



# What happened *before* “The Big Bang”?

By Rex Morgan

**A**s I look up at the night sky from my home in Auckland, I am often moved to gasp with awe at the magnificence of the star-studded expanse stretched out above me. When I have the chance to view it from the remoteness of the countryside, the sight is even more awesome.

But of course the stars we can see with the naked eye only represent an infinitesimally tiny fraction of what is actually there. All we can see are some of the closest stars of our own galaxy, the Milky Way. Beyond this are literally *billions* of other galaxies! Immense words like “billions” trip easily off the tongues of astronomers involved in the study of the vastness of outer space. Measurements describing the sizes, temperatures, and distances between heavenly bodies, including such phenomena as comets, nebulae,

**Galaxies Galore:** Gazing deep into the universe, NASA's Hubble Space Telescope has spied a menagerie of galaxies. Located within the same tiny region of space, these numerous galaxies display an assortment of unique characteristics. Some are big; some are small. A few are relatively nearby, but most are far away. Hundreds of these faint galaxies had never been seen before until their light was captured by Hubble. This image represents a typical view of our distant universe. In taking this picture, Hubble is looking down a long corridor of galaxies stretching billions of light-years distant in space, corresponding to looking billions of years back in time. The field shown here covers a relatively small patch of sky, a fraction of the area of the full moon, yet it is richly populated with a variety of galaxy types. All photos in this article courtesy of NASA.

quasars and black holes, involve figures that boggle the mind.

The distances are so great that it would be ridiculous for astronomers to measure them in kilometres. Rather, they speak in terms of light years, referring to the distance light can travel in a year, around 9.5 trillion kilometres. Using this enormous unit of measurement, our Milky Way is a spiral galaxy about 100,000 light years in diameter and varying from 10,000 to 30,000 light years in thickness. It contains an estimated 200 billion stars. The sun takes 240 million years to make one

orbit around the Milky Way. Figures of this magnitude are difficult for the average person to comprehend or even imagine, yet we are only talking about our galaxy, one amongst billions of others!

Photos taken from the Hubble Space Telescope indicate there are 50 billion galaxies. To give some idea of the meaning of numbers like these, if you were to count galaxies at the rate of one per second, you would take over 150 years to reach 50 billion.

What a massive and magnificent universe we live in!

## The Big Bang

Have you ever wondered: where did all of this come from?

It's a question worth thinking about. Astronomers and cosmologists have studied diligently into the origin of the universe for many years, and have proposed a number of theories to explain it. The most widely held position is that the universe began with an explosion, called the "Big Bang", about 13.7 billion years ago. The vast majority of scientists agree that the evidence argues strongly for this scenario.

In 1929 astronomer Edwin Hubble discovered that all the galaxies in every direction appeared to be moving away from each other. He based this conclusion on the "red shift" in the spectrum of the light coming from the galaxies. Just as the sound coming from a train whistle or ambulance siren is lowered in pitch or frequency if the train or ambulance is travelling away from the hearer, so the light from distant galaxies is lowered in frequency, or reddened, if the galaxy is travelling away from the earth.

Hubble's observation that the

galaxies are moving away from each other means that the universe is expanding. To picture the way this is happening, think of what would happen if you were to blow up a balloon with dots marked on its surface. The dots would move further apart as the balloon expanded.

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This means the galaxies were closer together in the past. Working backwards in time, the Big Bang theory holds that the universe began as an explosion of space and matter, starting from an enormously dense and hot state when all the matter and energy in the universe was concentrated in a tiny space, known as a "singularity".

Early Big Bang theorists also predicted the existence of cosmic background radiation, the glow left over from the explosion. This radiation was actually discovered in 1964, providing powerful confirmation of the theory.

Observations made in 2003 by the NASA satellite WMAP probe indicate that the Big Bang took place 13.7 billion years ago, with a remarkably small one percent margin of error.

### Can something come from nothing?

Supposing most scientists are right, and the universe began with a Big Bang, the next question to ask is "What caused the Big Bang?" In other words, "Where did the Big Bang come from?"

Robert Jastrow, founding director of NASA's Goddard Institute for Space Studies, says in his book *God and the Astronomers*, "Consider the enormity of the problem. Science has proven that the universe exploded into being at a certain moment. It asks, 'What cause produced this effect? Who or what put the matter and energy into the universe? Was the universe created out of nothing, or was it gathered



**A Grazing Encounter Between Two Spiral Galaxies:** The Hubble Space Telescope photographed this image of two galaxies trapped in mutual orbit around each other, resulting in distortion and disruption of one another. Our awesome universe contains myriads of spectacular phenomena. Where did the universe come from? Is it all a matter of blind chance, or was it orchestrated by a powerful divine being?



together out of pre-existing materials? And science cannot answer these questions..."

Cosmologists' observations cannot reach back to the time before the Big Bang. But we must ask the question "Where did the matter and energy released in the Big Bang come from?" If there was nothing in existence before the Big Bang, how could something have come from nothing?

Imagine a world in which there is nothing. Absolutely nothing at all in existence anywhere. Now ask yourself, "Is it possible for anything to come out of nothing?" Such an occurrence would defy the principles of logic, reason and science. Clearly, if there *was* a time when there was nothing, there would *still* be nothing!

Since it is impossible for something to come from nothing, there are just two choices: either the universe has always existed, or it was produced by something else that was already in existence.

If the Big Bang theory is correct, science has ruled out the first of these alternatives, by proving that the universe did have a beginning.

Another evidence that the universe hasn't always existed was outlined in an article entitled "The Origin of the Universe" in *The Economist* of April 12, 1980. The article pointed out "A more fundamental problem with the notion of an ageless universe has to do with the second law of thermodynamics, one of the most fundamental laws of physics. This states that (in the macro world at any rate) order gives way to disorder, irreversibly. Cars

unwinding, depleting its reserves of ordered energy."

A further factor showing the universe had to have a beginning was the discovery of the radioactive decay of certain elements. This means that these elements could not be infinitely old, or they would have already turned to lead. There must have been a time when radioactive materials began to disintegrate.



**Lift-off of Mariner 1, bound for Venus:** *Mankind has interest in exploring the universe and the ability to do so, although we are still dwarfed by its enormity. How come man has a mind, with the ability to think, dream and explore? Did our imagination and inventiveness somehow arise from inert matter?*

If the universe hasn't always existed, there are only two possibilities for its origin. Either it came about by blind chance, by accident, from nothing; or it was generated by something else that was already in existence. The first of these options defies logic, as we have seen above.

Here is where the Christian Bible offers an answer, with its simple and authoritative opening words, "In the beginning God created the heavens and the earth".

#### **A world of astounding complexity**

Let's stop for a moment and consider some specific aspects of the universe.

It so happens that the earth is located just the right distance from the sun. If it were only fractionally, say around 2%, further away, we would all freeze. If it were as little as 2% closer, we would all burn up.

It so happens also that the earth moves at just the right speed. If it moved just a little faster in its orbit around the sun, the centrifugal force would hurl us away to our destruction like a stone from a slingshot. If it travelled only slightly more slowly, the sun's massive gravity would draw our planet closer, causing the extinction of all life.

The size of the earth is just right too. Its corresponding gravity enables a thin layer of gases, mostly nitrogen and oxygen, to form our atmosphere – just the right mixture of gases to sustain life. If our planet was only a little larger, hydrogen would be unable to escape the atmosphere, making it inhospitable to life. If earth was a little smaller, oxygen would escape and water would evaporate.

Many other aspects of the solar system also work remarkably in our favour. For instance, the moon happens to be in just the right place too. If it was further away, or closer than it is, the oceans would flood over the land, destroying all life.

Without a planet the size of Jupiter positioned just where Jupiter is, the earth would be struck about 1000 times more frequently by comets or comet debris than it currently is.

The list of "fortunate coincidences" like this goes on and on. But are they just fortunate coincidences, or were they designed by something greater than they are?

When we replace the telescope with a microscope and look into the inner world, the same breathtaking complexity again astounds us. For instance, one molecule of human DNA, far too tiny to be seen by the naked eye, comprises an intricate spiralling ladder with about 100 million twists, and about 100 billion atoms. The human eye looking into

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wear out, buildings fall down, people grow old. The arrow of time points one way only: e.g. people never grow younger. The universe, like a clock, should be gradually but inexorably

the microscope contains 40 different mechanisms, such as a lens, a pupil, and a retina, and is made up of 130 million cells. And is there anything more marvellous than the human brain, which processes more than a million messages every second?

Whether we look up into the outer space of the world above us, or down into the inner space of the world around us, we are moved to marvel at what a massive and magnificent universe we live in!

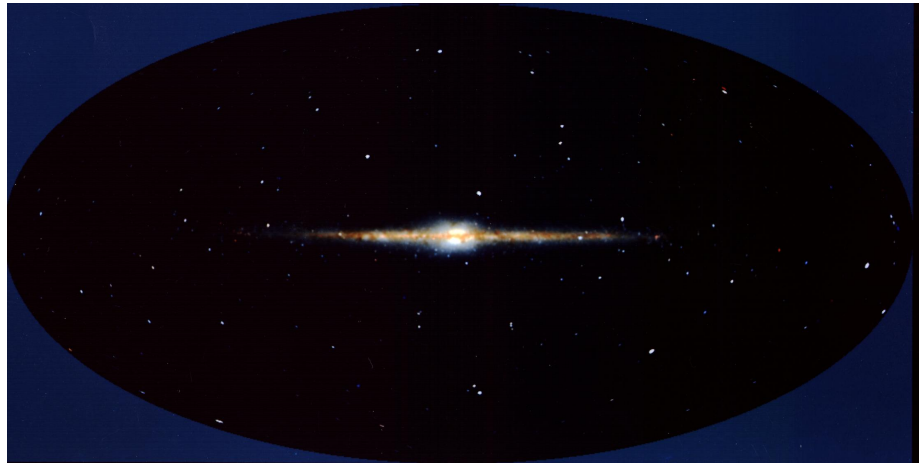
Did this mind-boggling display of awesome intricacy so perfectly tailored for life on earth all begin with a haphazard, arbitrary explosion that subsequently developed brilliantly into the remarkably precise mosaic of marvels we see all around us? Could all of this creation, crowned by the supreme masterpiece of the conscious human being, really have developed by sheer accident? By blind chance, from absolutely nothing? This seems to me to call for more faith than is required to believe in God!

A number of writers in the Bible speak of the origin of the universe. For instance, the book of Psalms says "The heavens declare the glory of God; the skies proclaim the work of his hands". (Psalm 19:1)

Written perhaps 3,500 years ago, the book of Job describes the greatness of God in this way: "He alone stretches out the heavens and treads on the waves of the sea. He is the Maker of the Bear and Orion, the Pleiades and the constellations of the south." (Job 9:8-9)

The prophet Isaiah wrote: "Lift your eyes and look to the heavens: Who created all these? He who brings out the starry host one by one, and calls them each by name. Because of his great power and mighty strength, not one of them is missing." (Isaiah 40:26)

Jeremiah described it this way: "He made the earth by his power; he founded the world by wisdom and stretched out the heavens by his understanding." (Jeremiah 51:15)



**Edge-on view of the Milky Way:** From its orbit around Earth, the Goddard Space Flight Centre's Cosmic Background Explorer (COBE) captured this remarkable view of our Milky Way galaxy in infrared light, a form of radiation that humans cannot see but can feel in the form of heat, as part of its mission to test the "Big Bang" theory of the creation of the universe. According to NASA, "In addition to proving the Big Bang, the satellite discovered that the cosmic background radiation had indeed been produced in the Big Bang just as scientists originally speculated. The satellite's data even discovered the primordial temperature and density fluctuations that eventually gave rise to the Milky Way and other large-scale objects found in space today."

## New research on the origin of life

The *New Zealand Herald* of August 16, 2005 reported that a team of researchers is receiving US\$1 million per year from Harvard University for a research project studying how life began.

David R. Liu, a professor of chemistry and chemical biology at Harvard, is quoted as saying, "My expectation is that we will be able to reduce this to a very simple series of logical events that could have taken place with no divine intervention."

In other words, these researchers seem rather keen to prove God wasn't involved in the origin of life! But surely it is important go into research projects like this with an open mind, seeking to find the truth and ready for any outcome, rather than expecting to verify a predetermined assumption?

The project is called "The Origins of Life in the Universe Initiative". But of course studies into the beginning of *life* proceed from the "given" that the *universe* is already in place. They beg the question as to how the universe came about in the first place.

Actually, seeking the origin of life and seeking the origin of the universe are very similar propositions. Just as the universe couldn't just come about from nothing, similarly life couldn't just arise out of nothing. Louis Pasteur's experiments gave rise to the law of biogenesis, which reflects the fact that life can come only from pre-existing life. Never in the history of science has life been observed to come from non-living material, let alone to spring forth from absolutely nothing at all!

The accompanying article goes back to the very beginning. Once the origin of the universe is established, the origin of life naturally follows.



## Where did God come from?

In response to these assertions, the question may be asked: "But where did God come from?" That's a fair question, and should be carefully considered.

With its clear and authoritative opening statement about the origin of all things, the Bible simply answers that he was always there. "In the beginning God created the heavens and the earth." (Genesis 1:1)

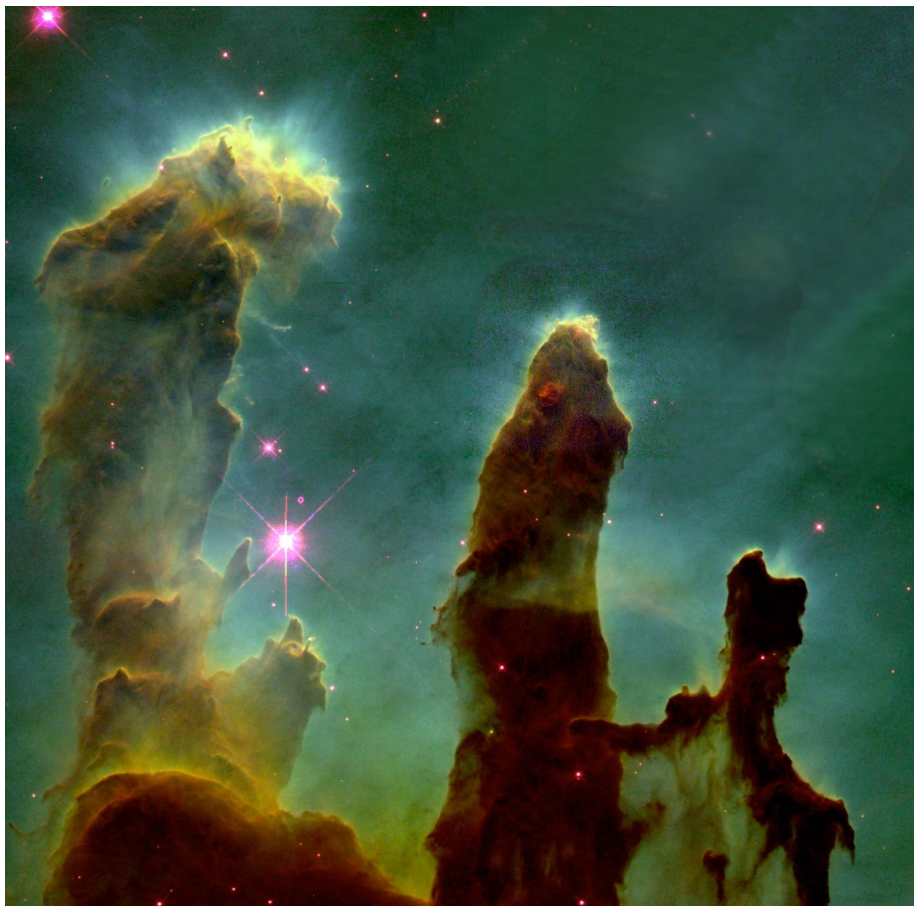
It's hard for us to comprehend something that is eternal, because we live in a physical world, and naturally think of everything as being physical. Because of their temporary nature, all physical things have a beginning and an ending, and they all deteriorate over time.

But according to the Bible, there is also a spiritual dimension, and that is where God lives. John 4:24 says that "God is spirit", and other verses show he is invisible and immortal, or eternal, having no beginning or ending (Hebrews 7:3). This is because God lives outside the constraints of time and space. When he created the universe, and the material world sprung into existence, time and space began.

**Since there could be no time when there was nothing, there had to be something at the beginning, something that was already in existence, and that had in fact always been there.**

The Bible contends that the visible elements of the physical universe were made by someone who is invisible.

The biblical book of Hebrews says, "By faith we understand that the universe was formed at God's



**"Pillars of Creation":** These eerie, dark pillar-like structures are actually columns of cool interstellar hydrogen gas and dust that are also incubators for new stars. The pillars protrude from the interior wall of a dark molecular cloud like stalagmites from the floor of a cavern. They are part of the "Eagle Nebula" (also called M16), a star-forming region 6,500 light-years away from Earth in the constellation Serpens. Did remarkable phenomena like this just appear out of nothing, or did the creation have a creator?

command, so that what is seen was not made out of what was visible." (Hebrews 11:3)

Another scripture adds, "For since the creation of the world God's invisible qualities -- his eternal power and divine nature -- have been clearly seen, being understood from what has been made." (Romans 1:20)

Christians cannot absolutely prove to unbelievers that God exists. As the above quotation from Hebrews says, this is something they accept by faith. But they do have a wealth of reasonable evidence on which to base that faith. As we saw earlier, if there was nothing at the beginning, there would still be nothing now. Since there could be no time when there was nothing, there had to be something at the beginning, something that was already in

existence, and that had in fact always been there.

And that something had to be capable of creating everything, or there would still be nothing. So God didn't come from anywhere -- he was always there!

If you are interested in reading more on this subject, please write to **Inside Life**, P.O. Box 2709, Auckland, and request our free article "Can You Believe in God?"

Rex Morgan, the editor of "Inside Life", and his wife Marilyn live on Auckland's North Shore. Rex produced 264 issues of



a family newspaper from the age of 12 through 19, and has contributed articles to a number of publications since. Rex can be contacted at :  
rex@wcg.org.nz