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IN THE BEGINNING
An Honors Paper

by
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Presented to
Dr. Jim Berryman

on
December 7, 1973

OUTLINE
"In The Beginning"

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"In the beginning, God created the heaven and the earth."¹

Creation is a word that is used in a great many different contexts at the present day. The fundamental use of the word "creation" is the one from which all the other modern uses of it have borrowed, is a religious one, to describe the act by which as we say, "God created the world."

Men are always asking basic questions such as "Who started it?" and "How was it done?". This beginning of the heavens is one of our greatest mysteries. Many of the ancient answers to this problem presented in this paper may seem fantastic. The birth, or the creation of the earth is thought by many scientists to have been about 5,000 million years ago. Life itself appeared some 3,000 million years later, while primitive man left the trees for a terrestrial future close to two million years ago.

Archbishop Ussher of Ireland, together with Cambridge Hebraist Dr. John Lightfoot, won eternal fame about 1650 by calculating that the earth was

¹Genesis 1:1 ,

created on Sunday morning, the 23rd of October, 4,004 B.C.E. Their date went unchallenged for 100 years. But then came Darwin, and the geologist and the astrophysicists, and much clerical effort was directing towards harmonizing Genesis with Science.²

Since it is generally helpful to know how things started, the first book of the Bible sits out to tell us of the beginning of things.

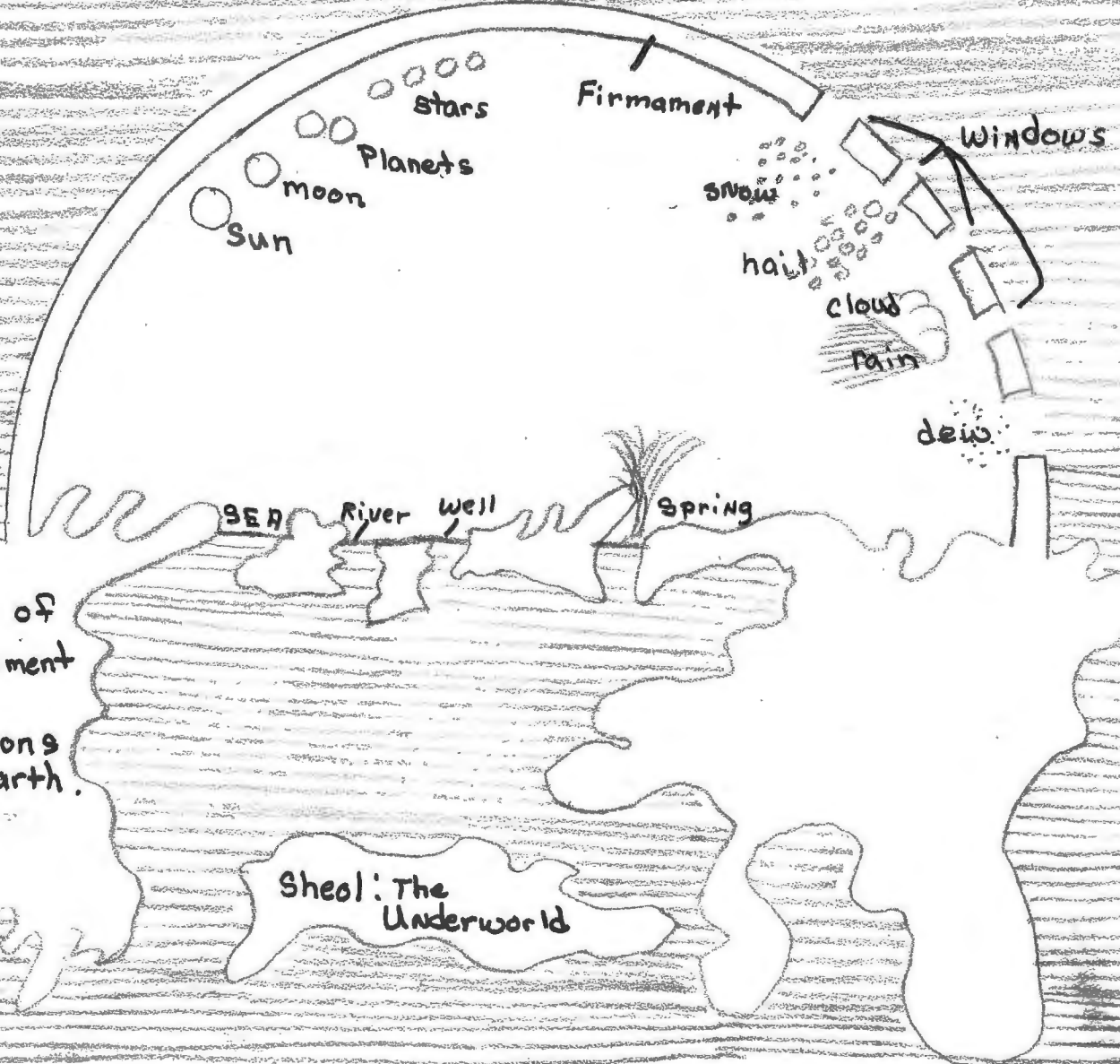
The first chapter of the book of Genesis is familiar to everyone. We read that God created the world and then spent six days putting it into exact order. Then God rested on the seventh day, known as the Sabbath.

"The early Hebrews probably visualized a God hovering over a massive, dark, desolate earth platform entirely surrounded by water. By a simple fiat of God's will, a layer of platform was peeled off to form a firmament above the new surface of the earthy disc, thus dividing the waters above the earth from those below. Both earth and firmament were then fixed by mountainous pillars on the Horizons, these plunging down to form as well the foundations of the earth."³

²Simon S. Levin, Adam's Rib, (Los Allos, California: Geron-X, Inc., 1970), p.1.

³Ibid, p. 2.

Heaven of Heaven Waters above the firmament



Hebrew Conception of the World

The imagined firmament was a solid, distant layer through which the upper waters could seep in through windows⁴, or doors⁵ of heaven to produce snow, hail, cloud, rain or dew.

Though the sun ruled the day, and the moon the night, light was independent of the sun, having been present as a consequence of divine fiat before the sun was created.⁶ "The day is thine, the night also is thine: thou hast prepared the light and the sun."⁷

Bible apologists have generally suggested that the sun was there all along, but mostly shrouded in clouds which finally parted on the fourth day.

The solid, firm disk of the earth was visualized as ending at four corners and stretched out over the waters.

Each of the seven days in Genesis 1 is divided into periods of darkness and light, exactly as a solar day is. "According to some thinkers, the word 'day' in Genesis 1 is to be interpreted

⁴Genesis 7:11

⁵Psalms 78:23

⁶Genesis 1:3-5,16

⁷Psalms 74:16

as meaning a real day. On this view we must accept the fact that creation took place in six real days." ⁸ A period of light, a period of darkness; each being approximately equal to the other in length of time, make up collectively a "day". These periods, which conform to the customs of the Hebrew people, start and end in the same way: "And the evening, and the morning was the first day". ⁹

Because the rays of the sun did not shine on the earth until the fourth day, it is sometimes contended that the first three days could not have been solar days; but "it must be remembered that even today there are many winter days when we never see the sun. But there is evening and morning just the same, and we divide the day even in the absence of the direct light of the sun." ¹⁰

At this point, the concordistic theories of the Biblical account of creation must be mentioned. The most important is the one that interprets the word "day" as a period of possibly millions of years.

Related to this theory is the inter-period theory, which inserts periods of millions of years between the days and Genesis 1, and the restitution

⁸N. H. Ridderbos, Is There a Conflict Between Genesis 1 and Natural Science?, (Grand Rapids, Mich.: Wm. B. Eerdmans Pub. Co., 1957), pgs. 9,10.

⁹Genesis 1:5

¹⁰Harry Rimmer, Modern Science and the Genesis Records. (Grand Rapids, Mich.: Wm. B. Eerdmans Pub. Co., 1946), p. 17.

theory. According to this latter theory the first creation, described in verse 1, called into being a world which was complete and similiar in shape to ours. This first world was destroyed by a series of mighty castrophies (v. 2), and the present world was then brought into being out of these ruins by a second creation.

As we follow the description of the various works, we read that God first divides light from darkness. Next, he divides waters above from waters below by means of a firmament, some kind of solid dome which pushes the primordial waters apart. This leaves water above the firmament (thus accounting for the rains) and water underneath it. In between is the air. On the third day God divides again, this time the earth from the water left below. On the fourth day God makes the sun and the moon and the stars.

On the fifth day the birds of the air and the fish of the sea make their appearance. The first three days speak of division, the last three of inhabitation. "What God divides on the first day, he ornaments on the fourth; what he divides on the second, he ornaments on the fifth; what he divides on the third, he ornaments on the sixth."¹¹

¹¹ Neal M. Flanagan, Salvation History, (New York: Hamlyn Pub. Group Ltd., 1969), p. 8.

The Separation and the Deceration

Separation

Deceration

1st day:

God separates light from
darkness.

4th day:

God makes the sun,
moon, stars.

2nd day:

God separates waters above from
waters below.

5th day:

God makes birds for
air and fish for
waters.

3rd day:

God separates dry land from
waters below.

6th day:

God decorates the
earth with beasts and
man.

7th day:

God rests the way a man should rest on the Sabbaath

- First Day: The creations of all the cosmos of the uttermost universe (Gen. 1:1-3)
- Second Day: The conglomeration of space particles, eventually to condense into the earth and enter a solar system (Gen. 1:2-6)
- Third Day: Contact with a solar system: appearance of the sun (Gen. 1:16)
- Fourth Day: Appearance of plant life (Gen. 1:11)
- Fifth Day: Appearance of marine life, amphibia and fowl (Gen. 1:20,21)
- Sixth Day: Further development of reptiles. Appearance of mammals, and finally evolution of man (Gen. 1:24-27)
- Seventh Day: The world having been set in motion, the Creator desisted further activity (Gen. 2:2) and left his magnificent works: "and God saw everything that he had made, and, behold, it was very good".¹² to revolve and evolve till the end of time.¹³

Genesis I reveals that God is Creator of all things. What the author of this book of the Bible has in mind is "not science, but theology. Not a description of the physical construction of the universe, but of the nature and power of God and of the grandeur of man, earth's masterpiece."¹⁴

¹²Genesis 1:31

¹³Levin, p. 7.

¹⁴Flanagan. P. 8.

There are numerous creation stories of other countries and cultures of earlier literary form but with similiar cosmological views as the Bible.

These primitive myths, which are the earliest ways of answering the question, "Who started it?" , and "How was it done?", originate from the convictions that the creation of the world had a permanent effect on subsequent behavior and on the structure of the society.

"C.G. Jung has a thought-provoking idea that myths are natural phenomena which grow out of the mind more or less uniformly in all places, just as the human body is of one essential pattern in China and Peru."¹⁵

Because of the widespread popularity of evolutionistic and rationalistic thinking in our modern culture, the actual term "MYTH" usually refers to the fanciful imagination of the human mind.

But, for the cultures of people who live in terms of an explicit myth, the myth is a true story-- their myth is a story about reality. Naturally, we can obviously see that the myths are not true in a literal sense. This can be readily seen be-

¹⁵Charles H. Long, Alpha: The Myths of Creation, (New York: George Braziller, 1963), p.xiv.

cause the myths are filled with actions and characters which are impossible to comprehend.

Mythological thinking is a type of thinking which represents man's initial confrontation with the power in life. This mythical thinking is not concerned primarily with logic, but it is not illogical or prelogical either. The content of the myth must be understood within this context.

"The myth is a symbolic ordering which makes clear how the world is present for man."¹⁶

Some people have the notion that creation myths are prescientific attempts to give an explanation of the world. While it must be admitted that most myths are products of a prescientific age, it is seen that creation myths also perform an explanatory role in the life of the society which believes in them. Naturally, there are no records of the myths of the first human beings. The creation myths are expressions of new beginnings, new cosmos. New myths may appear in connection with a discovery, either of a new plant, animal, or technique. "The cosmosgonic myths express the power, spontaneity, absoluteness, plentitude, and mystery of reality in symbolic forms."¹⁷

¹⁶Ibid., p. 14.

¹⁷Ibid., p. 20.

"Cosmogonic myths refer to that power or force which centers and gives definiteness to the life of a human community."¹⁸

The myth does give expression to man's situation.

One of the oldest and perhaps most widespread of religious symbols is the symbol of Mother Earth. Echoes of this symbolism may be seen in myths from the northwest frontier of India.

In the emergence myths the earth is described as containing within itself all of the potencies of life. The basic motif of these myths is not how the earth came into being, but the symbol of earth as the source of all life and forms. Certain dieties have prominence in the emergence myth, the Sun, and corn in various manifestations.

"Erich Newmann makes use of a word from Plato's Timæus, the UROBOROS, to describe the static, eternal, unchanging, and non-historical origin of all creation. In the emergence myth, the uraboros is the earth itself."¹⁹ Creation is almost always accompanied by a display of power. This power is symbolized as the power which manifests itself in human birth. (see the Navaho emergence myth).

¹⁸Ibid. p. 23.

¹⁹Ibid. p.43.

Peculiar to the Semitic religions myths is the worship of, and belief in the existence of a single Supreme Being and/or creation from a void, or nothing. In some myths such as the Hebrew, the Zūñi, the Egyptian, and the Polynesian, equal emphasis is given to the Supreme Being who performs the creative act and the manner in which he formed it. This is the classical type of creation myth. In the classical type of creation-from-nothing myths, four characteristics may be distinguished. First of all, the Creator deity is all-powerful. He does not share his power with any other deity or structure of reality. Secondly and a correlate of the first point, the deity exists by himself, alone, in a void, or space. There is no material reality prior to him in time or power. He creates the cosmos out of the void or nothingness in which he exists. Thirdly, the mode of creation is conscious, ordered, and deliberate; it reveals a definite plan of action. Finally, the creator is free since he is not bound by the inertia of a prior reality.

A certain monotheistic tendency is present in all genuine religious experiences. This arises from the simple fact that a worshiper cannot worship more than one deity at a time. This means that one deity as the only god honored at any one

particular time, even in a polytheistic society.

The Creator deity is detached from the world and therefore not subject to the categories which subsequently apply it to the cosmos.

He is therefore eternal--with no beginning and no end. Before the stage of creation there is no time, only eternity. The Creator himself is the source of all time. Everything done by this creator is perfection. Because of this perfection his creative acts become divine models.

The creator deity is all-powerful because he is wise; he knows the potentiality of all forms, but he has at the same time the power to create, to make these forms actual and concrete.

"In these myths...creation centers in the production of the earth in its present form and the way it was made habitable and serviceable for human beings."²⁰

However, myths and mythological structures have been discarded by man throughout human history whenever new revelations of being and sacredness have been manifested.

²⁰Encyclopedia Britannica, "Creation", Vol. 6, (Chicago: William Benton Pub., 1969)p. 709.

EGYPTIAN MYTHOLOGY

All Egyptian cosmogonies were basically concerned with divinities of nature: the sky, the earth, the wind, the sun, the moon and the stars. The Egyptians imagined the sky to be a goddess. "She was pictured as a cow standing over the earth and supported by other deities, with the barque of the sun sailing along her starry belly, which was a heavenly ocean."²¹

The most important of the Egyptian deities was the sun, which had many names. "As a sun-disk he was called Atn; as the rising sun his name was Khepre; as the sun climbed to his zenith he was called Ra; and as the sun set as an old man he was called Atum."²²

" 'Creation by Atum' is a text which was carved inside the pyramid of Mer-ne-Re and Pepi II, about the twenty-fourth century B.C. According to the legend, Atum was the creator God who sneezed (cf., Gen.2:7, of God breathing life into man) and through the sneeze formed Shu, the god of the air, and Tefnut, goddess of moisture."²³

²¹Virginia Ions, Egyptian Mythology, (N. Y.: Hamlyn Pub. Group, Ltd., 1968). p. 24.

²²Op. cit.

²³Ralph Elliott, The Message of Genesis, (Nashville: Broadman Press, 1961), p. 22-23.

The moon was also said to be the sun's brother and son of Nut, the sky. The stars were children of the sky--goddess as a sow who gave birth to them in the morning and swallowed them at night.

The ancient Egyptians imagined that in the beginning the universe was filled with a primordial ocean called Nun. The waters on Nun were motionless and stagnant. Nun had no surface. The Egyptians seemed to have regarded the creation sequence as slow development rather than as an instantaneous act of creation.

"In Hermapolis, a city of Upper Egypt, a quite distinctive theory of creation was held which, it was claimed, was evolved earlier than any of the other Heliopolitan Ennead, the Hermopolitans substituted an Ogdoad, or group of eight gods. These were Num and his consort Naunet, Huh and his consort Hauhet, Kuk and his consort Kauket, and Amon and his consort Amaunet. These eight gods together created the world. They then ruled over it for a period which was considered to be a golden age. After they had reigned for some time and they had completed their work of creation, the eight died and went to the underworld to live. Their power continued after their death, however, for they continued to cause the Nile to flow and the sun to rise and set each day."²⁴

²⁴Ions. p. 34.

GREEK MYTHOLOGY

"In Hesiod's cosmogony, first there were Chaos and Earth. From Chaos came Erebus and Night. From Night the Ether (upper air) and Day. Earth first produced the Sea, the Ocean, and then the Titans, Caesus, Cruis, Hyperion, Iapetus, Thea, Rhea, Themus, Mnemosyne, Phoebe, Tethys, and finally Cronus. Many of these figures are nothing more than personifications."²⁵

INDIAN MYTHOLOGY

"According to one of the myths of the Crow Indians of Montana, long ago there was only water in which were ducks. Then the Sun as the creator, who has become Mergid which the 'transformer' known as the Cayote, told them to dive into the water and from the mud on the webbed feet of one of them he created the earth and peopled it with living creatures".²⁶

"In the Navaho emergence myth the first human couple gives birth to five sets of twins all hermaphrodites. The hermaphrodite nature of these first children carries through the motion of completeness of the level of sexuality and points to the divine origins of man."²⁷

²⁵John Pinset, Greek Mythology, (N.Y.: Hamlyn Pub. Group, Ltd., 1969), p. 16.

²⁶Encyclopedia Britannica, p. 709.

²⁷Long. p. 43.

The Zuni myth of the Genesis of the worlds, or the Beginning of newness :

"Before the beginning of the new-making, Awanawitone (the Maker and Container of All, the All-father Father) solely had being. There was nothing else whatsoever throughout the great space of the ages save everywhere black darkness in it, and everywhere void darkness. In the beginning of the new-made Awonawilone conceived within himself and thought outward in space, whereby mists of increasing stress potent growth were evolved and uplifted. Thus, by means of his innate knowledge, the All-Container made himself in person and form of the Sun whom we hold to be our father and who thus came to exist and appear. With his appearance came the brightening of the spaces with light, and with the brightening of the spaces the great mist-clouds were thickened together and fell, whereby was evolved water in water; yea, and the world-holding sea.

With his substance of flesh (yepnane) outdrawn from the surface of his person, the Sun-father formed the seed-stuff of twain worlds, impregnating therewith the great waters, and lo! In the heat of his light these waters of the sea grew green and scums (k'yanashot siyallawe) rose upon them, waxing wide and weighty until, behold! They became Awitelin Tsita, the 'Four-fold containing Mother-earth,' and Apoyan Ta'cher, the, 'All-covering Father sky.'"²⁸

²⁸ Frank Cushing, Thirteenth Annual Report of the U.S. Bureau of American ethnology, (Washington: Smithsonian, 1891), 381.

POLYNESIAN CREATION MYTH

"He existed, Taaroa was his name.

In the immensity (space)

There was no earth, there was no sky.

There was no sea, there was no man.

Above, Taaroa calls.

Existing alone, he became the universe.

Taaroa is the origin, the rocks

Taaroa is the sands,

It is thus that he is named.

Taaroa is within.

Taaroa is the germ.

Taaroa is beneath;

Taaroa is firm;

Taaroa is wise.

He created the land of Hawaii,

Hawaii the great and sacred,

As a body or shell for Taaroa..."²⁹

²⁹ E.S. Craighill Handy, Polynesian Religion, (Bernice P. Bishop Museum, Bulletin 34, Honolulu: Bishop Museum Press, 1927), p.11.

BABYLONIAN CREATION MYTH

The Babylonian creation myth is usually known as "Enuma Elish." This work consisted of seven tablets and was named from the first words of the tablet 1, "Enuma Elish", or "When on High."

"Basically, it is a story dealing with the struggle between Chaos and cosmic order. Originally existent were two monstrous dragons known as Apsu, the fresh-water subterranean Ocean, and his consort, Tiamat, the salt-water ocean that surrounded the earth.

From this original pair sprang various generations of deities until finally some of the younger ones garnered great power. A battle of the gods ensues. The great wind blew into Tiamat's body. Marduk (the god Bel of Babylon) took his sword and sliced Tiamat in the middle. Heaven was made with the top of her, and with her lower half the earth was made."³⁰

ITALIAN WITCH LORE

Italian witch lore presents us with the following creation story:

"In the beginning the Great Darkness, Diana, divided herself into two equal and opposite forces, night and day. The night was ruled over by Diana herself as the moon, the day by her alter ego and brother, Lucifer the seen. Diana, inasmuch as the moon is ever pursuing

³⁰ Elliot. p. 24.

Comparison of Enuma Elish and Genesis 1 to 2:4a

Enuma Elish

1. Divine spirit and cosmic matter are coexistent and co-eternal.
2. Primeval chaos, Tiamat enveloped in darkness.
3. Light emanating from the gods.
4. Creation of the firmament.
5. Creation of the dry land.
6. Creation of the luminaries
7. Creation of man
8. Gods rest and celebrate (man was to serve from here on)

Genesis 1-2:4a

1. Divine spirit exist independent of cosmic matter.
2. Earth a desolate waste with darkness covering the deep.
3. Light created.
4. Creation of the firmament
5. Creation of the dry land.
6. Creation of the luminaries
7. Creation of man.
8. The Lord rests and sanctifies the seventh day.

the sun across the sky, became enamoured of the brother
the sun, and seduced him in the shape of his pet cat.
The offspring of this union was a daughter, Aradia or
Herodias, the archetypal 'abatar' or patroness of
all witches."³¹

³¹Paul Huson. Mastering Witchcraft, (New York: G.P.
Putnam's Sons, 1971), p. 9.

There is no single, generally accepted scientific theory as to when or how the earth was formed. However, scientists agree that it was probably formed at the same time as the other planets in the solar system. They also have several ideas about the formation of the solar system. But they cannot be certain that their explanations are correct. New information about the chemical makeup of the moon and the planets might help prove or disprove these explanations. Scientists hope that astronauts and instruments sent into space will provide such information.

The earth is probably at least $4\frac{1}{2}$ billion years old. The oldest rocks ever discovered are almost $3\frac{1}{2}$ billion years old. Scientists believe that the earth itself must be at least 1 billion years older than these rocks.

Most scientists believe that the solar system developed from a huge nebula (cloud of gas and dust) that once swirled around the sun. The sun itself may have been formed from the central part of this nebula. As the nebula whirled around the sun, it slowly flattened out. Sections of the cloud began to spin like eddies (whirlpools) in a stream. Gas and dust collected near the centers of these eddies. The collections of gas and dust grew by attracting nearby particles of matter. They slowly developed into the spinning planets that now travel around the sun.

Scientists do not know any more about the earth's earliest stages than they do about the birth of the solar system. They suppose that the earth began as a waterless mass of rock surrounded by a cloud of gas. Radioactive materials in the rock and increasing pressure in the earth's interior gradually produced enough heat to melt the interior of the earth. The heavy materials, such as iron, then sank. The light silicates rose to the earth's surface and formed the crust. These rocks became the ocean floors and the land areas called shields, which were the original continents.

The heating of the earth's interior also caused other chemicals inside the earth to rise to the surface. Some of these chemicals formed water and others formed the gases of the atmosphere. Over many years, the water collected in low places of the crust and formed the oceans. As land developed, rain water and rivers dissolved salts from the rocks and carried them to the oceans, making the oceans salty.

"The earth's earliest atmosphere probably did not contain much oxygen. Oxygen collected gradually as the earth aged. The oxygen was originally combined with other chemicals in rocks. The melting of these rocks freed the oxygen and allowed it to escape to the surface. As the amount of oxygen increased, conditions on earth became favorable for plants and animals to develop."³²

32
World Book Encyclopedia, "Earth", (Vol.6., Chicago: Field Enterprises, 1970.), p.16.



Precambrian Time included almost all of the earth's first 4 billion years. The crust melted and hardened, the atmosphere and oceans were formed, and the simplest kinds of life appeared.



The Paleozoic Era lasted 375 million years. Many kinds of animals and plants developed in the seas and on land. This painting shows some early land plants from about the middle of the era.

The known history of the earth is divided into six lengths of time called eras. The eras are from oldest to youngest: Azoic, Archeozoic, Proterozoic, Palaeozoic, Mesozoic, and Cenozoic. Some historical geologists group the first three eras into one unit called the Precambrian.

A chart showing an outline of the earth's history by using the various time divisions is called a geological time scale. On such a chart, the earth's earliest history is at the bottom, and its recent history at the top.

The Azoic, Archeozoic, and Proterozoic eras make up almost the first 4 billion years of the earth's earliest history. This length of time covers about 80% of the earth's total history. Rocks of the Archeozoic Era contain fossils of the first and most primitive life--bacteria and tiny plants called algae.

"Geology tells us as plainly as possible, that the original crystalline mass was not a perfectly smooth ball, with air and water playing around it. There were vast irregularities in the surface..."³³

"Some very complex problems are also thrown up by historical anthropology. To mention only this: Often natural science has positioned that the human race has existed several hundred of thousands of years..."³⁴

³³ Robert Chambers, Vestiges of the Natural History of Creation, (New York: Humanities Press, 1844), p.49.

³⁴ Ridderbes. p. 71



Lyn, APF

Rocks Tell the Earth's History. Tilted layers of rock, above, show that this hillside was once a level plain. A piece of limestone, below, formed more than 100 million years ago, contains fossils of snail-like sea animals that have since died out.

WORLD BOOK photo courtesy the Field Museum of Natural History, Chicago



Paleozoic Sandstones make up part of the rock formations in Monument Valley, Utah. The rocks that once surrounded these formations have been worn away by water and the weather.

Josef Muench



A Mountain of Precambrian Rock rises in the harbor of Rio de Janeiro, Brazil. The rounded shape of Sugar Loaf Mountain resulted from hundreds of millions of years of erosion.




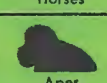


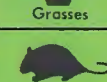

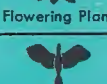

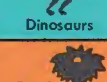


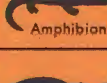

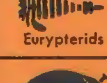
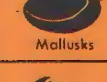
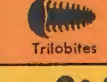
Annan Photo



It therefore becomes necessary to effect some sort of reconciliation between the Bible and the scientific theories of creation.

It is pointed out that the Hebrew story of creation is a powerful document, incomparably superior to the creation epics of Babylonian, Egyptian, Greek, and Indian mythologies.

While science theory is more factual, it must be acknowledged, that all men harbors a religious instinct. Therefore, in conclusion, it is felt that the book of Genesis gives a much clearer picture and identification relative to the divine Being and how He works.

Period or Epoch and Its Length		Beginning (Years Ago)	Development of Life on Earth		Development of the Earth	Mountain Building North America Europe and Asia	
CENOZOIC ERA	Quaternary Period	RECENT EPOCH 10-25 Thousand Years	10-25 Thousand	Man hunted and tamed animals; developed agriculture; learned to use metals, coal, oil, gas, and other resources; and learned to put the power of wind and rivers to work.	 Cultivated Plants	Streams, glaciers, and oceans eroded the land. Present river deltas and coastlines were formed. Ice Age glaciers melted and water collected, forming the Great Lakes in North America.	
		PLEISTOCENE EPOCH 3 1/2 Million Years	3 1/2 Million	Man appeared before the first glaciers swept down from the north. Mammoths, woolly rhinos, and other animals roamed parts of the world, but died out near the end of the epoch.	 Primitive Man	Four times during this Ice Age, glaciers covered large areas of North America and Europe. The climate was cool. Mountains rose in western North America, and volcanoes erupted.	
	Tertiary Period	PLIOCENE EPOCH 10 1/2 Million Years	14 Million	Sea life became much like that of today. Birds, camels, cats, elephants, horses, monkeys, and other mammals became like modern kinds and spread from continent to continent.	 Horses	The Oligocene, Miocene, and Pliocene epochs were much alike. Rocks that formed during these epochs included clays, limestones, and sands. The climate was uniform and mild through the Oligocene and Miocene, but began to get cooler during the Pliocene, leading up to the following Ice Age. Mountain making was common, and many volcanoes erupted. Oil and natural gas formed in rocks made during these epochs.	Cascade Mountains
		MIOCENE EPOCH 12 Million Years	26 Million	Apes appeared in Asia and Africa. Other animals included bats, monkeys, and whales, and primitive bears, dogs, and elephants. Flowering plants and trees resembled modern kinds.	 Apes		Alps and Himalayas
		OLIGOCENE EPOCH 14 Million Years	40 Million	Primitive apes appeared. Camels, cats, dogs, elephants, horses, rhinos, and rodents developed. Huge rhinoceroslike animals disappeared near the end of the epoch.	 Early Horses		
		EOCENE EPOCH 15 Million Years	55 Million	Fruits, grains, and grasses developed. Birds, amphibians, small reptiles, and fish were plentiful. Primitive bats, camels, cats, horses, monkeys, rhinoceroses, and whales appeared.	 Grasses		
		PALEOCENE EPOCH 10 Million Years	65 Million	Flowering plants became plentiful. Invertebrates, fish, amphibians, reptiles, and small mammals were common.	 Small Mammals		Rocky Mountains
MESOZOIC ERA	CRETACEOUS PERIOD 65 Million Years		130 Million	Flowering plants appeared. Invertebrates, fish, and amphibians were plentiful. Dinosaurs with horns and armor became common. Dinosaurs died out at the end of the period.	 Flowering Plants	Oceans flooded large areas. Coal swamps developed. Rocks included chalk, limestones, sandstones, and shales. Coal, gas, oil, and ores of gold, silver, and other metals were formed.	
	JURASSIC PERIOD 50 Million Years		180 Million	Cone-bearing trees were plentiful. Sea life included primitive squids. Dinosaurs reached their largest size. The first birds appeared. A few small, primitive mammals lived on land.	 Birds	Shallow seaways cut across the continents. Some volcanic action occurred. Rocks included limestones, sandstones, and shales. Gas, oil, salt, and ores of gold and uranium formed.	Sierra Nevada; California Coast Ranges
	TRIASSIC PERIOD 45 Million Years		225 Million	Cone-bearing trees were plentiful. Many fish resembled modern kinds. Insects were plentiful. The first turtles, crocodiles, and dinosaurs appeared, as did the first mammals.	 Dinosaurs	Layers called red beds developed along with shales, sandstones, and limestones. Gas, oil, and ores of copper and uranium formed. Faults (cracks) occurred in eastern North America.	Palisades Caucasus Mountains
PALEOZOIC ERA	Carboniferous Period	PERMIAN PERIOD 50 Million Years	275 Million	Algae were plentiful. The first seed plants—cone-bearing trees—appeared. Fish, amphibians, and reptiles were plentiful. Trilobites and eurypterids died out near the end of the period.	 Seed Plants	Glaciers in the southern hemisphere melted and left sedimentary layers. Rocks in the northern hemisphere included limestones, sandstones, and shales. Gas, oil, gypsum, and salt formed.	Ural Mountains
		PENNSYLVANIAN PERIOD 35 Million Years	310 Million	Algae were plentiful. Fern trees grew from seedlike bodies. Fish and amphibians were plentiful. The first reptiles appeared. Giant insects lived in forests where coal later formed.	 Reptiles	Swamps covered the lowlands. Oil, gas, and large amounts of coal formed among limestones, sandstones, and shales. River deltas partially filled the Appalachian seaway.	Appalachian Mountains
	MISSISSIPPIAN PERIOD 35 Million Years	345 Million	Algae were plentiful and the first mosses appeared. Trilobites were dying out. Shelled animals, fish, and amphibians were plentiful. Many coral reefs were formed.	 Amphibians	Large amounts of limestone formed among layers of shale and sandstone in deltas in the Appalachian and Cordilleran seaways. Coal, gas, oil, and deposits of lead and zinc formed.	Variscan Mountains	
	DEVONIAN PERIOD 60 Million Years	405 Million	The first forests grew in swamps. Many kinds of fish, including sharks, armored fish, and lungfish, swam in the sea and in fresh waters. The first amphibians and insects appeared.	 Fish	Red sandstones, shales, and limestones formed in Europe, and black shales, reef limestones, and sandstones formed in North America. Gas, oil, and quartz sand formed.	Acadian Mountains Caledonian Mountains	
	SILURIAN PERIOD 30 Million Years	435 Million	Algae were plentiful and spore-bearing land plants appeared. Trilobites, fish, and mollusks were common. Coral reefs formed, and air-breathing animals called eurypterids appeared.	 Eurypterids	Limestones, coral reefs, sandstones, and shales formed, with the deepest deposits in the Appalachian and Cordilleran seaways. Gas, oil, gypsum, iron ore, and salt formed.		
	ORDOVICIAN PERIOD 45 Million Years	480 Million	Algae became plentiful. Trilobites, corals, and shelled animals were common. Tiny animals called graptolites grouped together and formed branching colonies. Jawless fish appeared.	 Mollusks	Greatest floods of the era covered two-thirds of North America. A delta formed in the Appalachian seaway. Gas, oil, lead, and zinc formed in limestones, sandstones, and shales.	Taconian Mountains	
	CAMBRIAN PERIOD 120 Million Years (?)	600 Million (?)	Plentiful fossils appeared for the first time. Insectlike animals called trilobites, and some shelled animals were common in the sea. Fossil teeth give evidence of the first fish.	 Trilobites	Seas spread across North America from the Appalachian seaway in the east and the Cordilleran seaway in the west. Lead and zinc formed in sandstones, shales, and limestones.	Vermont Mountains	
	PRECAMBRIAN TIME Almost 4 Billion Years (?)	4 1/2 Billion (?)	Corals, jellyfish, sponges, and worms lived in the sea about 1,100 million years ago. Algae and bacteria lived as long ago as 2,200 million years. Before that, no living things are known.	 Bacteria	Copper, gold, iron, nickel, and silver formed in shales, siltstones, lava, volcanic ash, and metamorphic rocks. The earth's crust melted and cooled repeatedly during this time.	Kittlingen Mountains Algonian Mountains Laurentian Mountains	

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