



Theology and Physics Series

St Mary's University, Twickenham, London

The Big Bang Theory and the creation of the Universe:

The cosmological and biblical viewpoints

Cosmological viewpoint

- *Cosmological theories*



Source:

<http://www.cartage.org.lb/en/themes/sciences/mainpage.htm>

Cosmology is the study of the origins of the Universe (also called Cosmos from the Greek word $\kappa\omicron\sigma\mu\omicron\varsigma$).

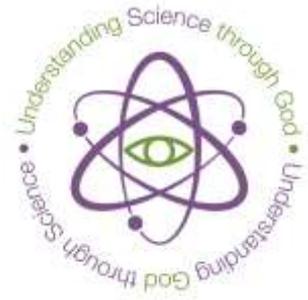
The three main cosmological models are:

Aristotle's Universe

Aristotle was a Greek philosopher who lived in the 4th century B.C. He developed a geocentric system in which the Earth was at the centre and static. Earth was surrounded by concentric celestial spheres containing the planets and the fixed stars (called "fixed" because they

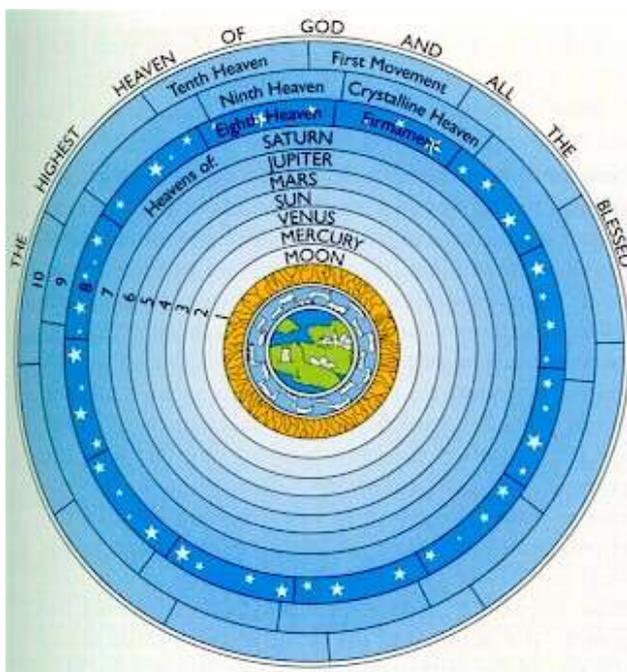


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were seen by an observer on Earth as luminous objects which were always in the same position)

Ptolemy's Universe

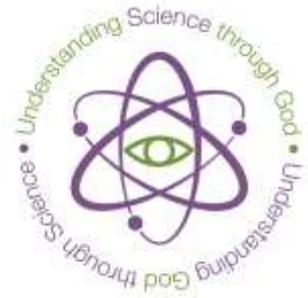


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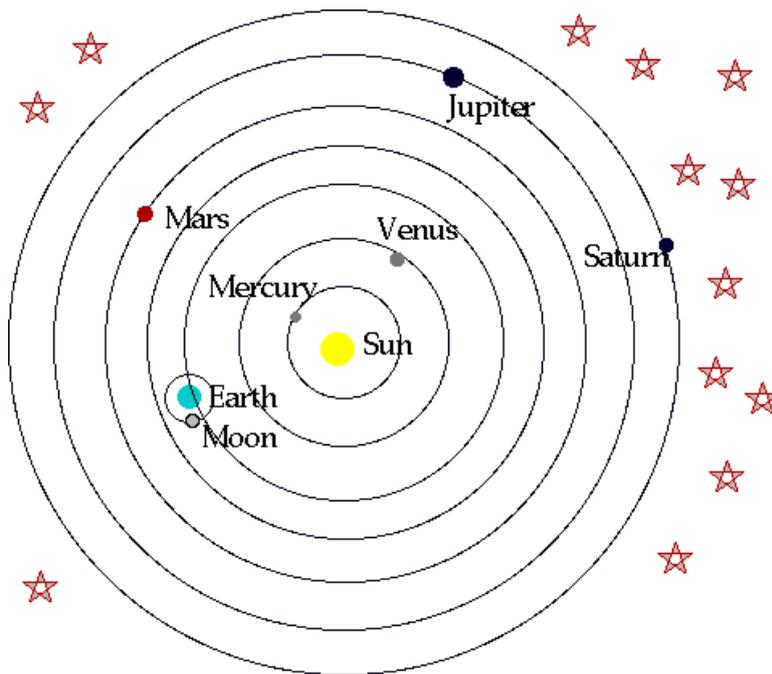
<http://websupport1.citytech.cuny.edu/faculty/pcatapano/WC2/wc2images/ptolemy.jpg>

Ptolemy was a Roman-Egyptian mathematician and astronomer who lived in the 2nd century A.D. The Universe model developed by Ptolemy was based on the Aristotelian one, which means that the Earth was thought to be a static planet placed at the centre of the system.

The rest of the Universe and the planets were orbiting around this static Earth following circular epicycles. This model was the most long-lived and successful of all Universe's models.



Copernican Universe



Nicolaus Copernicus was a Polish astronomer and polymath who lived in the 16th century A.D. He developed the heliocentric (the Sun is at the centre of the system) model of our solar system with the planets orbiting around it. Copernicus can be seen as the father of modern cosmology.

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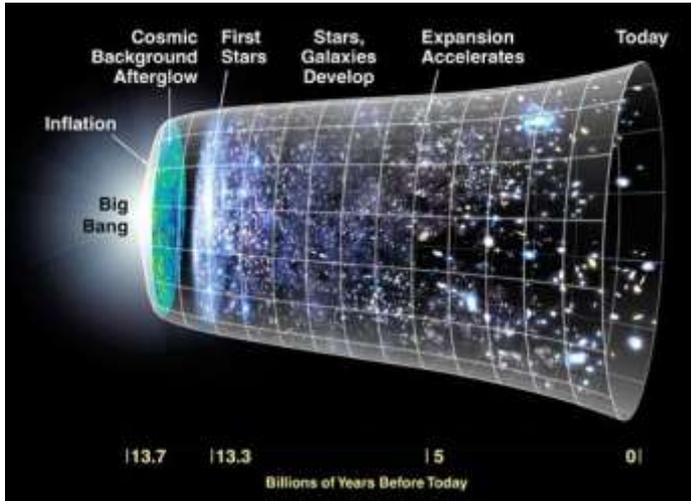
http://www.conservapedia.com/File:Copernicus_system.gif

Big Bang Theory of the Universe

This theory was developed by the Catholic priest and theoretical physicist Fr Dr Georges Lemaître in the 20th century A.D. According to this model, the Universe stemmed from an extremely small and dense point (called a singularity) about 13.8 billions of years ago. Since its “birth” the Universe is expanding.



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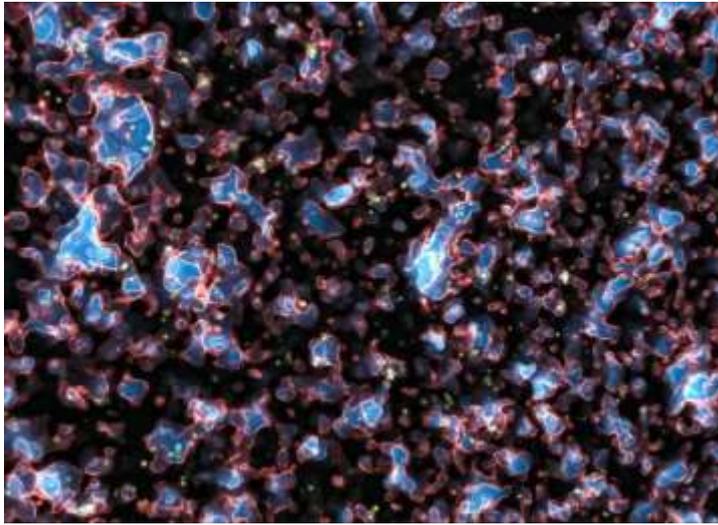
http://hetdex.org/dark_energy/index.php

- *Early Universe*

At the beginning of time, the Universe was a chaotic, extremely hot, unbelievably dense place in space and time packed beyond imagination with highly energetic particles. This is often called the “cosmic soup”. The soup started to cool soon after the Big Bang and within 20 minutes the first building blocks of matter, called **atomic nuclei**, started to appear. However it took more than 300,000 years before the formation of atoms. Although this happened so long ago, we still have knowledge of it by making careful measurement of the left over heat. We call this the “cosmic microwave background” (CMB), as its energy is similar to that of your microwave oven. The CMB heats up the universe by about 3 degrees in all directions, but the tiny departures from this tell us a great deal about the early universe.



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A simulation of the early Universe.
Credit: M. Alvarez, R. Kaehler, and T. Abel

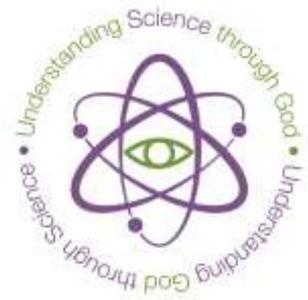
- *Evolution of the Universe*

According to the Big Bang theory:

- 1) The Universe was born as an extremely hot and dense single point (singularity) in which all the space and time were contained;
- 2) Soon after its "birth" the Universe (i.e. that single, hot and dense point) experienced a "growth spurt", i.e. an expansion better known with the name "inflation";
- 3) Within the first few minutes of its life, the Universe saw the formation of light chemical elements. As the Universe cooled down particles such as protons and neutrons were formed that then turned to form deuterium (an isotope of hydrogen). During the first 380,000 years protons, neutrons and electrons created a kind of foggy "cloud" that was too opaque to allow light to pass through it;
- 4) When the Universe was 380,000 years old, it was cold enough to permit electrons to combine with protons and neutrons and to form atoms.



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Because of this “recombination” of electrons in atoms, the Universe became less “foggy” and more transparent and “there was light”. This very old light is still “visible” today in the form of radiation from the CMB. The period of “recombination” was followed by a period of “darkness” before the stars were formed;

- 5) About 400 millions of years ago, the Universe came out of darkness and a dynamic phase of the Universe’s life began. Clusters of gas collapsed to form stars and other bright objects. The Universe started to shine;
- 6) About 9 billions of years after the “birth” of the Universe, our solar system in our Milky Way Galaxy came into being. Hence, our solar system including our Earth is about 4.6 billion years old.

Biblical viewpoint

- The Text (Genesis 1)

1¹ In the beginning when God created the heavens and the earth, 2 the earth was a formless void and darkness covered the face of the deep, while a wind from God swept over the face of the waters. 3 Then God said, ‘Let there be light’; and there was light. 4 And God saw that the light was good; and God separated the light from the darkness. 5 God called the light Day, and the darkness he called Night. And there was evening and there was morning, the first day.

6 And God said, ‘Let there be a dome in the midst of the waters, and let it separate the waters from the waters.’ 7 So God made



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the dome and separated the waters that were under the dome from the waters that were above the dome. And it was so. ⁸ God called the dome Sky. And there was evening and there was morning, the second day.

⁹ And God said, 'Let the waters under the sky be gathered together into one place, and let the dry land appear.' And it was so. ¹⁰ God called the dry land Earth, and the waters that were gathered together he called Seas. And God saw that it was good. ¹¹ Then God said, 'Let the earth put forth vegetation: plants yielding seed, and fruit trees of every kind on earth that bear fruit with the seed in it.' And it was so. ¹² The earth brought forth vegetation: plants yielding seed of every kind, and trees of every kind bearing fruit with the seed in it. And God saw that it was good. ¹³ And there was evening and there was morning, the third day.

¹⁴ And God said, 'Let there be lights in the dome of the sky to separate the day from the night; and let them be for signs and for seasons and for days and years, ¹⁵ and let them be lights in the dome of the sky to give light upon the earth.' And it was so. ¹⁶ God made the two great lights—the greater light to rule the day and the lesser light to rule the night—and the stars. ¹⁷ God set them in the dome of the sky to give light upon the earth, ¹⁸ to rule over the day and over the night, and to separate the light from the darkness. And God saw that it was good. ¹⁹ And there was evening and there was morning, the fourth day.

²⁰ And God said, 'Let the waters bring forth swarms of living creatures, and let birds fly above the earth across the dome of



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the sky.’²¹ So God created the great sea monsters and every living creature that moves, of every kind, with which the waters swarm, and every winged bird of every kind. And God saw that it was good.²² God blessed them, saying, ‘Be fruitful and multiply and fill the waters in the seas, and let birds multiply on the earth.’²³ And there was evening and there was morning, the fifth day.

²⁴ And God said, ‘Let the earth bring forth living creatures of every kind: cattle and creeping things and wild animals of the earth of every kind.’ And it was so.²⁵ God made the wild animals of the earth of every kind, and the cattle of every kind, and everything that creeps upon the ground of every kind. And God saw that it was good.

²⁶ Then God said, ‘Let us make humankind in our image, according to our likeness; and let them have dominion over the fish of the sea, and over the birds of the air, and over the cattle, and over all the wild animals of the earth, and over every creeping thing that creeps upon the earth.’

²⁷ So God created humankind in his image,
in the image of God he created them;
male and female he created them.

²⁸ God blessed them, and God said to them, ‘Be fruitful and multiply, and fill the earth and subdue it; and have dominion over the fish of the sea and over the birds of the air and over every living thing that moves upon the earth.’²⁹ God said, ‘See, I have given you every plant yielding seed that is upon the face of



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all the earth, and every tree with seed in its fruit; you shall have them for food. ³⁰ And to every beast of the earth, and to every bird of the air, and to everything that creeps on the earth, everything that has the breath of life, I have given every green plant for food.' And it was so. ³¹ God saw everything that he had made, and indeed, it was very good. And there was evening and there was morning, the sixth day.

² Thus the heavens and the earth were finished and all their multitude. ² And on the seventh day God finished the work that he had done, and he rested on the seventh day from all the work that he had done. ³ So God blessed the seventh day and hallowed it, because on it God rested from all the work that he had done in creation (Gen. 1.1–2.3 NRSV)

- **Structure of the text**

A "He created" [*Bārā'*] (1.1a)

B "*Elohim*" (1.1a)

C "the heavens and the earth" (1.1b)

D "God separated" and "God said let there be X and there was X or let X do Y and it was so" (1.2–31)

D¹ *Opus Distinctionis* (1.3–10)

D² *Opus Ornatus* (1.11–25)

D³ Creation of Humanity as *Imago Dei* (1.26–31)

D⁴ The command to keep *Shabbat* (2.1–3)

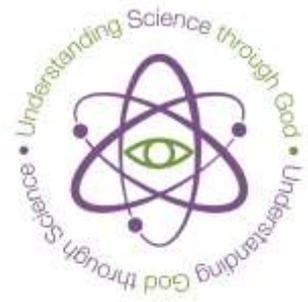
C' "the heavens and the earth" (2.1)

B' "*Elohim*" (2.2)

A' "He had created" [*Bārā'*] (2.3)



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- Introduction

Three arguments are central to this presentation: that in Gen. 1.1–2.3, read in the shadow of Empire, the author uses ancient cosmology as a blue print for the restoration of Judah and that this cosmology is not necessarily at odds with the scientific view; that Gen. 1.1–2.3 is a carefully crafted biblical cosmology based on the plan of the Jerusalem Temple; that the Genesis account begins not with God creating *ex nihilo*, as is commonly assumed, but with the deity working with undifferentiated matter, a cosmic mishmash. Primordial light, the first act of creation, is distinguished temporarily from the light transmitted by the sun and stars. As a whole, the Genesis account charts the progressive differentiation of the cosmos from cosmic mishmash to an intricate structure that supports biodiversity in which *Homo habilis* and *Homo sapiens* are the latest arrivals on our evolutionary calendar.

- Biblical cosmology and the *ENUMA ELISH*

He [Marduk] made the stations for the great gods;
The stars, their images, as the stars of the Zodiac, he fixed.
He ordained the year and into sections be divided it;
For the twelve months he fixed three stars.
The Moon-god he caused to shine forth, the night be entrusted to him.
He appointed him, a being of the night, to determine the days;
Every month without ceasing with the crown he covered him, saying:
“At the beginning of the month, when thou shinest upon the land, Thou
commandest the horns to determine six days. And on the seventh day to
divide the crown. When the Sun-god on the foundation of heaven ...
thee... [The tablet is damaged here].



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- **Cosmology as a means to monotheism**

Underlining the three arguments above is the premise that the cosmology of Gen. 1.1–2.3 is instrumental: It is a means to convince post-exilic Judeans that the one God of Israel is the architect, the creator of the restored nation of Israel. It is not the Babylonians or even the Persian King Cyrus who had given the people of Judea [*Yehud*] permission to go back to rebuild the nation and the Temple. I suggest therefore that one way to read the account in Genesis is to have in mind the restoration of Judah as my next few slides will show.

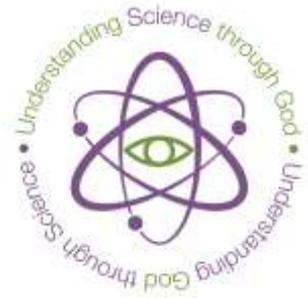
- **In the beginning... or when God created ...**

The account begins [בְּרֵאשִׁית בָּרָא אֱלֹהִים אֶת הַשָּׁמַיִם וְאֶת הָאָרֶץ] “When God created the heavens and the earth...” (Gen.1.1).

The French translation, *Traduction Œcuménique de la Bible* adopts a similar translation, «Lorsque Dieu commença la création».

I argue that understanding the Hebrew phrase בְּרֵאשִׁית בָּרָא אֱלֹהִים as a temporal clause admits of an evolutionary concept of creation not at odds with the scientific view.

While on one level this is about creation on another level this about restoration. It is not the postexilic leaders, such as Zerubbabel, or “Sheshbazzar the prince of Judah” (Ezra 1.8) who are architects of the restoration of Judea but God.



- Summary of six-day creation

Problem	Days 1–3	Days 4–6
	<i>Opus Distinctionis</i>	<i>Opus Ornatus</i>
Darkness	Separation of light and darkness	Sun, moon and stars
Water	Separation of waters between firmament	Birds and fish
Wasteland	Separation of the Earth and the Sea	Land animals and humans

- Biblical cosmology and the Jerusalem temple

THE PORTICO

The Portico corresponds to the first three days of creation which we have described as the *Opus Distinctionis*. In the context of the Temple precincts this is where all the preparations for worship are carried out, including distinguishing between what is clean and unclean. This is the area in the New Testament described as the cleansing of the Temple by Jesus.

THE NAVE

The nave is the main area of the Temple. Here only Jews were allowed. It represents the last three days of creation which we have described as the *Opus Ornatus*. It is as if proper worship is the highlight of creation. This is sacred space prepared for by the *Opus Ornatus*.

THE HOLY OF HOLIES [קֹדֶשׁ הַקְּדוֹשִׁים]

This is the inner sanctuary of the Temple where the Ark of the Covenant was kept during the First Temple, which could be entered only by the High Priest on *Yom Kippur* after sanctifying himself and represents the seventh day. When the Temple was rebuilt after the Babylonian captivity, the Ark was no longer present in the Holy of Holies; instead, a portion of the floor was raised slightly to indicate the place where it had stood.



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- **Model of the Jerusalem Temple**



- **Conclusion**

To conclude, Gen. 1.1–2.3 is not at odds with modern scientific cosmology. To insist that it is, does violence both to Scripture and to science. Gen. 1.1–2.3 is addressed to a group of people, who are surrounded by nations whose cosmologies were informed by polytheism and the mythologies that flowed out of polytheism. In short Gen. 1.1–2.3 is a corrective against polytheistic concepts encountered by the Israelites in Egypt, Babylon as well as in Canaan. Above all this cosmology is a means to show sixth century BCE readers that the chief Architect of the restored land of Judea is God and that the *Sabbath* is to be fulcrum of restored work and worship.