningless. A dinosaur, as well as terrestrial plants, can just as well be buried in the deep sea.

Mudcracks are a common environmental indicator for subaerial exposure. When they are associated with marine or "lake" sediments, they indicate shallow water and only a brief exposure of the sediments to air. Numerous subaerial shrinkage cracks do not fit into the Flood model. Are there any other mechanisms that form "mudcracks" underwater? Yes, there are at least two mechanisms, one just discovered, which will be discussed later.

Underwater cracking has been shown to be possible from experiments, and many shrinkage cracks in the rocks have been attributed to this mechanism, called synaeresis (Burst, 1965; Plummer and Gostin, 1981). Underwater shrinkage cracks can form by a volumetric decrease in mud caused by either variations in salinity of the depositing medium, sediment compaction, and/or temperature changes. Plummer and Gostin (1981) believe most synaeresis cracks occurred within the sediment and not at the sediment-water interface. Geologists have attempted to apply diagnostic criteria to differentiate between subaerial and underwater shrinkage cracks. Although their warning has been little heeded, Plummer and Gostin (1981, p. 1153) assert that this differentiation is difficult:

> However, because of the many possible combinations of interplay between the factors influencing crack morphology under conditions of both desiccation and synaeresis, an overlap in crack morphology occurs between the two groups.

Astin and Rogers (1991), on the other hand, claim that no cracks in the rocks of the earth can be shown positively to have been formed underwater. They criticize experiments for using conditions not reproducible in nature. The cracks formed experimentally have been thin with only rare polygons. Underwater shrinkage cracks claimed from the rock record are mostly linear and thin with rare polygons. They come from environments where large salinity fluctuations are possible, for instance on a tidal flat. For their example, Astin and Rogers (1991) analyze lake sediments (a uniformitarian environmental interpretation) from the Devonian Period in the uniformitarian time scale. These "lake sediments" are 1000 meters thick in a basin at least 550 kilometers long located in northern Scotland. Linear and polygonal shrinkage cracks are numerous on about 30 percent of the "lake sediments" beds. The linear cracks have been assumed to be underwater shrinkage cracks while the polygons have been assigned a subaerial desiccation origin by previous investigators. But, since the cross-sectional shape of both the linear and polygonal shrinkage cracks are similar, Astin and Rogers contend that even the linear shrinkage cracks are subaerial desiccation cracks. They claim cracks were preserved by periodic blowing sand over a dried lake bed.

Trewin (1992), although assuming that the polygons are subaerial shrinkage cracks, presents evidence that Astin and Rogers' mechanism for the linear cracks is unrealistic, calling for hundreds of large changes from deep water to a partially dried lake. He prefers a mechanism of salinity changes for the linear cracks. Deep water on the order of tens of meters is inferred from laminated fish beds, although Astin and Rogers (1992) find polygons associated with these fish beds. Trewin (1992) claims there is no evidence the mud dried; a cohesive mud layer was required since there are no soft sediment loading features. The uniform grain size, normal grading in 30 percent of the sand layers, and the composition of the sand supports a subaqueous mechanism for the sand above shrinkage cracks. This sand is the same as the sand in the fish beds of the ancient "lake." Many of the cracks in the fish beds also thin upward, indicating the cracks formed within the sediment. All this evidence indicates that both the linear and the polygonal shrinkage cracks may have formed underwater.

Now, a third mechanism for forming shrinkage cracks has been suggested, for at least various types of carbonate mud. The resulting cracks are called diastasis cracks, which are formed by differential mechanical behavior within inter-layered sediments of different cohesive strengths (Cowan and James, 1992). The cracks form a complete array of shrinkage cracks from linear forms to polygons that look like subaerial desiccation cracks. Several lines of evidence, illustrated from thin sections, indicate the cracks were formed at either the sediment-water interface or within the sediment. Some of this evidence is ripped up, cracked blocks of mud in the overlying sediment and the disruption of the over lying sediment above a crack. Cowan and James (1992, p. 1116) state the implications of their research: "There may be many fewer ancient peritidal carbonates than we think."

Cowan and James (1992, p. 1109) state that previous workers automatically interpreted the cracked sediments as a peritidal environment, even though the sediments contain none of the important peritidal features. In other words, the finding of shrinkage cracks, although their origins is controversial, automatically determines a peritidal environment. One would think investigators would look for further evidence of tidal features, but they apparently do not. Is it typical for geologists to rely on a few questionable features and to ignore evidence to the contrary when making environmental interpretations?

So there are now two mechanisms for forming shrinkage cracks: either at the sediment-water interface or within the sediments. Many geologists have been skeptical of synaeresis cracks because the experimentally produced cracks are poor analogs of cracks in the rocks. However, with time polygons do form from linear shrinkage cracks in these experiments. Although many geologists believe experiments are unrealistic, the Genesis Flood can provide a mechanism for numerous submarine shrinkage cracks. Rapid sedimentation and compaction would cause diastasis cracks. Synaeresis cracks could form by expulsion of porewater in mud and by rapid changes in salinity and temperature of the water. Presumed desiccation cracks in sediment cores taken from the Mediterranean Sea have been used to support the idea that the Mediterranean was once a desert. However, Dietz and Woodhouse (1988) claim that similar shrinkage cracks have been found by divers at the bottom of Lake Michigan. "Mudcracks" very likely are not subaerial: they can form rapidly underwater or within the sediments during the Flood.

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Introduction

The *Creation Research Society Quarterly* has been published since 1964 (30 complete volumes). In an effort to make these volumes available, all of the missing issues have been reprinted. Brief synopses have been written on volumes 1-14 and have appeared in the previous 14 quarterlies. In each synopsis, major articles are reviewed to give a person interested in scientific creationism a general idea of the contents of that volume. Many of the articles are of continuing interest and value.

Origin of Life

Duane Gish (1979, pp. 185-203) wrote an article entitled "A Comprehensive Christian-Scientific View of the Origin of Life." This field is the author's specialty and he has developed many telling arguments against the naturalistic model. He demonstrated that the spontaneous generation of life is opposed by (1.) the rate of destruction of simple organic compounds is much greater than the rate of formation, (2.) the presence of so-called traps would be fatal to the origin of life, (3.) compounds needed for the origin of life would have been removed under "primitive earth" conditions, (4.) large polymers such as DNA, RNA, etc. could not have formed, (5.) if they did, only randomly arranged DNA and RNA sequences could have formed which would have been useless for life, (6.) enzymes and life are impossible without each other, (7.) spontaneous organization of complex, coordinated systems would have been impossible, (8.) all living systems are unstable and can only be formed by reproduction of already-formed living systems and (9.) the degenerating processes as predicted by the second law of thermodynamics would not allow any *spontaneous* generation of life. Gish covered primitive earth models, production of amino acids, the Viking probe, Fox's thermal model, origin of stable, living systems, Oparin's coacervate theory and degeneration processes in this classic paper. In the same vein of thought, Trop (1979, pp. 205-209) showed that polyamino acids are the missing links in any chemical evolution scenario for the origin of life. Creationists have continually noted the defects in reasoning of evolutionists in this "scientific" field.

Botany

Howe (1978, pp. 39-40) claimed that the Venus flytrap had to have a fully-formed trap with trigger hairs, digestive glands, etc. for the mechanism to be useful to the plant. Then he explained how this caused problems for the neo-Darwinian model of evolution and suggested that the plant was designed. Lammerts (1978b, pp. 131-132) briefly discussed vernal pools (shallow, temporary pools) and the unique plants found in them. He thought that God may have created the plants after the Flood to create beauty in the post-Flood world. The desert primrose *(Oenothera caespitosa)* was presented briefly from a design perspective by Keithley (1978b, p. 147).

Zoology

"A (recently) living pleisosaur found?" was the intriguing title of a brief article by Swanson (1978, p. 8). The figure shown in this note possibly indicates the carcass of a reptile-like creature. Keithley (1978a, p. 46) humorously examined the male-female relationship of the phalarope bird *(Steganopus tricolor)* and made some applications as to the silliness of evolutionary reasoning.

Genetics and Taxonomy

Siegler (1978, pp. 36-38, 11) offered a creationist taxonomy discussing species vs. kinds. The subject of variation and fixity among living things as a biological principle was discussed by an expert on the subject, Frank Marsh (1978, pp. 115-118). He explored Darwin's studies noting the mistakes of the latter. Also he covered the possible types of variation and hybridization. Marsh explained that the basic types are fixed and that variation is limited. For a more detailed discussion of Marsh's postulates, see Marsh, 1976. The assumptions of evolutionary genetics were examined by Tinkle (1978a, pp. 53-54). The author refuted naturalistic claims where necessary.

Anthropology

A discussion of *Ramapithecus* was presented by Hummer (1978, pp. 92-94). He explained that:

> If *Ramapithecus* is not the first hominid then the already "sudden appearance" of *Homo* in the fossil record becomes overwhelming. It means that for more than 20 million years of supposed primate evolution there are no known ancestral forms for man (p. 94).

Later Hummer (1979, pp. 212-214, 204) examined *Homo habilis.* He believed that the fossil evidence did not warrant the creature being assigned a *Homo* status.

Pre-Flood Vapor Canopy

One of the creationists who probably has done more technical work in defense of a pre-Flood vapor canopy about the earth, Dillow (1978a, pp. 27-34), offered a treatise on ancient longevity and gigantism. His discussion included the radiation flux at the earth's surface, the biological effects of electromagnetic radiation, the canopy and the theory of aging, gigantism in the fossil record, gigantism and oxygen, longevity and oxygen, dinosaur size and longevity, ozone and the canopy and carbon-14 and longevity. He concluded that:

> . . . the biosystems of pre-flood animals apparently produced an enzyme that cleaned out cross-linked molecules. Subsequent to the flood, either due to inbreeding, mutation, a radiation burst or some unknown cause, this enzyme was gradually eliminated and longevity declined (p. 32).

The same author (Dillow, 1978b, pp. 148-159) examined the mechanics and thermodynamics of a postulated vapor canopy. His conclusions were carefully phrased after he defended the concept. Cyr (1979, pp. 184, 211) speculated on global precipitation under a vapor canopy. He included evidence from ice-core oxygen-18 isotope ratios, the C-14 anomaly and cosmic spherules in Pacific mud.

Carbon-14 Dating and Dendrochronology

Don DeYoung (1978, pp. 14-16) discussed radiocarbon dating in relation to some of the variables that affect the method and concluded that the ancient dates derived by irrational uses of the method are not reliable and that the method offered promise for young-earth creationists. Tyler (1978, pp. 16-23) examined the non-equilibrium method of C-14 dating and stated that the model is viable. This paper deserves serious study by young-earth creationists. Dendrochronology and radiocarbon dating were discussed by Gladwin (1978, pp. 24-26). He noted many problems in the correlation of C-14 and tree ring dating.

Thermodynamics

Harold Armstrong (1978a, pp. 119-121; 1978b, pp. 167-168, 175) used the first law of thermodynamics in an unusual manner to illustrate that matter is conserved and entities (forms) are replicated but that matter and form cannot originate from nothing. Thus the evolutionary concept of the spontaneous generation of order from nothing or nonorder is impossible. Also see Armstrong, 1981. It was demonstrated that living systems could not have arisen by natural processes (Boylan, 1978, pp. 133-138). Only matter plus creative intelligence could have formed life. The first and second laws of thermodynamics were employed to reach this conclusion.

Earth Science

Two articles noted rapid growth of stalactites in cement tunnels (Amer, 1978, pp. 8-9; Cannell, 1978, pp. 9-11) and applications were made within a young-earth model. Williams and Herdklotz (1978, pp. 88-91) continued their research program to outline the variables that could cause rapid stalactite and stalagmite formation. This particular report included the amount of water available, acidity of the water, CO_2 content of water, cave humidity, presence of ammonia in a cave and the crystalline form of deposited $CaCO_3$. Applications were made within a young-earth framework.

Strickling (1978a, pp. 12-14) discussed catastrophism and its effect on science. A detailed review of Davis A. Young's uniformitarian views was presented by Clough and Fredricks (1978, pp. 47-52) and answers were provided from a young-earth viewpoint. An extensive examination of the cephalopods in the creation and the Flood was conducted by Woodmorappe (1978, pp. 94-112). He developed a model to explain the physical evidence seen in the geologic record. He considered the antediluvian ecological zones of coexistence of cephalopods as well as ecological zonation and the Flood. Russell Humphreys (1978, pp. 141-147) initiated a series where he viewed the core of the earth as consisting of water. He considered the Scriptural evidence in this part.

Peleg's division mentioned in the Bible was postulated to be a rift valley in the Red Sea region by Strickling (1978b, pp. 159-160). A reprint of Whitney's article, "The Origin of Yosemite Valley" was presented (1978, pp. 164-166). The author considered the valley to have had a recent origin. Smith (1979, pp. 179-183) noted that likely the Flood waters were heterogeneous, not homogeneous. Thus creatures living in fresh water and salt water could have survived the catastrophe.

Astronomy

In a carefully presented thesis, Hanson (1978, pp. 55-68) argued against the catastrophic postulations of Velikovsky to the effect that the earth's axis had been deflected in the past. Also he listed evidence for a recent creation of the earth. Harris (1978, pp. 112-115) suggested a solution to the quandary of seeing stars that were created only a few thousand years ago from the earth today.

General

A unique article written by Walter Lammerts (1978a, pp. 3-7) noted that certain accurate scientific predictions can be made based on Biblical creation concepts. He discussed findings from the space program and documented the earth's spreading deserts. Bergman (1978, pp. 40-46) claimed that cause and effect is necessary in a real world in spite of the claims that evolution occurred without any sufficient reason. Cause and effect mirrors intelligent design. It was noted that often students are indoctrinated (brainwashed) into accepting Darwinism (Harper, 1978, pp. 83-87).

Tinkle (1978b, pp. 138-140) discussed social Darwinism and stated:

> The doctrine of social Darwinism is not popular nowadays. But it and Darwinism in nature should stand or fall together; those who reject the former and hold to the latter are being inconsistent (p. 138).

A discussion of the course and destination of Noah's ark was given by Schmich (1978, pp. 161-163). A humorous story of evolution in Biblical literary style was cleverly done by Agard and Howes (1979, pp. 203-204). Haigh (1979, pp. 210-211) presented some arguments against theistic evolution. This volume of the Quarterly also contained several other items (notes, book reviews, letters to the editor, etc.) of interest to creationists.

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COBE Instrumentation and its Engineering Limitations

Introduction

In April 1992, newspapers across the country proclaimed with great fanfare that evidence had been obtained that the Big Bang occurred approximately 20 billion years ago. This news was based on data received by the Cosmic Background Explorer (COBE) Satellite. The Big Bang Theory originally predicted a uniform mass distribution throughout the universe but this prediction has since been proven false. Therefore the residual heat from that explosion must be non-uniform. The background radiation, shown by COBE to have a temperature differential of 10 μK (micro-Kelvin), has been constant at 2.74 degrees Kelvin which is in contradiction with the Theory. The temperature differential was obtained by using six Dicke differential radiometers on board the COBE satellite, with each observing different points in the universe, measuring the received radiation and comparing it with the other radiometric measurements. Russell Humphreys points out that these measurements could have been taken through a cosmic cloud or plasma field, resulting in the differentials obtained by the COBE team. In addition to the above mentioned astronomical problems, serious engineering difficulties exist in achieving these miniscule temperature differential measurements. Following are some of the many engineering problems:

1. Radiometric Sensitivity
2. Dynamic Range Sensitivity
3. Absolute Accuracy and Calibration Techniques
4. Losses and Mismatches in the Antenna
5. Satellite Stability (incident angles)
6. Error Analysis
7. Other Sources Contributing to Uncertainties

Radiometric Sensitivity

In any electrical system, interference, called noise, is present. The radiometer sensitivity is set equal to the random noise in the electronics driving the radiometers and thus equal to the measureable temperature difference. The lowest noise can be achieved by averaging all the interferences many times to obtain no lower than 50 percent of the total noise level. The best temperature difference in terms of noise achieved so far is 0.1 Kelvin. The radiometric sensitivity (resolution) is the minimum change in the radiometric antenna temperature that can be detected in the radiometer output. This is defined as a change in the output equal to the standard deviation of the output. The input to a radi-

ometer is a gaussian random noise signal. An ideal total radiometer with no gain fluctuations would have a resolution given by the equation (Ulaby et al., 1981):

$$\text{Delta } T(\text{ideal}) = T(\text{sys}) / \text{SQRT}(Bt) \quad (1)$$

where T(sys) = T(a) + T(rec) SQRT = Square root
and T(a) = Radiometric antenna temperature
T(rec) = Receiver input noise temperature
T(sys) = Radiometer system noise
B = Predetection bandwidth
t = Predetection integration time

The integration time on the COBE satellite is two years!

Dynamic Range Sensitivity

The dynamic range for calibration of the radiometers is set from 3 to 300 K with a required temperature stability of 0.05 K or better. The best stability achieved so far is 0.1 K which has been obtained only a few times. This indicates quite an inconsistent temperature stability between the various radiometers.

Absolute Accuracy and Calibration Techniques

Accuracy depends greatly on the calibration techniques employed and is extremely vital to the validity of the data received by these instruments. Aerojet and Hughes Aircraft, which built these radiometers, calibrate to 1 K in a thermal-vat chamber and to 3 K in space. In a thermal-vat chamber, the radiometers are continuously calibrated for 6 to 8 months and at a minimum cost of $8 million per differential radiometer calibration. As noted above in dynamic range sensitivity, the inconsistent temperature stability in the system contributes greatly to errors in the actual measurements.

Losses and Mismatches in the Antenna

The losses and mismatches in the antenna are the key to all the prescribed functional requirements. Great efforts are spent to solve this difficult problem. This paper will not elaborate on the numerous and extensive algorithms involved to compensate for the errors incurred by this problem.

Satellite Stability

Satellites do not fly in a straight line but wobble about all three axes. This wobbling, of course must be continuously tracked. The tracking data (on the incident angles) is stored at such high rates that the COBE satellite must downlink this and other stored data to a ground station every 10 minutes. In addition, the temperature resolution equation (1) must be integrated before the enormous data flow is properly correlated and interpreted.

Error Analysis

After examining the COBE error analysis it seems that an overly high confidence in the accuracy of the contributing effect of the many error sources was employed. Several potential error sources to the precision of the COBE data, referred to a future NASA paper, are not considered in this analysis. One very important neglected error source is foreground microwave sources which include thermal emissions of the COBE spacecraft itself and also from earth, sun, moon, and other solar system objects. Nonthermal radio frequency interference (RFI) is another neglected error source. Cosmic and galactic signals were also disregarded in the analysis because an assumption was made that galactic emissions were fixed in the sky under observation. For brevity the error sources listed in the COBE error analysis will not be mentioned (see Kogut et al., 1992). A confidence level (CL) was assigned to each error source by the COBE team. Nineteen error sources are weighted at a 95% CL, three error sources at a 68% CL, and one error source at a 13% CL. Simple statistics shows that the combined CL of this analysis by the COBE team is 11%. Furthermore, none of the error sources discussed here are included in the COBE error analysis.

Other Sources Contributing to Uncertainties

Linearity
Antenna beam efficiency
Polarization purity
Incident angles
Antenna pattern corrections
Instrument Degradation
Microwave Losses
Receiver Gain
Transmission Lines Signal Losses
Receiver Excess Noise

How much these error sources contribute to the uncertainty of the measured temperature differentials is extremely difficult to determine. No analyses on these topics have been published, although various algorithms have been proposed.

Conclusion

Faced with the overwhelming problems and uncertainties presented in this paper, the published temperature differentials remain highly questionable. Therefore more caution and humility on the part of the COBE team is in order. Unfortunately modern uniformitarian scientists are not in the habit of admitting their erroneous assertions. They also will not publicly correct errors in their own theories. With the introduction of the Plasma theory, it should be noted that the Big Bang theory is losing its popularity and those intent on salvaging it are desperately searching for reasons, however absurd, to rescue it.

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