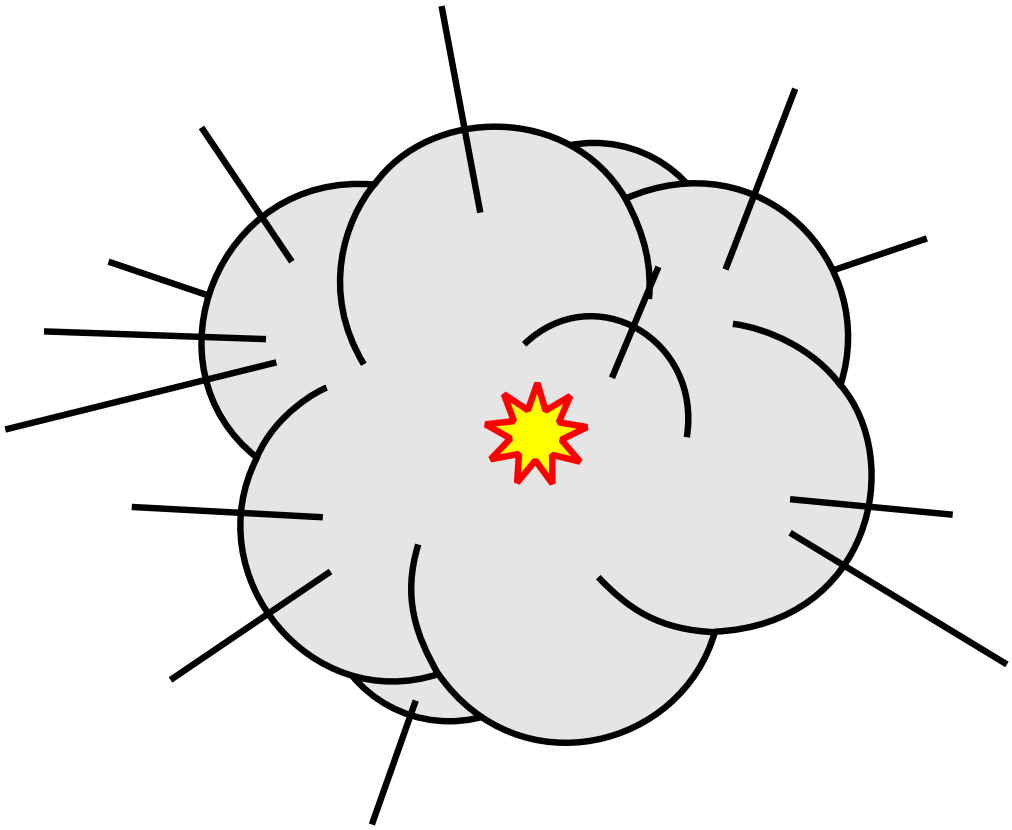
The Big Bang
And
The Bible

(Contingency and Creation)



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Summary

The Big Bang Theory is the idea that the universe came into existence as the result of a single creation event in the distant past. It is now generally accepted as being an almost certain fact, apart from by a vanishingly small number of die-hard atheists and a small number of American extremist Evangelicals.

The Big Bang theory has, however, only been generally accepted by a majority of scientists since the end of the 1969s. In earlier times the alternative idea, a steady state universe which has always existed prevailed because it had been accepted by ancient Greek philosophers and because it was much less evident why the steady state theory would imply the existence of God.

The first items of evidence for a creation event were the fact that the sky is mainly dark at night and that there are stars in it, which means that the universe is not infinite and that the universe is not old enough for the stars to have burned up all their fuel. In the first half of the twentieth century Einstein showed that the theory of relativity implied a universe which was finite and either expanding or contracting; this theory was developed by Lemaître to indicate that it was expanding and had come from a singularity in the past. Lemaître's work came from his belief in the biblical idea of creation. It was confirmed in 1929 when Edwin Hubble discovered that the universe was, indeed, expanding. Further items of evidence in the form of the relative abundances of various atomic nuclei and the cosmic microwave background radiation were observed after the second world war and by the mid 1970s the Big Bang Theory had become almost universally accepted.

The Big Bang theory was not welcomed by atheists, who continued to oppose it long after the general scientific community had accepted it. It is fully consistent with the teaching of the Hebrew Scriptures, and indeed its discovery was prompted by a reading of the Bible. Nevertheless the evidence is overwhelming.

The Big Bang theory gives an easy introduction to the argument for the existence of God from contingency (sometimes called the first cause argument). This argument can be summarised as:-

1. Things in the universe exist
2. It is possible for all things in the universe to not-exist - they are contingent.
3. Any contingent entity requires some other entity to cause it to exist.
4. An infinite regression of causes cannot account for the existence of contingent entities.
5. Therefore there must be a necessary entity to account for the existence of the universe.
6. This necessary entity corresponds to the God of the Bible.

The important ideas of the paper are those of contingent items (items that can either not exist or can be different from what they are) and necessary items (items which must logically exist as they are). God is a necessary entity and one can therefore deduce things about him. These correspond to what the Bible tells us about God.

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Introduction

The origin of the universe is the subject of considerable interest. At one point it was thought that the universe was of infinite age and had never had a moment of creation but the general consensus now is that the universe came into existence as the result of a single creation event which is known colloquially as “The Big Bang”. This idea is taught in schools and universities, is depicted on television and is generally accepted by scientists. It also provides extremely good evidence for the existence of a supernatural Creator.

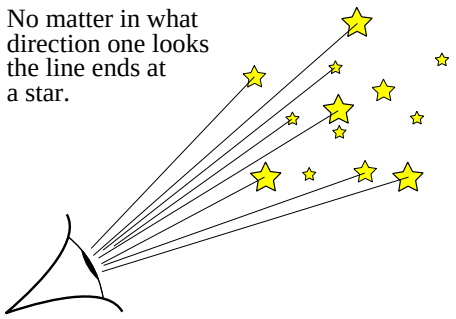
The Big Bang Theory

History of the Idea

If one traces the history of ideas back, it is clear that the idea of a creation event has only been widely accepted quite recently. In mediaeval times the Church adopted the teachings of Aristotle, among them the idea that the universe had always existed and that there was therefore never any direct creation event as such. The philosophy of Thomas Aquinas includes his *Quinque Viae* which were arguments which show that a creator is necessary even for an eternal universe.

The idea that the universe was infinitely old became so ingrained in our culture that it remained unquestioned even among scientists of the calibre of Edmund Halley or Isaac Newton. Newton posed the question of why his law of universal gravity did not cause all the stars to fall together into a single mass. The real reason is that the universe is expanding, which requires a universe of finite age, but Newton was so used to the idea of an infinitely old universe that he couldn’t accept this idea. Instead he concluded that the universe would have to be infinitely large and to have stars (or galaxies) distributed uniformly throughout it so that the pull of gravity on one side is balanced by the pull from the opposite direction. The possibility of a universe which was of finite age simply did not occur to him. A universe which has come into existence as the result of a creation event is, of course, of finite age.

Olbers’ Paradox



In 1823 Olbers published his question about the fact that the sky is dark between stars at night. If the universe were infinite then no matter what direction the line of sight was in, sooner or later it would reach a star and the sky would be very bright.

The fact that the sky at night is dark shows that the universe is finite. This can only happen if it is not infinitely old, which requires that at some point there was a creation event.

Olbers’ contemporaries were so convinced that the universe had no beginning that they considered his question to be a paradox.

Olbers’ Paradox

The only problem at this stage came from the Danish astronomer Heinrich Olbers, who noticed that the sky was dark at night. Olbers reasoned that if the universe was infinite then no matter in what direction one looked the line of sight would always end with a star and the sky would therefore be as bright as the surface of the sun. However, a finite universe would collapse under gravity.

The obvious and correct solution to this problem is that the universe has not existed for an infinite time, and is in motion. However, when Olbers pointed out his analysis and its implications in 1823 everyone was so convinced that the universe was infinitely old that they were unable to solve the problem and it was described as a paradox.

Star Fuel

Another problem that became apparent towards the end of the 19th century was the existence of stars. Stars burn fuel in order to produce light and heat, and their fuel is clearly not yet exhausted. There is only a finite amount of fuel in any finite volume of the universe, and in a

Quantum Theory

Quantum theory deals with the universe at very small scales. On the scale of a few nanometers (the size of an atom) or smaller, objects behave as though they were both waves and particles. The behaviour of a particle is affected by the fact that it is being observed and truly random events occur.

One of the striking results of quantum theory is the Heisenberg uncertainty principle, which states that it is impossible to know with complete accuracy both the momentum and the position of an object, or the energy and the time of measurement.

Quantum effects lead to behaviour which seems bizarre to people who are used to systems at larger scales.

universe which was infinitely old all this fuel would have been used up. In this case the stars would have long gone out and the energy of the universe would be distributed as thermal radiation, evenly through space. This state is called “heat death” and the fact that the universe is not in this condition implies that it is not infinitely old.

Relativity

At the start of the 20th century there was a revolution in human understanding of the physical universe. In 1905 Albert Einstein published four papers which forced this change. One of these formed the beginning of quantum theory, one outlined the theory of special relativity and one showed how mass could be converted into energy and vice-versa.

In 1917 Einstein, having developed his theory of relativity further and applied it to the universe as a whole, published an equation which described the size of the universe; this is Einstein’s famous cosmological equation. The solution to the equation shows a universe which is in motion, either expanding or contracting. Einstein was so used to the idea of a universe which had always existed and was static that he fudged the equation to force a possible solution which allowed a static universe.

Lemaître and the Big Bang

At this point the idea of a static universe without a beginning was challenged by Georges Lemaître. Lemaître was a Christian and also a physicist. He saw that the solution to Einstein’s cosmological equation allowed for a moment of creation, and because the Bible described a creation event he was prepared to accept that the universe was not eternal but had expanded from a creation event.

He published his solution to the problem and the idea of a creation event in 1927; this is one of the few times that Bible teaching has led to a modern scientific theory which was unknown outside the pages of the Bible. By accepting the Bible at face value, Lemaître was able to advance the scientific understanding of the universe.

The Theory of Relativity

This theory of relativity is based on the experimental result that the speed of light is the same to all observers and the idea that it is impossible to decide that one observer has a better view of the universe than another who might be travelling at a different speed.

The consequences of these two facts include the idea that it is not possible for anything to travel faster than the speed of light, and that time is a property of the observer rather than an absolute property of the whole universe.

The Special Theory of Relativity was launched in 1905 by Albert Einstein and deals with the effect of travelling at high speeds but without acceleration. This is a special case of the General Theory of Relativity, in which observers may accelerate or travel in gravitational fields.

General relativity predicts that light can be bent by gravitational fields, that the speed at which time flows depends on the velocity of the observer and gravitational fields in which the observer is situated. It also predicts the existence of black holes, places where the density of matter is so great that light is unable to escape.

Evidence for the Creation Event

The idea of a creation event was an interesting theory based on a small number of very simple observations, but very soon it became a certainty as predictions made by the theory were confirmed by experiment.

Hubble and the Expansion of the Universe

Direct evidence of the expansion of the universe was provided by the observations of Edwin Hubble who published his findings in 1929, two years after Lemaître had deduced what was going on from the Bible and the solution to Einstein’s cosmological equation.

Hubble looked at the spectra of galaxies. These spectra have dark lines in them from the absorption of light at specific frequencies by atoms in those galaxies; we would expect to see exactly the same set of absorption lines from any light source, including any galaxy. In fact the absorption lines of distant galaxies were shifted towards the red end of the spectrum, and the further away the galaxy was the more pronounced was the red-shift.

The explanation of this redshifting of spectra is in the Doppler effect. When an object sends out a wave the frequency of that wave is altered by the motion of the object. If an object emitting a sound wave is moving away the sound will appear to have a lower note; if the object is emitting light the light will be redder.

Einstein's cosmological equation

$$R_{\mu\nu} - \frac{1}{2}Rg_{\mu\nu} + \Lambda g_{\mu\nu} = 8\pi\frac{G}{c^4}T_{\mu\nu}$$

Einstein's equation describes the action of objects in space under the influence of gravity. It can be applied to collections of individual particles or to the universe in general.

The solution of this equation for the whole universe has the problems that when $\Lambda = 0$ it has no stable solution; the universe must either expand or contract. Originally the $\Lambda g_{\mu\nu}$ term was not part of the equation; it was added by Einstein to allow a solution which represented a static universe. When the expansion of the universe was discovered Einstein described the insertion of this term as his greatest mistake. However, this is the term which may allow for the existence of "dark energy" in the universe.

Hubble's observations are best explained by the idea that the galaxies are moving away from us, and that the further away the galaxies are the faster they are moving. This is equivalent to the suggestion that all galaxies are moving away from one another; the universe is expanding.

When Einstein read of Hubble's discovery of the expanding universe he realised that this expansion was shown by the unstable solution to his cosmological equation. He described his alteration to the equation to allow a static universe as his "greatest mistake".

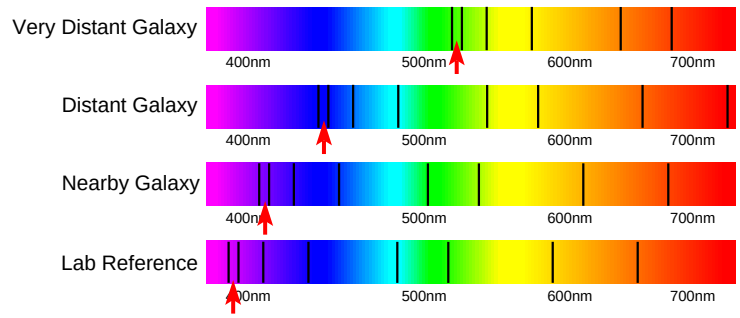
Consequences of an Expanding Universe

The implication of the fact that the universe is expanding comes from what happens if one effectively runs the film of the expansion of the universe backwards. If one works back from the present day one can see that the universe was smaller in the past. If one works further back still, the universe will be even smaller and one can see that there was a time in the past when the universe had no size at all. This is the creation event.

At this point Einstein's cosmological equation has no solution; it is described as singular (the ordinary terminology for an equation with no solution). The point from which the universe would have emerged is therefore described as "The Singularity". It is

Hubble and The Expanding Universe

In the 1920s Edwin Hubble measured the spectra of different galaxies and found that the pattern of lines in them was shifted towards the red. The further away were the galaxies, the greater the redshift. The best explanation of this is that the galaxies are moving away from us and that the speed of this movement increases with distance.



These measurements indicate that every galaxy in the universe is moving away from every other galaxy. Effectively the universe is expanding. This means that in the past the galaxies were much closer together and if one goes back far enough the universe should come from a single point. At this point there is no solution to Einstein's equation; the point is called a "singularity".

Mass and Energy

One of the consequences of Einstein's theory of relativity is that matter can be converted into energy and energy into matter. The famous equation that expresses this conversion is:

$$E = MC^2$$

C is the speed of light, which is very large; as a consequence eliminating a small amount of matter will generate a very large amount of energy.

useful to realise, however, that the universe may have been created at a point later than this (although the evidence suggests that it was not much later).

The idea of a creation event was proposed in 1927 by Lemaître and evidence for it was published by Hubble in 1929, but scientists who were strongly atheistic continued to reject to it on the grounds that it was too much like the biblical idea of the creation. Even some non-atheists were suspicious of it because they liked to keep the idea of God out of their science. Hubble himself never accepted the idea that the universe was expanding and that there had therefore been a creation event. He always wrote that the universe "appeared" to be expanding and never that it was actually expanding. Eddington (another famous scientist of the period) wrote that the notion of a beginning to the universe was "repugnant".

The Steady State Theory

The largest objection to the idea of the beginning to the universe came from Fred (later Sir Fred) Hoyle and Herman Bondi (also knighted later). Hoyle argued that the idea that the universe had a beginning must be unscientific because it resembled arguments for the existence of a creator. He, Bondi and Gold proposed, as an alternative, what was known as the "Steady State Theory" in which matter was being created continuously to fill the void left by the expansion of the universe. The only reasoning behind this was that the proponents were atheists and they wished to avoid obvious evidence for the existence of a creator. Hoyle later became a theist, but Bondi remained an atheist all his life and was distinguished by awards from various atheist foundations and societies for his work.

Hoyle coined the phrase "Big Bang" to describe the creation event; this was during a wireless broadcast by the BBC in 1949. This seemed to be an attempt to belittle the idea of a creation event, but Hoyle himself protested that he had not intended the phrase to be anything other than helpful.

For some time there was debate over the relative merits of the Big Bang theory and its only alternative, the Steady State theory. However as evidence accumulated it became obvious that there really had been a creation event.

The Abundance of Helium

The first evidence to appear was measurement of the abundances of various light elements in the universe. The nuclei of

Reactions to the Creation Event

The fact of a creation event at the start of the universe has tended to produce unease among atheists. When the evidence first appeared many people who wished to deny the existence of God or the involvement of God in creation continued to oppose the idea of the Big Bang theory.

Stephen Hawking: (1988) "Many people do not like the idea that time has a beginning, probably because it smacks of divine intervention" [*Brief history of time*, p46]

Sir John Maddox: (1989) pronounced the idea of a beginning to the universe as "thoroughly unacceptable" because it implied and "ultimate origin of our world" and gave creationists "ample justification" for their beliefs". [*Down with the big bang*, *Nature* August 1986, Vol 340, p425]

Sir Fred Hoyle claimed that the idea of a creation event was pseudo-science because it resembled the arguments for a creator.

These reactions were repeated many times by people of lesser calibre. Great impetus was given to the Steady State Theory of Hoyle and Bondi simply because the fact of a beginning to the universe invites the question of what, or who, was responsible for it. (see Gribbin, J (Nature vol 259, p359f)

The fact of opposition to the Big Bang theory by atheists purely on the ground that a creation suggests a creator is great testimony to the way that scientific evidence supports the case for a creator.

Light Atomic Nuclei

The atomic nucleii whose abundances are predicted by the Big Bang Theory are the following:-

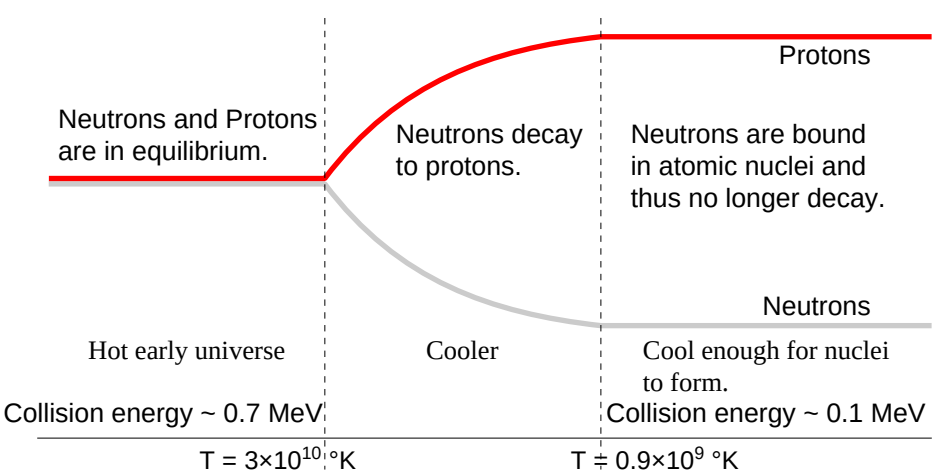
- Hydrogen (H^1) 1 proton, 0 neutron2
- Deuterium (H^2) 1 proton, 1 neutron
- Helium-3 (He^3) 2 protons, 1 neutron
- Helium-4 (He^4) 2 protons, 2 neutrons
- Lithium-7 (Li^7) 3 protons, 4 neutrons

The existence of Deuterium cannot be accounted for by ordinary natural processes outside the creation event as all the processes which can make a deuterium (H_2) nucleus will also convert it to some other kind of nucleus.

the atoms of these elements contain small numbers of neutrons and protons; it is the number of protons which determines the number of electrons in the atom and hence the chemical properties. The neutrons in an atomic nucleus are needed to help to hold the nucleus together. A hydrogen nucleus usually has no neutrons in it, but there is an alternative form called “Deuterium” which has one neutron. Helium cannot exist without some neutrons; Helium-3 has one neutron and two protons and Helium-4 has two neutrons and two protons. As neutrons on their own decay into protons, electrons and anti-neutrinos the only effective source of neutrons for these light elements is the creation event.

In the very early stages of the universe, shortly after the creation event, the energy density of the universe would have been very high. At any collision a neutron might be converted to a proton or a proton to a neutron and the number of each of the two types of particle would be very similar. As the universe expanded it would cool down, and after a while the energy would not be enough to cause conversions between neutrons and protons. The neutrons would continue to decay into protons and the relative number of neutrons would fall. When the temperature fell to an even lower level a collision would result in the neurons and protons holding together to make atomic nuclei. Almost all the neutrons would be used in this way, and the proportions of the different light elements would be fixed; there would be very few heavy nuclei.

The Abundances of Light Elements



In the hotter times collisions between neutrons and protons have enough energy to convert neutrons to protons and vice-versa. At a temperature of 3×10^{10} °K this stops and neutrons are free objects. They then decay until the universe is cool enough to allow them to bind to protons to form nuclei. In the dense universe almost all neutrons bind quickly.

The diagram shows the way that the numbers of neutrons and protons changed in the early universe. A high temperature means that a large amount of energy is involved in any collision between two particles and the two can convert into one another. At temperatures in excess of 30,000 million degrees Kelvin neutrons and protons convert from one to another rapidly and the number of neutrons and protons is almost equal. When temperatures fall below this the neutrons and protons no longer convert to one another. Free neutrons undergo beta decay which converts them to protons; the half-life is about 10 minutes (they are stable when bound in nuclei). During the second phase of the process neutrons continue to decay; the number of neutrons falls and the number of protons increases.

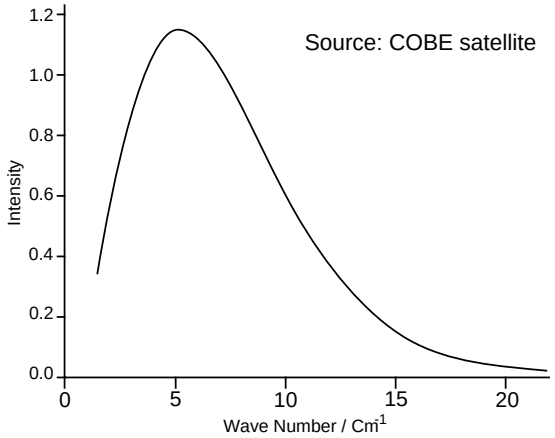
When the temperature falls below 900 million degrees Kelvin the energy of collisions is low enough for neutrons and protons to bind together to form atomic nuclei. In the dense universe at this time neutrons and protons will bind rapidly to form light nuclei. Very few nuclei heavier than Lithium-7 will be formed. The relative abundances of the different nuclei can be calculated from this process and the result is consistent with observed abundances.

The proportions of these nuclei observed in reality match the proportions predicted by the Big Bang theory almost exactly. The existence of deuterium is particularly interesting, because all the other mechanisms for making deuterium convert the deuterium to something else even more rapidly; thus the existence of deuterium is direct evidence of the creation event.

Cosmic Microwave Background Radiation

The other evidence comes from Cosmic Microwave Background Radiation. In the late 1940s various different astrophysicists worked out that if there had been a creation event then there should be very faint microwave radiation coming from all over the sky. This should come almost equally from every direction and should have a distinctive spectrum; this spectrum is characteristic of what is known as “Black Body Radiation”.

CMBR - COBE spectrum



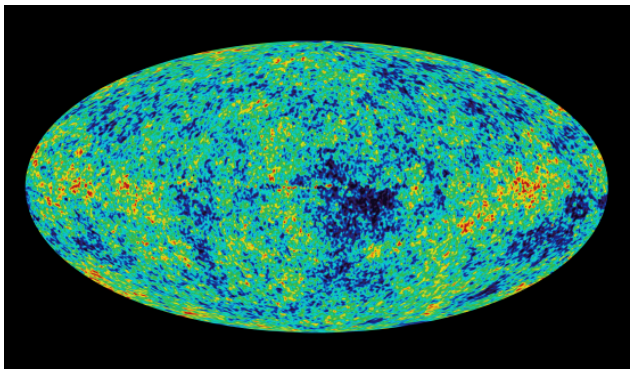
As soon as a creation event for the universe was proposed scientists calculated that this would leave a residue in the form of faint microwave radiation from the sky. The spectrum of this radiation was expected to match that of standard black body radiation.

The spectrum of the radiation was measured by the COBE satellite and shown exactly to match the distribution predicted from the creation event theory.

The radiation was finally observed by Arno Penzias and Robert Wilson in the early 1960s. They were looking for the source of microwaves which were causing noise in radio communications, and found that microwaves were coming from all over the sky. They published their results in 1964.

The evidence continued to build up in favour of a creation event. The COBE satellite measured the spectrum of the microwave background radiation and showed that it was exactly as predicted. The measured spectrum is so close to the prediction of the Big Bang Theory that the line on a graph marking the observations cannot be distinguished from the line of the theoretical predictions (see box).

Distribution in Space



The prediction of the Big Bang Theory is that the cosmic microwave background radiation should be almost exactly equal in intensity from every direction, but with very tiny variations in temperature. These variations should be of the order of one part in 100,000; they form the basis of modern galaxies and clusters of galaxies.

The distribution of the microwave background radiation has been measured by various methods. The most accurate of these in 2014 is the measurement by the WMAP satellite which produced the picture above. The variation in temperature of the background radiation is what was expected from the Big Bang model.

The other detailed prediction from the Big Bang Theory was that the Cosmic Microwave Background Radiation would come almost equally from all directions, but that there would be tiny variations in it. These variations were too small to be measured from earth, but in 2001 a satellite (WMAP) was launched to measure them from space. The data from this were reported in 2006 and 2012; they are almost exactly what one would expect from a creation event.

What it Means

By the mid 1970s only a few die-hard atheists and a few American fundamentalists rejected the idea of a creation event. The atheists rejected the idea because it was too obvious a pointer to the existence of God and the fundamentalists because they thought that science should be opposed by religion and that the idea of creation was not a proper idea to be investigated by scientists.

The theory has also been developed mathematically. One can see that not only did the creation event bring the matter and energy of the universe into existence, but also the laws of nature and even things like the space and time in which the universe exists. Because the laws of nature came into existence with the universe, there can be no natural explanation of how the universe came into existence. What brought it into existence was outside the universe and not subject to the laws of science. The universe must have a supernatural cause.

Summary of Evidence for a Creation Event

The following items of evidence are discussed in this article.

1. **Olbers' Paradox**: The fact that the sky is dark at night shows that the universe is not infinite or eternal.
2. **Existence of Stars**: The fact that stars have not used up all their fuel indicates that a creation mechanism exists.
3. **The Expanding Universe**: As the universe is permanently expanding and has finite size it must have come from an original point; nothing is possible before this.
4. **Abundance of Nuclei**: The Big Bang Theory predicts the relative abundance of certain light elements. The observed abundances are very close to those predicted by the theory.
5. **Cosmic Microwave Background Radiation**: The theory predicts that faint microwaves should be coming from all over the sky. This has been observed and measured and found to match the predicted characteristics of such radiation exactly.

There is other, more exotic, evidence for the idea of a creation event at which the universe started, but this is not discussed in this article.

The Bible Account

Having seen that the universe came into existence as the result of a single creation event it is useful to see how this account fits in with the Bible picture. The important passage is the first chapter of the Bible, Genesis 1.

The First Actions

This chapter begins with a statement about the creation of the universe:-

1 *In the beginning, God created the heavens and the earth.*
2 *The earth was without form and void, and darkness was over the face of the deep. And the Spirit of God was hovering over the face of the waters.*
3 *And 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.*

(Genesis 1:1-5)

This passage starts with a reference to "the beginning" in verse 1. This implies that the entire universe (the heavens and the earth) were created at some point ***before*** the days which are described later on in the chapter. The six days of creation which follow this verse don't describe the creation of either the heavens or the earth; these were already created in verse 1.

One can envisage some process, the duration of which is not revealed in the Bible, which ends up with the earth being "without form and void" (Authorised - King James Version wording). This

phrase translates the Hebrew "תֹהוּ וָבֹהוּ" ("Tohu ve Bohu") which means "empty and waste". The idea here is that the planet existed but was devoid of life. Some scholars from the victorian period and earlier speculated that there had been one or more previous creations in this period, and even attributed the existence of angels to one of these earlier periods. The evidence for these periods is tenuous, but the text of Genesis certainly doesn't rule them out. The text indicates that the heavens and the earth are older than the days of Genesis chapter one, possibly much older.

When God says "Let there be light" and light appears (verse 3) this can be seen as a view of the events as seen from the surface of the earth. Even though the earth had been in existence for some time, the surface is empty and the atmosphere is thick with dust or cloud so that the sky cannot be seen and even light from the sun cannot penetrate. In the rest of the chapter this state of affairs is completely altered.

The Fourth Day

The other point from this chapter is in verses 14-16, the fourth day. This is the day on which the sun, moon and stars appear.

14 *And God said, "Let there be lights in the expanse of the heavens 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 expanse of the heavens to give light upon the earth." And it was so.*
16 *And 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 *And God set them in the expanse of the heavens to give light on 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.* (Genesis 1:14-18)

This might seem to indicate that the stars weren't created until the fourth day of the process, and that therefore they didn't exist earlier. In fact the Hebrew doesn't require this. The only place where there is a direct description of God's activity is in verse 16 - "*God made the two great lights*". The word "*made*" here is not the same as the word "*create*" in v1. The word used for create - bring into existence - is the Hebrew "בָּרָא" ("*bara*"). This is the word which implies that something was created where there was nothing present before.

In verse 16 the word used is different. It is the word "יַּעַשׂ" (*asah* - imperfect tense) which has a wide variety of meanings. Among these is the meaning "show" or "cause to appear". The word could mean that God shaped the stars, or arranged them, or that he simply caused them to be seen on the earth when he cleared the atmosphere.

It is probably this last of these meanings which reflects the situation on the fourth day of creation. The fourth day is the first day that the sun, moon and stars were visible from the surface of the earth in this dispensation.

Meaning of the word Asah

The word translated "made" in Genesis 1:6 is the Hebrew "*asah*". This is a word with a wide range of meanings, and one which is completely different from the word translated "created" in Genesis 1:1

The word *asah* is translated in a large number of different ways, from "do" to "maintain" and from "make" to "perform". The scope of the word includes the idea of showing something which already exists. For example, the word is used here:-

Great salvation he brings to his king, and <u>shows</u> steadfast love to his anointed, to David and his offspring forever. (Psalm 18:50)

Here the word "shows" translates the Hebrew "*asah*". Clearly the word doesn't mean "created".

In Exodus 20:11 we find the word describing God's activity in making our world ("In six days the LORD made the heavens and the earth") but the word also appears in verse 6 ("*<u>showing</u> mercy to thousands*") and verse 9 ("*six days you shall labour and <u>do</u> all your work*").

Clearly the word does not necessarily refer to the creation of the world from nothing.

Meaning

Having established that the scientific evidence and the Bible both tell us that the universe came into existence as the result of a creation event which happened before the current age. one can see that there are some very deep consequences. These are of particular importance when we are discussing God with atheists.

Contingency and Necessity

There are two very important concepts which are used when one is thinking about the existence of God and two very useful technical words.

Contingent: An object is contingent if it does not have to be as it is. If the object could logically not exist, or if it could be completely different from what it is, then that object is contingent. The author is contingent; if I did not exist there would be no difference in the nature of the world. The universe is contingent, because there was a time before which it did not exist.

Necessary: An object is necessary if it is not contingent. In other words, a necessary object must exist; it cannot not-exist, nor can it logically be other than what it is.

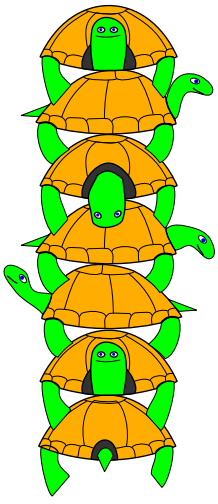
These two ideas are vital in understanding the origin of the universe and the nature of the creator.

The argument from Contingency

Putting together the ideas of Contingency and Necessity with the fact of there being an event at which the universe came into existence allows one to put together a full proof of God's existence.

The first stage in the argument is the observation that things exist. The document you are reading exists, you exist and the whole universe exists.

The Tower of Turtles



This story is occasionally told by atheists in the hope of overturning the argument for the existence of God. However, the story really undermines the atheist case. The story is like this:-

After a public lecture on astronomy an elderly lady stands up in the audience and says that the lecture is wrong and that the earth really stands on the back of a turtle. The lecturer asks what the turtle is standing on. "Another turtle" replies the lady. The lecturer asks what the second turtle is standing on. The lady's answer is scathing: "You can't fool me young man. From there on it's turtles all the way down!"

The point is that one can't explain anything by an infinite sequence of causes. The tower of turtles needs something to stand on, and sooner or later there must be a cause for the universe. If the chain of causes doesn't begin with God, then there must be some other uncaused cause. An atheist who objects to the idea of God must propose some other eternal and necessary entity on which to base the existence of the the universe.

The second observation is that, for things within the universe, it is possible for those things not to exist. This document could not exist; a few years ago it didn't. The article is contingent. Similarly, the writer of this article is contingent, and so is everything else in the universe. There was a time before which none of these things existed.

One can move on from this to point out that anything which is contingent (comes into existence) must require a cause. Nothing that has come into existence can cause itself, because it must exist to cause anything. As nothing can exist before it comes into existence, nothing can cause itself. Thus all the things in the universes require some entity to bring them into existence. This article has a writer, the writer had parents, and so on. This idea of cause and effect goes right back to the universe itself. The universe had a cause.

Who created God?

The common objection to the argument that the universe requires a creator, and that that creator is God, is for the opponent of the argument to ask what, or who, created God. However, this is not really a problem. The point is that there cannot be an infinite regression of causes. A sequence of contingent entities will itself be contingent, and will need a necessary entity to explain it.

Any collection of contingent entities is contingent; this is still the case if the contingent entities form a sequence of cause and effect. Adding another contingent entity to the sequence has no effect; the collection of contingent entities is still contingent. Repeating the process many times makes no difference. This must be the case even if an infinite number of contingent entities is added to the chain. Thus an infinite regression of causes cannot provide a satisfactory explanation of the universe. What is required is a single necessary entity.

An atheist may suggest that the universe is a sufficient cause in itself, but now we know that the universe had a start we can be absolutely certain that it is contingent. It can't provide its own cause.

The version of this argument by ancient philosophers ended at this point with the claim that this creator is God, but there is one possible objection that needs looking at. This is the possibility of an infinite regression of causes.

Who Made God

The schoolboy question on the existence of God is "Who made God?" The idea is that if everything has a cause, then what is the cause of God? In reality God only needs a cause if he is contingent; a necessary object cannot not-exist, so needs no cause.

The chain of cause and effect can't simply be infinite. Consider a collection of contingent entities. This collection must itself be contingent because there is nothing in it to cause it to be necessary. As adding another contingent entity makes no difference to the status of the collection, one can continue to do this indefinitely without making any change; the collection will not become necessary even if the process adds an infinite number of contingent entities. Thus an infinite sequence of contingent entities is contingent; it requires a necessary entity to cause it to exist.

Thus even if the creator of the universe is contingent and needed to be created, the process must end somewhere with a necessary entity. Suppose, for example, that the universe was actually created by angels, there would still be a need for an ultimate entity - a necessary entity - to create the angels. Sooner or later the regress of causes must end with a single ultimate cause; this cause is God.

Because a necessary entity is required to account for the universe, any atheist must show what such an entity would be if there is no God. The question "Who made God" is not sufficient to undermine the first cause argument unless one can propose an alternative first cause.

Things that must be True about God

The fact that God created the universe tells one something about God. God is the ultimate necessary being on which the universe depends and this tells us something about God. Essentially there are some elements that we must expect of a the necessary entity which is responsible for the creation of the universe.

1. **God is not subject to the laws of nature**. God created the universe, and with it the laws of nature that govern events within the universe. Thus God is not subject to the laws which he created himself.

Einstein's Definition of Insanity

Albert Einstein famously stated that insanity was: "doing the same thing over and over again and expecting different results." This is where expecting an infinite collection of objects to become necessary takes one. If adding one contingent entity to the collection does not make it necessary (self explaining) then adding yet another one will not make any difference and so on for ever. To expect anything different is simply insane!

2. **God is Not Subject to Space and Time**: When God created the universe he created both space and time with it. This means that God is, in a sense, outside space and time. He can thus be present anywhere in the universe and is able to know what will happen in the distant future as well as what has happened in the past. This is consistent with what the Bible says about God:

3. **God is not made of matter**: As God existed before there was any matter, he is not made of matter. God caused the universe but he is not part of it. God is outside space and time, and also outside matter.

4. **God is without limit**: This must be the case because God is necessary. God was not created; it is impossible for him to not-exist. This means that he is eternal, and the starting point of any chain of cause and effect which leads to the universe. God is thus without limit other than any that he chooses to impose on himself because otherwise some prior entity would be required to define the limit. If such an entity existed then God could be other than what he is; he could not then be necessary.

5. **God is Rational**: God is the being behind the laws of nature which govern the universe. These laws are clearly rational; they have succinct mathematical forms which are marked in their elegance. This shows that God is able to decide what is rational and what is not, which is evidence of mind and purpose.

Liebniz's Library

Leibnitz considered the idea of a manuscript copy of a book. This was made by copying an exemplar. The exemplar was itself made by copying an earlier exemplar, and so on. The library is extremely old, and the book has been copied many times, so many that the earlier copied have fallen apart and cannot be produced.

A visitor comes to the library and looks at the book. He asks the librarian who wrote it. The librarian asserts that the book has no original author. Instead the scribes have copied it entirely accurately for ever. The book is simply the result of an infinite sequence of copying.

Leibniz pointed out that the visitor would be quite justified in refusing to believe this account. The fact of numerous copies cannot account for the information in the book. Making another copy doesn't add any information. The original information must therefore have come from an author.

One can make a similar argument about a computer virus. The fact that the virus has infected a very large number of computers doesn't lead one to believe that it can never have had a writer who made it in the first place.

The Argument from Contingency

The complete argument from contingency is:-

1. *Things exist* This is obvious - if nothing exists, then what are you reading?
2. *It is possible for things in the universe not to exist*. This also is obvious as the universe itself has come into existence. These things are contingent entities.
3. *Whatever entity has the possibility of not existing but nevertheless exists must have been caused to exist by some other entity.* Nothing can bring itself into existence, since it must exist to be a cause.
4. *This cannot be explained by an infinite regression of contingent objects causing other contingent objects.* Any collection of contingent entities is contingent - no matter how many entities are in it. This is true even of an infinite collection.
5. *Therefore there must be an uncaused cause.* The only way that a collection of contingent objects can exist is if there is a necessary (uncaused) object to begin it.
6. *This uncaused cause is God*. Properties of the necessary first cause match some of the known properties of God.

Conclusion

It sometimes seems as though Christians are afraid of the Big Bang theory. Some dismiss it out of hand as being somehow at variance with the Scriptures. This is not so.

In reality it is the atheists who should be afraid of the Big Bang Theory because it provides very good evidence for the existence of God. The evidence that supports the Big Bang Theory is evidence that supports the idea that there was a time before which the universe did not exist. This is a creation event and it matches the statement in the Bible that God created the heavens and the earth.

The idea of a creation event also underpins the idea that the universe is contingent, which means that it needs a necessary entity to bring it into existence. This necessary entity can be identified with the God of the Bible.

What God is Like

The Big Bang was the creation event which brought the universe into existence. This creation event didn't just involve the matter and energy of the universe; it includes the laws of nature which govern the way that the universe works, and even things like the time and space in which the universe exists. This allows us to deduce certain facts about the creator. These derive from the fact that the creator is a necessary being responsible for the creation of the universe, and not from a consideration of the details of the universe.

- **God is not subject to the laws of nature**. As God made the laws of nature, these laws derive their existence and form from God. This means that God existed prior to these laws and is not subject to them. It also means that God could alter or suspend them as required, which would allow him to perform miracles.
- **God is outside space and time**. Space and time are major parts of the universe. They were also brought into existence at the creation event, and just as God is the originator of the laws of nature so is God the creator of space and time. This means that God must be outside space and time himself. God is not, therefore, restricted to any particular place or time. He is able to act outside space and time, which means that he is able to be present everywhere and to know the future as well as the past.
- **God is not made of matter**. God made the matter in the universe and existed before there was matter. Whatever God is made of, if it is anything at all, cannot be matter.
- **God is without limit**. This must be the case because God is necessary. God was not created; he exists because it is impossible for him not to exist. This means that he must have no limit other than limits he chooses to impose upon himself, because otherwise there would have to be some prior entity to define those limits. This would push the sequence of being back one more stage, and so would suggest that God was not necessary.
- **God is rational**. This is only partly deduced from the fact that God is necessary and comes more from the fact that God is the creator of the laws of nature. These laws are rational; indeed they invariably have elegant mathematical forms.The creator of such laws must understand what it means to be rational. This indicates a being with mind and purpose.

The God who can be deduced from the ideas of contingency and necessity has the attributed of the God of the Bible.

Conclusion

Christians sometimes sound as though they were afraid of the idea of the Big Bang. In reality it is the atheists who should fear it, because it shows the truth that there was a time before which the universe did not exist, which in turn shows that the universe is contingent and requires a necessary entity to bring it into existence. This necessary entity is essentially identical with the God of the Bible. Far from being afraid of the idea that science shows that the universe came into existence with a single creation event, we should be broadcasting it to everyone we meet.

The evidence for the existence of the Big Bang is evidence for the existence of God.