

# ~Beliefs & Origins~

Ori-001

**The Sky:** The sky is simply enormous. Any one looking up at night and seeing the stars as tiny pin pricks of light can't help but ask themselves, Are we alone? Among all those vast galaxies spreading out through the entire universe there has to be more of us.

To the Christian the answer to the question about the existence of extraterrestrial life is absolutely exciting. We know from Genesis chapter one that God created man in His own image [Gen. 1:26-28]. We also know that prior to making human beings He had created an angelic host in comparison with whom we are a lower form of life. [Ps. 104:4; Heb. 1:7; 2:7, 9] Further from the accounts of Scripture where humans have encountered these creatures we can tell that they are powerful, majestic, imposing Beings with abilities far in excess of those of our own.

People have met and spoken to angels in both their natural and human form; so we know they can assume different outward appearances. We also know that they eat food. [Ps. 78:25] Therefore, in the light of all this knowledge, why should we believe that God only made human beings and no other intelligent life forms in the universe other than angels? It just doesn't make sense! All that space in the Universe just sitting empty?

The huge diversity of life forms on this planet, from the giant creatures that are now extinct to the smallest microbes inhabiting our globe, testify to God's ability to come up with the most amazing life forms. So why should He limit His creative genius to our dominions? With the entire universe to work in, why shouldn't we believe He has made countless creatures our minds cannot fathom? Consider the descriptions in the book of Revelation by the apostle John of the four living creatures: "... and around the throne [of God], were four living creatures full of eyes in front and in back. The first living creature was like a lion, the second living creature like a calf, the third living creature had a face like a man, and the fourth living creature was like a flying eagle. The four living creatures, each having six wings, were full of eyes around and within..." Rev. 4:6-8.

John is obviously describing something God has created that is hard to portray in writing. If he had said nothing about them we wouldn't know of their existence. And so again, to suppose that God has only created great and marvellous life forms on this earth only leaving the vast dominions of space empty just doesn't make sense. But as to our ability to appreciate the possible reality of the existence of angels and other creatures inhabiting the Universe, that all depends on one small detail – our ability to believe. This brings me to the crux of this article and that is: What we believe is more important than anything else in determining what we will accept as possible. Let's look at Beliefs for a moment.

**Beliefs:** These are important. No matter how much we may like to claim that we are being completely objective, it is impossible for us to free ourselves from what we believe. Our faith, whether Christian, Catholic, atheistic, mystical or whatever is an essential part of our being and we cannot avoid the influence that our philosophy of life has on our thinking. In a book dealing with the subject of analysing written material an author wrote: "... everyone has a set of personal beliefs which subconsciously effects the way they view events and situations, presenting a bias in the way they present their material to the public." These biases often take the form of such deep personal convictions about issues that it becomes almost impossible even for the presenter to distinguish between what are their personal beliefs and what are the real facts in a situation. So with this in mind let's look at origins.

# ~Beliefs & Origins~

Ori-001

**Evolution is a Belief:** Supporters of Darwin's Theory of Evolution try to portray their belief as an established scientific fact, when in reality it is simply a philosophy with strong roots in atheism. That is to say the belief denies God is the creator of heaven and Earth and everything contained therein. The word "Theory," being connected to Evolution, ought to alert the general public to the fact that they need to be careful how they accept the conclusions of any scientific material said to be in favour of this philosophy as the origin of life and the Universe. The reason we should take this care is because, what a large number of people may not realise is the contest that exists between creation and evolution isn't over religious beliefs verses scientific facts but between how the philosophies of evolutionary science and Christian science interpret the same facts. The "proofs" from nature are not favourable to either side. Nature presents her facts as plain facts. As to whether these facts support creation or evolution, that outcome is often determined by the philosophies held by the individuals interpreting the evidence.

What this indicates is, a scientist's personal philosophy plays a far more important role in determining whether a fact of nature supports evolution or creation than the data before their eyes. As an example take the case of dating rocks. Rocks don't tell the time. Neither does any known scientific method of dating material tell the time. What they do tell us is the chemical composition of the materials found in the rocks and it is at this point that the opposing personal philosophies take over. Those with an interest in long ages will plead for uniformitarianism and no catastrophes, they will also argue over how much of certain elements existed in the first place. The Christian scientist will seek to explain the data within the constraints of the Genesis time-frame. What we should understand is, it is the philosophies and not the data that is determining the outcome.

Therefore when we are confronted with material claiming to support either evolution or creation it is definitely in the best interests of good scientific practise to remember that, viewed from a different standpoint, the evidence for one position may also be just as favourable to opposite belief. This means that great care should be taken as to how much credibility we attribute to a "proof."

Now let's make a brief comment on the current belief about the whole universe coming from a big bang. The Big-Bang didn't happen. It's a belief! Evolutionists like to predict there was a big bang, but that is simply their belief and a group's belief doesn't bring a big bang into existence. The idea that things came into existence from an explosion which occurred around 15 billion years ago stretches the imagination to a far greater degree than a belief in an all-powerful God through whom the heavens and the earth were made. Of all the creatures living in the universe we are probably the most experienced with explosives. We are forever blowing something or someone up. And yet with all this experience we never stack boxes of printer's type around sticks of dynamite and blow the whole lot up in the hope of producing a best selling novel. Explosives don't produce law and order; intelligence does. So why should I give credibility to something which in the context of current human experience appears totally ridiculous. On whether this event really did or didn't take place the jury should still be out; and in a separate paper we will be looking at the feasibility of such an event.

**Creation is a Bible Doctrine:** Creation is the Biblical model for the origin of all life and, to be totally fair, we have to ask ourselves the question: "Isn't creation also a theory?" Strangely enough the answer to that question is, "No!" So let's examine the difference between a belief in evolution and a belief in creation to see how that could be so.

**Evolution is a belief** developed by human beings about how they think various things like the universe and life on earth came about. It is fairly easy to see that the basic tenets of the belief are

## ~Beliefs & Origins~

Ori-001

not self-evident truths of nature for the positions taken regarding the origin of the universe are themselves evolving to the point of new information contradicting, and in cases proving wrong, old previously established evolutionary beliefs. For example the current Big-Bang theory has replaced the old theory of Laplace regarding the “hot, spinning, and contracting nebula out of which the sun and planets were formed.” And as Dr. Otto Struve observed regarding the changes in position on the beginning of the solar system, “The hypothetical media and their properties, and the catastrophic events were adjusted in such a way to permit the authors of the various hypotheses to deduce many, if not all, of the observed regularities of the solar system.” Dr. Struve was talking about the efforts of Kant, Laplace, Chamberlain, Jeans, Jeffreys and Moulton to invent “a suitable primordial medium,” to explain the solar system.

**Creation is a Doctrine:** The idea that the world came into existence through an act of God is based upon Moses’ account in the book of Genesis, the first book in the Bible. The creation story is in the first chapter. Now as many scientists will be quick to point out, Genesis is not a scientific text book. And this is true. But what many people ignore in this statement about Moses’ account is what Genesis actually is; and that is the whole key to this matter!

Genesis is the account God gave to Moses regarding the beginning of things. It is a sacred version of history. It begins with the start of the world and the first humans to walk on its surface; then comes the first sin of Adam and Eve; the first murder with Cain slaying Abel; sin then spreads throughout the world until God places a check on it with the first global judgment in the form of Noah’s flood. After the flood the book focuses on the early history of the family of one man – Abraham and how God chose him to be the head of a nation which was to become a nation belonging to God. The whole book is history.

Now let’s get serious. If the history Moses has given us about the beginning of the world and God’s part in it isn’t accurate, what does that say to us about God? This isn’t just an academic question. God bases much of what He has to say to us in the rest of His Bible on the fact that He, as our Creator, is our heavenly Father. The fourth of the Ten Commandments contains a reference to the fact that He made the world in six days and the command goes on to say we are to keep the Sabbath as a reminded of the fact that He did this. Now if He didn’t create the world in six days as He said, if the whole story in Genesis is a fable, what is that telling us about God’s credibility with regard to any of the statements He has made. Jesus said, “In My father’s house are many mansions; if it were not so, I would have told you. I go to prepare a place for you.” [John 14:2]. Do we believe in these mansions or not? Do we believe in anything Jesus told us or not? It is claimed He was the Creator of the world [see John 1:1-3; Eph. 3:9; Col. 1:16; Heb. 1:1-2, 8-10]; yet if Genesis is nothing but fables, then this is also a fable, and so might be the promises of heaven and eternal life.

Once you begin tampering with Scripture you open a floodgate the result of which you can’t control. The entire Book from Genesis to Revelation is a complete unit which shouldn’t surprise us as all Scripture was given, “by inspiration of God.” [2 Tim. 3:16]. Now the source of its inspiration was the Holy Spirit [2 Pet. 1:20-21] who just happened to be an eyewitness to the events recorded in Genesis [Gen. 1:2]. Therefore, if we are to credit the creation account as a fable, a legend, or a story Moses invented to make some point, we have undermined nearly all the authority of the word of God. For consider this next sentence: If God is not our Creator, what right has He got to interfere in anything that takes place on this planet? This raises the question of the legality of the whole plan of salvation. Why does God punish sinners? What gives Him constitutional rights over them? If God is not the Author, supporter and sustainer of all life how did He become its Judge?

## ~Beliefs & Origins~

Ori-001

Moses writes about the flood of Noah's day that God said, "I will destroy man whom I have created from the face of the earth ... for I am sorry that I have made them." [Gen. 6:7]. If God didn't make the earth and the people in it we have a serious problem here regarding justice. God is claiming his right to destroy the earth is based on His right as its Creator. Are we to assume that Moses is creating a fictional basis for God's act of justice? This calls the whole event into question; and this spills over into other areas of Divine jurisprudence.

The Gospel cannot supersede the Creation. You cannot come with a plan to save mankind from the penalty of the law, if you have no right to be man's sovereign. Without sovereign rights there is no divine law. And it is pointless looking to God for justice regarding all the atrocities that take place on this planet. God's right to being our Judge, Saviour, Sovereign and Priest is based on the fact that He is the Creator of all heaven and earth. Once creation by God goes, God's judicial right goes.

Scripture presents creation as an act of God, as a fact. "In the beginning God created the heavens and the earth." [Gen. 1:1]. "The heavens declare the glory of God; and the firmament shows His handiwork." [Ps.19:1-2]. "Then God said, Let there be lights in the firmament of the heavens to divide the day from the night; and let them be for signs and seasons, and for days and years; and let them be for lights in the firmament of the heavens to give light on the earth; and it was so. Then God made two great lights: the greater light to rule the day, and the lesser light to rule the night. He made the stars also." [Gen.1:14-16]. The Bible teaches that God made all the laws of nature as well as all matter from nothing. [Col.1:16]

The author Ellen White wrote, "Many who profess to believe the Bible record are at a loss to account for wonderful things which are found in the earth, with the view that creation week was only seven literal days, and that the world is now only about six thousand years old." [SG, Vol.3, p.92]. "Inferences erroneously drawn from facts observed in nature have ... led to supposed conflict between science and revelation; and in an effort to restore harmony, interpretations of Scripture have been adopted that undermine and destroy the force of the word of God. Geology has been thought to contradict the biblical interpretation of the Mosaic record of the creation. Millions of years, it is claimed, were required for the evolution of the earth from chaos; and in order to accommodate the Bible to this supposed revelation of science, the days of creation are assumed to have been vast indefinite periods, covering thousands or even millions of years." [Ed. Pp. 128-129].

**Miracles are not the domain of Scripture only.** There are those who feel that miracles are the basis of the Christian's belief in creation while the evolutionist bases his belief on the facts of science. This isn't the case. Evolution calls for greater miracles to be performed for by the laws of chance than anyone could possibly give credit to. According to mathematicians when an event reaches a level where the odds of it happening are 100:1 it is almost certain that a level of intelligence is involved and the actions taking place are not the result of chance. At 1000:1 the odds of chance being the author of an event is impossible.

However, with some of the complexities of design found in nature the odds of them happening by chance are many millions to one; and yet there are scientists who blatantly expect us to accept the fact that by some fortuitous experience vast chains of these occurrences actually took place. Our existence on this planet originating from the coming together of the right chemical compositions by chance is mathematically impossible. Nature testifies to the existence of her Creator.

God's power over nature is repeatedly testified to throughout the Scripture. The Gospels themselves contain numerous accounts of Jesus' mighty works demonstrating His complete control of the laws of nature. Along with His well-known acts of healing there is turning the water into

## ~Beliefs & Origins~

Ori-001

wine at the wedding in Cana, feeding the 5000 by multiplying loaves and fishes in His hands, walking on water, stilling a storm through a simple command along with many more miraculous actions.

However, let's look a little more carefully at one in the Old Testament for a moment. The Hebrew king Hezekiah is dying and he pleaded with the Lord to spare his life. So the prophet Isaiah comes to him with a message that God would extend the king's life for a further fifteen years. Then he adds, as a sign that what Isaiah has told Hezekiah would happen, the king is given the choice of having the sundial move forward or backward by ten degrees. Here's what Hezekiah said to the prophet, "It is an easy thing for the shadow to go down ten degrees; no, but let the shadow go backward ten degrees." [2 Kg.20:10]. Perhaps Hezekiah had some understanding of astronomy. He knew that according to the natural order of things the sundial would go forward for it always moved in that direction; he knew that the dial never reversed. Such a motion would be to him the sign of divine intervention with the continuing laws of nature. So his choice was, let the dial move backward.

How God performed this action we are not told; only that it was done. But if this was to follow natural law the implications of doing such an act are colossal. The sun's shadow moving around a sundial is the result of the earth's rotation on its axis. To reverse the shadow ten degrees would appear to require stopping the earth's forward rotation, going back the required distance to accomplish the ten degree adjustment and then restarting the planet's forward motion all without bringing the world to a state of chaos.

That requires an enormous miracle. The earth has a diameter of 12,756 Km and revolves once every 23 hours, 56 minutes, and 4.09 seconds in a sidereal day. With an equatorial circumference of 40,090 Km and object standing on the surface of the planet would have a resting speed of about 462.28 m/s in a westerly direction. Now let's put this in the terms of a model that we might understand the consequences of what was involved if God chose to use natural law to achieve His purpose for Hezekiah. Suppose you were on a train travelling west at 462.28 m/s and the engine suddenly stopped, reversed backward for awhile, and quickly accelerated west again to its original speed. What would happen to the carriages and everything in them?

The relevance of Hezekiah's story to the point we are making here is, do we believe it or not? If we don't believe it, then why don't we believe it? Is it because it gives God too much power over the laws of nature? Skeptics and atheists laugh at Christians for believing things like that because they believe the laws of nature won't allow that kind of thing to happen. But under today's laws of nature their belief in evolution can't happen either. And what's more important, it doesn't happen. Fish always remain fish. But that hasn't stopped them believing that all life came from the chance union of some primeval cells.

**Wisdom:** When Paul preached the message of the cross in Corinth he said that to the Jews it was a stumbling block, to the Greeks it was foolishness but to those Christians who believed it was the power of God. [1 Cor.1:18-24]. Then he adds, "... the natural man does not receive the things of the Spirit of God, for they are foolishness to him..." [1 Cor.2:14]. And further he said, "... the wisdom of this world is foolishness with God..." [1 Cor. 3:19]. God's wisdom is foolish to the world and the world's wisdom is foolish to God; speaking of those people who, "... changed the glory of the incorruptible God into an image made like corruptible man..." Paul says, "Professing to be wise, they became fools." [Rom. 1:22]. Therefore it seems highly unlikely that anyone will avoid being called a fool. What our choice appears to be is, not that we won't be called a fool, but between who is making the accusation, the world's wise men or God.

## ~Beliefs & Origins~

Ori-001

The author Ellen White once wrote that, “Apart from Christ we are still incapable of interpreting rightly the language of nature. The most difficult and humiliating lesson that man has to learn is his own inefficiency in depending upon human wisdom, and the sure failure of his efforts to read nature correctly. Of himself he cannot interpret nature without placing it above God.... Without the guidance of the divine Teacher, [those who] take up the study of nature.... Will assuredly come to wrong conclusions.” [8 Test., p.257].

Studying nature, for the Christian, has a hidden blessing. “He who has a knowledge of God and His word through personal experience is prepared to engage in the study of natural science.” [8 Test, p. 324]. “There is need of a close study of nature under the guidance of the Holy Spirit. The Lord is giving object-lessons, He is making holy truths familiar to the human mind, through the most simple things of nature.” [Sons and Daughters of God, 241] “If we faithfully study the book of nature, we shall find it a fruitful source for contemplating the infinite love and power of God.” [My Life Today, p.140].

What this all indicates is our beliefs are extremely important when it comes to the study of nature. Without our realising it, they are forming what we are willing to accept as truth. Unfortunately this in turn has an effect on our eternal destiny. We should always be aware that science isn't God, and neither has it replaced the authority of Scripture. A simple Christian who believes in the first chapter of Genesis already knows more about truth than the most learned scientist who is searching the heavens for the origin of life. So let us consider carefully any arguments that conflict with the world of God, for without a doubt, such arguments will always be flawed.

o o o 0 o o o

# ~The Creation Model~

Ori-002

**The Creation Model:** As creationists we need to be very careful about the positions we take with regard to science and the universe. Sometimes, in our desire to present the facts in a way we feel is consistent with a six literal-day creation, we overlook some important details in the creation account as recorded in Genesis. This is unfortunate, for it makes us appear biased.

Truth can afford to be fair. And we should be extremely careful not to distort the picture given in Gen. 1:3-31 in an endeavour to present our views of what took place during those first six days of the creation week. All the evolutionary theories that I have ever encountered contain extrapolations based on scientific facts. For example an evolutionist will go and collect a mass of genuine scientific information about a particular fossil or rock and then, using these facts as a basis, guesstimate a history about the sample in question such as its age. The consistency displayed by these researchers, when so many of their conclusions are based on extrapolation, to produce long-age outcomes reveals their evolutionary bias. Now as Creationists we must be conscious of our bias and remember that this can make us liable to the same human frailty if we are not very careful. A fact that becomes obvious when we are called upon to deal with things like the gap theory.

**The Gap Theory** relates to the insertion of a large period of time covering millions and perhaps billions of years prior to when God created light on day one of the creation week (v.3). In the minds of some creationists this causes a terrible problem with the six-day account. So let's look at what are the facts and what are the extrapolations regarding these views. There are two versions of this gap theory. We'll take what has become known as the Classical gap theory first.

**The Classical Gap Theory** proposes that there has been a period of ruin followed by a period of reconstruction. Its exponents believe the expression, "without form and void" in verse 2 allows for an interval of great duration after verse 1. However there is a subtle interpretation of Scripture incorporated in their viewpoint. To achieve this outcome for millions of years after the first verse they read the opening of the second verse as, "The earth was caused to be without form and void." Then, upon this rendering of the Hebrew words "tohu wabohu" they then rest the view that the world was created perfect at some moment in the remote past (v.1) but that an appalling cataclysm obliterated every trace of life upon it and reduced its surface to a state that might be described as "tohu wabohu." The cataclysm which took place appears to be an event known as "Lucifer's flood" which formed the fossil record eons of time before the Creation Week. None of this is supported by Scripture; the whole lot is an extrapolation based on very little fact indeed. The only fact appears to be that Genesis does say the earth was without form and void, but even this has been altered to incorporate a sense of destruction; this is an element missing from the Genesis account.

**The Soft Gap Theory** claims that verses 1-2 refers to the creation of the stars and galaxies and the matter from which earth came and that verses 3-31 describes a finalisation of Earth's creation perhaps billions of years later. In a June-August Creation magazine<sup>1</sup> Don Batten quotes Gorman Gray as saying, "Earth lay in total darkness ... for an undefined length of time before the first day until God began to clear the envelope of thick darkness." He then says, "The first day of forming and filling of Earth began from the pre-existing matter, according to Gray, in verse 3, and this began the Creation Week.

---

<sup>1</sup> Batten, Don, Creation magazine, "Soft Gap Sophistry," June August 2004, Vol.26 No.3, p.44.

## ~The Creation Model~

Ori-002

The objection to this theory by some creationists seems to lie purely on the basis of the time frame mentioned, i.e. Billions of years. There is a strong bias among elements of the Christian community that unless everything was done in six literal days this somehow destroys God's glory. So before we look at what is right or wrong with this theory, we should examine this perception of time diminishing God's power. Our Creator's glory is in no way diminished by the passage of time. It is as much a miracle that fruit appears on the grapevine after winter as it was for Jesus to turn water into wine instantaneously at the wedding feast in Cana. Those grapes that slowly mature on the vine over a period of days are just as much one of His miracles as any other work God does in whatever timeframe you like to name. We must be careful of the magician complex that unless there is an element of abracadabra it's not a powerful event. The miracle of life never ceases to amaze me and God did it. So if God did something and let it sit for a billion years its not going to faze me. It's still his power doing the work, and that's what matters. Now this should not be confused with the evolutionary idea that time will allow matter to generate miracles on its own. That's an entirely different story. Without God, matter will always be matter. So let's look at what may have taken place prior to the creation week.

**Prior to the Creation Week** there was an existence; that is a fact. God and His Son were in existence from eternity. Then it appears the angels were in existence; and heaven, God's dwelling place, was also in existence. In her book "Patriarchs and Prophets," the author Ellen White writes regarding the contention the revolt of Lucifer caused that, "Before the assembled inhabitants of heaven the King declared that none but Christ could fully enter into His purposes.... The Son of God had wrought the Father's will in the creation of all the hosts of heaven; .... Christ was still to exercise divine power, in the creation of the earth and its inhabitants."<sup>2</sup> Now this statement probably wouldn't be an acceptable source of information to many people; yet for those who do accept it's legitimacy it offers some interesting possibilities.

It was after this meeting with the Father that war broke out in heaven with the consequential loss of Lucifer's position as the covering cherub. Then, when it was all over and Lucifer had been expelled, we read, "The Father consulted His Son in regard to at once carrying out their purpose to make man to inhabit the earth."<sup>3</sup> What these two quotations tell us is that not only was God the Father and the Son in existence prior to the creation week but there were a large number of other created intelligences as well and that all these beings were occupying a real place in space.

Now in spite of having said that we need to respect the fact that there are many people in the world who won't accept this source of information however attractive the possibility of making sense of those long ages implied by light coming from distant stars. So let's move on.

**Without Form and Void** describes the state of the world when God began His work of creation. It is followed by a parallelism; that "darkness was on the face of the deep" and God's Spirit was hovering "over the face of the waters" (v.2). The words "face of the deep" stand in parallel to the phrase "face of the waters." To my mind this indicates the substance referred to as water was present prior to anything God did in those first six days.

However the moment we imply there was some pre-existing matter around before God began creating the world people get upset and some quote Heb. 11:3, "By faith we understand that the worlds were framed by the word of God, so that the things which are seen were not made of things which are visible." And from this they deduce God never used any pre-existing material to make

---

<sup>2</sup> White, Ellen, "Patriarchs and Prophets," (Pacific Press Pub. Association: California, 1958), 36.

<sup>3</sup> White, E. G., "The Story of Redemption," (Review and Herald Pub. Association: Washington, 1947), 19.



## ~The Creation Model~

Ori-002

anything. Now that may not be strictly true. God made Adam from clay, and depending on how you read verse 9, which may have been pre-existing material. Eve was made from one of Adam's bones. And that brings me to this very important point. As God made Adam's bones and used one in the creation of Eve, so at some point or other He created all matter (see John 1:3 and Col. 1:16-17) and whether it stood unused for a billion years or more doesn't alter the fact that it was the Creator's power that put it there.

**The Heavens** are a source of contention between those believers who feel they appeared during the six day creation and others who feel they have been in existence for billions of years. However, before we comment on that let's make a note of the fact that the Bible refers to three heavens: the atmosphere, the region where the sun and moon resides; and the place where God and heavenly beings dwell. Therefore, when we read that "In the beginning God created the heavens and the earth" (v.1) it may mean no more than the fact that God created the earth and our solar system.

With that in mind it seems fairly safe to say that, with the exception of the fourth day of creation, the Genesis story deals with the formation of the earth and its inhabitants. It also appears beyond all reasonable doubt that from a Scriptural point of view the earth, its inhabitants, as well as the sun and the moon were all formed over this six day period about 6,000 years ago. But what about the creation of the rest of our universe, when did it come into existence?

In answering this question there appears to be a reluctance on the part of some believers to accept any timescale other than 6,000 years for the life of the universe because our evolutionary opponents sometimes refer to the billions of years it takes light to travel from some of the more distant galaxies to our earth as an evidence for their theory. However, as we said before, time has nothing to do with how something originated. If earth were to exist for a trillion years it wouldn't change the fact that God made it in six days. Neither would it diminish His power; actually the fact that it had lasted so long would be a tribute to His might. So let's understand that if we are not going against a clear statement in the Bible then believing in a long-standing universe isn't denying Scripture.

The passage dealing with the creation of the heavenly bodies appears as day four's activities. By far the majority of the verses in this section relate to the creation of the sun and moon. However, verse 16 does include the phrase "He made the stars also." This has led a number of Bible students to the conclusion that this verse supports the belief that the whole of creation took place on day four. But it would be wise to note that the words "He made" in this section of the text have been supplied by the translators and don't appear in the original Hebrew Scriptures. What we have here is just the phrase, "the stars also." This seems to imply that although the stars are mentioned in connection with the sun and moon The actual passage from Genesis seems to limit this act of creation to the Sun and Moon.

Now there isn't enough information here to be authoritative regarding what this phrase means on day four; although there are only two possibilities. Firstly the stars, being mentioned in connection with the creation of the sun and moon on day four, were brought into existence at the same time and that before this moment the entire universe was empty. This would mean that space contained nothing but the water that was here and those elements God had brought into existence during the previous three days. To me this conclusion seems unwarranted. The second conclusion is that Moses refers to the stars in passing as they form a part of the heavenly luminaries and he wishes to convey the fact that although they were not a part of the creation package during the Genesis week, they were still nevertheless the work of our Creator God. Either of these positions is permissible from the text and there is no good reason from these words themselves to accept either position.

## ~The Creation Model~

Ori-002

Therefore, based on what Ellen White has written regarding the timing of the creation event, I have slanted my study of astronomy towards the position that firstly God made all matter and beings irrespective of when; secondly that the earth and everything in it was created about 6000 years ago in six days, and further it is quite possible that the rest of the universe may have been around for billions of years. Finally, another statement by Ellen White is of interest to me in this study and that concerns the geography of the Universe. She wrote, “With undimmed vision they [the Saints] gaze upon the glory of creation – suns and stars and systems, all in their appointed order circling the throne of Deity.”<sup>4</sup> This assertion seems to indicate the whole Universe is circling around the throne of God in a majestic order. It would certainly be interesting to discover if there was some point in the heavens around which everything revolves – that’s certainly something to look for!

o o o 0 o o o

---

<sup>4</sup> The Great Controversy, p. 677:3

## ~Morning has broken~

Ori-003

**Article:** In “Creation,” Vol. 23 No. 2 [Mar. —May, 2001], pp.51-53.

“Morning has broken ...but when?”

Author: • Russell Grigg

‘Was Creation’s first day the beginning?’

The Creation movement has increasingly caused many to face up to the powerful, Biblical arguments for such things as:

- All living things were created (about 6,000 years ago) in six literal Earth-rotation days.
- There was no death, bloodshed or suffering before Adam’s Fall.
- Noah’s Flood covered the whole globe, and would have laid down a vast number of fossils.

However, many of the Christians who now accept the above points are still overawed by certain arguments from astronomy for billions of years. This seems to have compelled a number of writers to come up with novel ‘interpretations’ of the Bible to try to harmonize it with the idea that there were ‘billions of years’ before the creation of living things during the six days of Creation Week.

We are not talking here about the classical ‘gap’ (or ruin-reconstruction) theory, which has long been ‘on the ropes’.<sup>1</sup> Rather, we are addressing recent books by Christian writers trying to find room in the Bible for vast ages, who say that *the sun, moon and stars were all made long before Day 1*.<sup>2</sup>

But what does the Bible actually say? God’s historical record in Genesis 1:1— 5 reads:

‘In the beginning God created the heaven and the earth. And the earth was without form and empty. And darkness was on the face of the deep. And the Spirit of God moved on the face of the waters. And God said, Let there be light. And there was light. And God saw the light that it was good. And God divided between the light and the darkness. And God called the light, Day. And He called the darkness, Night. And the evening and the morning were the first day.’

**The beginning:** The first thing God tells us in the Bible is that there was a beginning. Not a beginning to God,<sup>3</sup> but a beginning to time and to the Earth and to the space-time environment in which we live. These words assure us that, as linguist Charles Taylor says, ‘The universe was no accident, though many evolutionists think so, and some Eastern religions suggest so, with a near-eternal universe and gods emerging from it.’<sup>4</sup>

---

<sup>1</sup> Batten, D., ed., The (Updated and Expanded) Answers Book, chap. 3, Answers in Genesis, Brisbane, Australia / Master Books, Arizona, 1999.

<sup>2</sup> E.g. Gorman Gray, Joim Sailhamer.

<sup>3</sup> The Bible does not set out to prove the existence of God—in the beginning no-one doubted God. Instead the Bible observes: ‘The fool has said in his heart, There is no God!’ (Psalm 14:1). Romans 1:20—21 says that the evidence for God can be plainly seen, but is deliberately rejected.

<sup>4</sup> Taylor, C., The First 100 Words, Good Book Co., Gosford, Australia, p. 1, 1996.

## ~Morning has broken~

Ori-003

The first Hebrew word in Genesis 1:1 is *bereshith*; it occurs without the article and so is a proper noun, meaning ‘absolute beginning’. Why is this important?

*Answer:* Because the construction does not allow it to be translated ‘In the beginning of God’s creating’ or ‘When God began creating’,<sup>5</sup> as some theistic long-agers would prefer.

**What does ‘God created the heaven(s) and the earth’ mean?:** The phrase ‘heaven(s) and earth’ in Genesis 1:1 is an example of a Hebrew figure of speech called a *merism*, in which two opposites are combined into an all-encompassing single concept.<sup>6</sup> Throughout the Bible (e.g. Genesis 14:19, 22; 2 Kings 19:15; Psalm 121:2) this means the totality of creation, not just the Earth and its atmosphere, or our solar system alone. It is used because Hebrew has no word for ‘the universe’ and can at best say ‘the all’.<sup>7</sup>

One of the words in this Hebrew figure of speech is the plural noun *shamayim*, which signifies the ‘upper regions’ and may be rendered ‘heaven’ or ‘heavens’, depending on the context.<sup>8</sup> The essential meaning is everything in creation apart from the Earth. The word translated ‘the earth’ is *erets*, and here refers to the planet on which we now live.

The opening sentence of the Bible (‘In the beginning God created the heaven and the earth.’) is thus a summary statement (the details follow) that God made everything in the universe. The rest of Genesis 1 gives the details of how this happened over a period of six days.

### Is this exegesis justified?:

*Answer:* Yes, a summary statement can be either at the end of the list of happenings it summarizes, or at the commencement. Inspired by God, Moses put it first. By analogy we might say, ‘At the beginning of this year I built a garden shed. On the first day I laid the foundations. On the second day I erected the walls. On the third day I put the roof on. On the fourth day I installed the lights. On the fifth day I added some fish in a tank and some birds in a cage. On the sixth day I added some rabbits in a hutch. On the seventh day I rested.’

Some long-agers have claimed that this summary statement in Genesis 1:1 means that the sun, moon and stars were created over a vast time period, before there were any days on Earth.<sup>9</sup> Is this valid?

First, note that the Hebrew text does not allow there to be any gap in Genesis 1 between verses 1 and 2, i.e. before Day 1.<sup>10 11</sup> Second, note that the Hebrew makes no mention of the greater light

---

<sup>5</sup> Or ‘In the beginning of creation’ as in The New English Bible.

<sup>6</sup> English equivalents would be ‘far and near’, ‘hill and vale’.

<sup>7</sup> See Leupold, H.C., *Exposition of Genesis*, 1:41, Baker Book House, Michigan, 1942, who cites similar usage in Jeremiah 10:16; Isaiah 44:24; Psalm 103:19, 119:91; and Ecclesiastes 11:5.

<sup>8</sup> ‘The word could hardly mean the place where God lives, because He was presumably there already.’ Ref. 4, p. 4.

<sup>9</sup> E.g. Gray, G., *The Age of the Universe: What Are the Biblical Limits?*, Morning Star Publications, Washington, pp. 18 ff, 2000.

<sup>10</sup> Genesis 1:2 begins with the Hebrew *waw* which can mean ‘and’, ‘now’, ‘but’, ‘then’, etc. Wherever *waw* precedes a noun (as in v.2 *waw* ‘and’ + *erets* ‘the earth’) it has the meaning of an explanation (called a *waw*

## ~Morning has broken~

Ori-003

(sun), the lesser light (moon) and stars until Day 4. There is therefore no mandate for anyone to add these items to the text of Genesis 1:1.

**When was ‘the beginning’?:** The term ‘heaven(s) and earth’ is used by Moses in Exodus 20:11: ‘For in six days the Lord made the heavens and the earth, the sea, and all that is in them.’ The Bible here unequivocally states that everything in the universe was created within a time period of six days (the same phrase ‘six days’ is used in an earlier part of the passage to refer to our working days), *and thus nothing was created before these six days*. Since Adam was created on Day 6, and we have the genealogies from Adam to Christ, this verse totally precludes ‘billions of years’.

A recent defender of the view that God created the stars and planet Earth long before the six days of Genesis 1 argues that ‘the heavens’, in Exodus 20:11, means the atmosphere.<sup>12</sup> But this overlooks the context—that ‘heavens’ is not used in isolation but is combined with ‘earth’. As said above, this combination is a term for the entire creation. Also, the ‘heavens’ of Exodus 20:11 is the same Hebrew term that he elsewhere tries to make mean the sun and the stars when it occurs in Genesis 1:1—since Exodus 20:8—11 is clearly referring to Genesis 1, ‘heaven(s) and earth’ must mean the same thing in both passages.

Genesis 1:1 tells us that the totality of creation was ‘in the beginning’. Exodus 20:11 tells us that the totality of creation took six days. Genesis 1:14—19 tells us that the sun, moon and stars were created on the fourth of these six days.

Those who promote the long-age view often claim that there is a radical difference between the meaning of the Hebrew words *bara* (‘create out of nothing’ in Genesis 1:1) and *asah* (‘make’ in Exodus 20:11 and Genesis 1:16). They say that therefore, the latter refers to an *appearing* of the sun on Day 4, when dark clouds surrounding the Earth dissipated. However:

- *Asah* and *bara* are often used interchangeably, as in Genesis 2:4: ‘These are the generations of the heavens and of the earth when they were created [*bara*] in the day that the Lord God made [*Asah*] the earth and the heavens.’
- *Asah* means ‘make’, not ‘appear’, throughout Genesis 1.
- In Genesis 1:9, when ‘appear’ is meant, a different word is used, i.e. *ra’ah*.

**The creation of light:** Genesis 1:3 reads: ‘And God said, Let there be light. And there was light.’ This verse alone should be sufficient to undermine the various ‘billions of years’ scenarios. If the sun, moon and stars were all created (and so shining) prior to Genesis 1:2, why was it necessary for God to create light, as recorded in verse 3?

---

disjunctive or waw explicativum, i.e. explanatory waw). It is *not* a sequence of events such as ‘then the earth became’ (which would require a waw consecutive, where waw precedes a verb). It compares with the old English expression ‘to wit’; it could be translated by ‘Now’ or even with the use of parentheses as follows: ‘In the beginning God created the heaven and the earth (the earth was without form and empty ...).’ Moses used the two waw constructions very deliberately in Genesis 1. Verse 2 has the only waw disjunctive. All 28 other verses beginning with ‘And’ have the waw consecutive.

<sup>11</sup> For a fuller treatment see Grigg, R., From the beginning of the creation: Does Genesis have a gap?, Creation 19(2):35—38, 1997. And Ref 1.

<sup>12</sup> Ref 9, p. 52.

## **~Morning has broken~**

**Ori-003**

Some long-agers invoke Job 38:4, 9: ‘When I laid the foundation of the earth I made clouds the garment and thick darkness its swaddling band’ to say that the sun shone on an opaque Earth until God commanded light to penetrate the blanket of darkness. However, this is using a Hebrew poetic expression (in Job), and putting a twist on it to justify changes to the plain meaning of the Genesis 1 text regarding both the creation of light on Day 1 and of the sun, moon and stars on Day 4.

Long-agers overlook the words of Jesus in Mark 10:6, ‘But from the beginning of the creation God made them male and female.’ The Lord Himself obviously did not envisage any ‘billions of years’ prior to the creation of Adam and Eve.

The whole concept of the need to allow for ‘billions of years’ shows ‘wrong-way-round’ thinking. It is the outcome of Christians’ using humanistic evolutionary scientific opinions to determine the meaning of the Bible, rather than vice versa.

o o o 0 o o o

# ~Morning has broken~

Ori-004

**Article:** In “Creation,” Vol. 23 No. 2 [Mar. —May, 2001], pp.51-53.

“Morning has broken ...but when?”

Author: • Russell Grigg

‘Light before the sun?’

Genesis 1:3 reads: And God said, Let there be light. And there was light.’ This light source must have been independent of the sun, which was not made until Day 4.<sup>1</sup>

Sceptics and long-agers like to ask how there could have been light before the sun. The Bible provides at least four other examples of events involving non-solar light and God:

1. Exodus 14:19—20: when the Israelites were fleeing from Egypt a ‘pillar of cloud’, which brought darkness to one side and ‘gave light by night’ to the other, stood between them and the Egyptian forces.
2. Luke 2:9: when an angel announced the birth of Jesus to the shepherds at night, ‘the glory of the Lord shone around them’.
3. Matthew 17:2: during the transfiguration of Jesus, ‘His face shone as the sun, and His clothing was white as the light.’
4. Revelation 21:3: ‘the city [ New Jerusalem] had no need of the sun, nor of the moon, that they might shine in it, for the glory of God illuminated it, and its lamp is the Lamb [ the Lord Jesus Christ, cf. John 1:29]’.

We therefore conclude that the first light that illuminated the Earth was an act of God quite in keeping with His several other acts, recorded in the Bible, involving light without the sun. Day 1 is described as involving an evening and a morning, so we conclude that the Earth was now rotating. Also, that the light was coming from one direction in relation to the Earth, thereby giving it a night/day cycle.<sup>2</sup> Presumably on Day 4, when God created the sun, this first light source ceased.

The description of day and night before the existence of the sun gives a stamp of authenticity to the Genesis account. There was no way that a secular Jewish writer would have proposed a night/day cycle without the sun.

The ancients worshipped the sun as the source of light, warmth and life. Moses was brought up in all the wisdom of the Egyptians (Acts 7:22), who revered the sun god Re (or Ra). Nevertheless, Moses rejected this pagan notion of the deity of the sun and, inspired by God, wrote that God created light before He made the sun.

---

<sup>1</sup> Visible light is a small segment of the electromagnetic spectrum, which includes X-rays, ultraviolet radiation, visible light, infrared radiation, micro waves and radio waves. It is therefore probable that when God said, ‘Let there be light’, the whole electromagnetic spectrum came into existence.

<sup>2</sup> Moses not only defined the term ‘day’ (Hebrew *yôm*) the first time he used it by the words ‘evening and morning’ and a number, he defined it similarly every time he used it (Genesis 1:5,8, 13, 19, 23,31). It cannot therefore, here, refer to an age or a succession of ages.

**~Morning has broken~**

**Ori-004**

o o o 0 o o o



**Article:** In “Creation,” Vol. 25 No. 4 [Sep.—Nov. 2003], p.49.  
“light-travel time problem”

Author: • Robert Newton

## Attempts to overcome the big bang’s ‘light-travel—time problem’

Currently, the most popular idea is called ‘inflation’—a conjecture invented by Alan Guth in 1981. In this scenario, the expansion rate of the universe (i.e. space itself) was vastly accelerated in an ‘inflation phase’ early in the big bang. The different regions of the universe were in very close contact before this inflation took place. Thus, they were able to come to the same temperature by exchanging radiation before they were rapidly (faster than the speed of light<sup>1</sup>) pushed apart. According to inflation, even though distant regions of the universe are not in contact today, they were in contact before the inflation phase when the universe was small.

However, the inflation scenario is far from certain. There are many different inflation models, each with its set of difficulties. Moreover, there is no consensus on which (if any) inflation model is correct. A physical mechanism that could cause the inflation is not known, though there are many speculations. There are also difficulties on how to turn off the inflation once it starts—the ‘graceful exit’ problem.<sup>2</sup> Many inflation models are known to be wrong—making predictions that are not consistent with observations,<sup>3</sup> such as Guth’s original model.<sup>4</sup> Also, many aspects of inflation models are currently unable to be tested.

Some astronomers do not accept inflationary models and have proposed other possible solutions to the horizon problem. These include: scenarios in which the gravitational constant varies with time,<sup>5</sup> the ‘ekpyrotic model’ which involves a cyclic universe,<sup>6</sup> scenarios in which light takes ‘shortcuts’ through extra (hypothetical) dimensions,<sup>7</sup> ‘null-singularity’ models,<sup>8</sup> and models in which the speed

---

<sup>1</sup> This notion does not violate relativity, which merely prevents objects travelling faster than  $c$  through space, whereas in the inflation proposal it is space itself that expands and carries the objects with it.

<sup>2</sup> Kraniotis, G.V., String cosmology, *International Journal of Modern Physics A* 15(12):1707—1756, 2000.

<sup>3</sup> Wang, Y., Spergel, O. and Strauss, M., Cosmology in the next millennium; Combining microwave anisotropy probe and Sloan digital sky survey data to constrain inflationary models, *The Astrophysical Journal* 510:20—31, 1999.

<sup>4</sup> Coles, P. and Lucchin, F., *Cosmology: The Origin and Evolution of Cosmic Structure*, John Wiley & Sons Ltd, Chichester, p. 151, 1996.

<sup>5</sup> Levin, J. and Freese, K., Possible solution to the horizon problem: Modified aging in massless scalar theories of gravity, *Physical Review D (Particles, Fields, Gravitation, and Cosmology)* 47(10):4282—4291, 1993.

<sup>6</sup> Steinhardt, P. and Turok, N., A cyclic model of the universe, *Science* 296(5572):1436—1439, 2002.

<sup>7</sup> Chung, D. and Freese, K., Can geodesics in extra dimensions solve the cosmological horizon problem? *Physical Review D (Particles, Fields, Gravitation, and Cosmology)* 62(6):063513-1—063513-7, 2000.

<sup>8</sup> C el erier, M. and Szekeres, P., Timelike and null focusing singularities in spherical symmetry: A solution to the cosmological horizon problem and a challenge to the cosmic censorship hypothesis, *Physical Review D*, 65:123516-1—123516-9, 2002.

## ~Light-Time Travel~

Ori-005

of light was much greater in the past.<sup>9 10</sup> (Creationists have also pointed out that a changing speed of light may solve light-travel—time difficulties for biblical creation.<sup>11</sup>)

In light of this disagreement, it is safe to say that the horizon problem has not been decisively solved.

o o o 0 o o o

---

<sup>9</sup> Albrecht, A. and Magueijo, J., Time varying speed of light as a solution to cosmological puzzles, *Physical Review D (Particles, Fields, Gravitation, and Cosmology)* 59(4):043516-1—043516-13, 1999.

<sup>10</sup> Clayton, M. and Moffat, J., Dynamical mechanism for varying light velocity as a solution to cosmological problems, *Physics Letters B* 460(3—4):263—270, 1999.

<sup>11</sup> For a summary of the c-decay implications, see: Wieland, C., Speed of light slowing down after all? Famous physicist makes headlines, *TJ* 16(3):7—10, 2002. Online at: <[www.answersingenesis.org/cdk](http://www.answersingenesis.org/cdk)>.

**Article:** In “Creation,” Vol. 25 No. 4 [Sep.—Nov. 2003], pp.48-49.

“Light-Travel Time a problem for the big bang”

Author: • Robert Newton

*‘The vast distances of space prove to be a huge problem for an evolutionary view of the universe’*

The ‘distant starlight problem’ is sometimes used as an argument against biblical creation. People who believe in billions of years often claim that light from the most distant galaxies could not possibly reach Earth in only 6,000 years. However, the light-travel—time argument cannot be used to reject the Bible in favour of the ‘big bang’, with its billions of years. This is because the big bang model also has a light- travel—time problem.

**The Background:** In 1964/5, Penzias and Wilson discovered that the earth was bathed in a faint microwave radiation, apparently coming from the most distant observable regions of the universe, and this earned them the Nobel Prize for Physics in 1978.<sup>1</sup> This Cosmic Microwave Background (CMB) comes from all directions in space and has a characteristic temperature.<sup>2 3</sup> While the discovery of the CMB has been called a successful prediction of the big bang model,<sup>4</sup> it is actually a *problem* for the big bang. This is because the precisely uniform temperature of the CMB creates a light-travel—time problem for big bang models of the origin of the universe.

**The problem:** The temperature of the CMB is essentially the same everywhere<sup>5</sup>—all directions (to a precision of 1 part in 100,000).<sup>6</sup> However (according to big bang theorists), in the early universe the temperature of the CMB<sup>7</sup> *would have been very different at different places in space due to the random nature of the initial conditions*. These different regions could come to the same temperature if they were in close contact. More distant regions would come to equilibrium by exchanging radiation (i.e. light<sup>8</sup>). The radiation would carry energy from warmer regions to cooler ones until they had the same temperature.

The problem is this: even assuming the big bang timescale, there has not been enough time for light to travel between widely separated regions of space. So, how can the different regions of the current CMB have such precisely uniform temperatures if they have never communicated with each other?<sup>9</sup> *This is a light-travel—time problem.*<sup>10</sup>

---

<sup>1</sup> Coles, P. and Lucchin, F., *Cosmology: The Origin and Evolution of Cosmic Structure*, John Wiley & Sons Ltd, Chichester, p. 91, 1996.

<sup>2</sup> 2.728 K (-270.422°C).

<sup>3</sup> Peacock, J.A., *Cosmological Physics*, Cambridge University Press, p. 288, 1999.

<sup>4</sup> However, the existence of CMB was actually deduced before big-bang cosmology from the spectra of certain molecules in outer space.

<sup>5</sup> Excluding sources in our galaxy.

<sup>6</sup> Peebles, P.J.E., *Principles of Physical Cosmology*, Princeton University Press, p. 404, 1993.

<sup>7</sup> For convenience, the commonly understood term CMB will be used without implying that the radiation peaked at the same wavelength in all epochs of the model.

<sup>8</sup> Infrared radiation is part of the spectrum of light.

<sup>9</sup> This is an internal inconsistency for the big bang model. It is not a problem for a creation model; God may have created the distant regions of the universe with the same temperature from the beginning.

<sup>10</sup> Misner, C., *Mixmaster Universe*, *Physical Review Letters* 22(20): 1071—1074, 1969.

## ~Light-Travel Time~

Ori-006

The big bang model assumes that the universe is many billions of years old. While this timescale is sufficient for light to travel from distant galaxies to Earth, it does not provide enough time for light to travel from one side of the visible universe to the other. At the time the light was emitted, supposedly 300,000 years after the big bang, space already had a uniform temperature over a range at least ten times larger than the distance that light could have travelled (called the ‘horizon’)<sup>11</sup> So, how can these regions look the same, i.e. have the same temperature? How can one side of the visible universe ‘know’ about the other side if there has not been enough time for the information to be exchanged? This is called the ‘horizon problem’.<sup>12</sup> Secular astronomers have proposed many possible solutions to it, but no satisfactory one has emerged to date.

Summing up: The big bang requires that opposite regions of the visible universe must have exchanged energy by radiation, since these regions of space look the same in CBM maps. But there has not been enough time for light to travel this distance. Both biblical creationists and big bang supporters have proposed a variety of possible solutions to light-travel—time difficulties in their respective models. So big-bangers should not criticize creationists for hypothesizing potential solutions, since they do the same thing with their own model. The horizon problem remains a serious difficulty for big bang supporters, as evidenced by their many competing conjectures that attempt to solve it. Therefore, it is inconsistent for supporters of the big bang model to use light-travel time as an argument against biblical creation, since their own notion has an equivalent problem.

o o o 0 o o o

---

<sup>11</sup> Ref. 1, p. 136.

<sup>12</sup> Lightman, A., *Ancient Light*, Harvard University Press, London, p. 58, 1991.

**Article:** In “Creation,” Vol. 26 No. 3 [Jun. —Aug., 2004], p.4.

“Light-travel time”

Author: • Feedback

Two readers queried the editor’s comments (Creation 26(1):5) that the instantaneous creation of light from distant stars would imply a false history. The editor was not saying that God did not create things instantaneously, or that some things (e.g. Adam and Eve) had an appearance of age, being functionally mature, only that this cannot solve the question of distant starlight. Light reaching Earth today from distant stars contains images of explosions and other events. If God created this light in transit, replete with images of events such as explosions that had never actually happened, this would make God a deceiver. As stated, *The Answers Book*, chapter 5, explains this in detail.

o o o 0 o o o

**Planet Theories Wrong:** Hubble telescope pictures of ‘a giant gaseous object orbiting two burned-out stars’ is forcing a rethink of theories of the origins of planets. Astronomers say the gaseous object is the most distant and oldest planet yet found in the universe, as it appears to have formed 12.7 billion years ago, within a billion years of the theorised big bang origin of the universe.

But these conclusions challenge the belief that planets could not have formed so early because of insufficient heavy elements at that time. So the astronomers say this discovery shows that all theories of planetary formation may have to be revised.

[The Washington Times, <[washingtontimes.com/upibreaking/20030710-093314-3718r.htm](http://washingtontimes.com/upibreaking/20030710-093314-3718r.htm)>, 9 September 2003.]

**‘Creation’ Note:** The detection of this planet goes against evolutionary predictions, but its existence is consistent with the Bible. Note that the planet’s alleged age is not based on any evidence whatsoever— see ‘New planet challenges evolutionary models’ at <[www. answersin genesis. org/newplanet](http://www.answersingenesis.org/newplanet)>.

o o o 0 o o o

**Article:** In “Creation,” Vol. 26 No. 3 [Jun. —Aug., 2004], p.4.

“Pansperima prompts mirth”

Author: • Feedback

Re ‘Designed by Aliens?’— Creation 25(4):54—55.

Are they serious? ‘Panspermia’ indeed—I can’t stop laughing! The learned Dr Crick and other supporters of the hilarious ‘panspermia’ idea have actually come full circle. They are right back there with the ‘primitives’, spinning myths to try to explain the origin of things they don’t want to understand, yet do understand in their hearts, but are too afraid and too arrogant to admit.

What a tragic waste. May God reveal Himself to them. 1 Corinthians 1:20 is so true: ‘Where is the wise? Where is the scribe? Where is the disputer of this age? Has not God made foolish the wisdom of this world?’

NORMA SANDHAM  
Crosby, South Africa

o o o 0 o o o

**Article:** In "Creation," Vol. 25 No. 3 [Jun-Aug 2003], pp.28-30.

“ ‘Early’ Galaxies Don’t Fit!”

Author: • Andy McIntosh & Carl Wieland

Using infrared photography, a team of astronomers at the European Southern Observatory have taken pictures of what are said to be extremely distant galaxies. Their press release of 11 December 2002 assures us that ‘The resulting images reveal extremely distant galaxies, which appear at infrared wave-lengths, but are barely detected in the deepest optical images acquired with the Hubble Space Telescope (HST).’<sup>1</sup>

These galaxies are so far away from us that, according to normal theories of how light travels in space, it would have taken many billions of years for their light to have reached us. According to God’s revealed Word, the Bible, the whole universe was made only a few thousand years ago.<sup>2</sup>

There are different models to explain how the light could have reached us in such a young universe,<sup>3</sup> but the bottom line is as follows. If the evolutionary astronomer’s ‘big bang’ hypothesis is correct, then light from the most distant galaxies has taken the longest to reach us. Therefore, galaxies billions of light-years away would also be billions of years closer to the time of the proposed primordial ‘explosion’.<sup>4</sup> Thus, since we are seeing these galaxies not as they are now, but as they were when the light left them, ‘big bang’ believers expect us to be observing them as being in much earlier stages of their alleged evolution than ones near to us.

In fact, these recent findings fit well with a Biblical viewpoint, i.e. a young universe. One of the most telling admissions in the recent article was the following:

‘... a few of [ galaxies] are clearly rather large and show spiral structure similar to that seen in very nearby galaxies. It is not obvious that current theoretical models can easily account for such galaxies having evolved to this stage so early in the life of the Universe ...’

**Spiralling Problems:** Galaxies are rotating, and the outer parts rotate more slowly than the inside. They commonly show a spiral structure, which is supposed to be the result of this rotation, starting from a simple bar structure. But this means that after a few rotations, galaxies will ‘wind themselves up’ so as to destroy the spiral structure.

Both nearby galaxies and these far away ones show the same sort of spiral structure. The evolutionist astronomer is thus ‘caught’ in two ways:

---

<sup>1</sup> Deepest Infrared view of the universe—VLT images progenitors of today’s large galaxies, ESO Press release 23/02, 11 December 2002, <[www.eso.org/outreach/press-rel/pr-2002/pr-23-02.html](http://www.eso.org/outreach/press-rel/pr-2002/pr-23-02.html)>.

<sup>2</sup> Since Einstein, one has to specify a frame of reference, as time has been shown to flow differently for different observers/locations. In particular, gravity slows time. So here the Earth is the reference frame. For further information, see Humphreys, R., *Starlight and Time*, Master Books, Arizona, 1994.

<sup>3</sup> See Batten, D. (Ed.), *The Answers Book, Answers in Genesis*, Queensland, Australia, chapter 5, ‘How can we see distant stars in a young universe?’, 1999.

<sup>4</sup> ‘Big bang’ cosmologists don’t conceive of this as an explosion in the usual sense, but as a rapid expansion of space itself from a point of infinite density.



## ~Early Galaxies~

Ori-010

- 1) The nearby galaxies should not be spirals anymore, because in the time that is supposed to have elapsed. they should have wound themselves up long ago, blurring the spiral appearance.<sup>5 6</sup>
- 2) These recently-observed galaxies are ultra-young (according to 'big bang' belief) because they are so far away. So they should not have had time to develop even the beginnings of a spiral.

The article further highlighted the confusion facing long-age astronomers by saying:

'... in contrast to the galaxies at similar redshifts<sup>7</sup> (and hence, at this early epoch) found most commonly in surveys at optical wavelengths, most of the "infrared-selected" galaxies show relatively little visible star-forming activity. They appear in fact to have *already formed most of their stars* [italics added] and in quantities sufficient to account for at least half the total luminous mass of the Universe at that time. Given the time to reach this state they must clearly have formed even earlier in the life of the Universe and are thus probably amongst the 'oldest' galaxies now known.'<sup>1</sup>

The results seem consistent with the notion that the Lord, who spoke the stars into existence, made the galaxies much 'as is'. He may well have had some unwound, some not and some fully, and the variety would 'declare the glory of God' (Psalm 19:1). In an instant, He spread out the heavens (Isaiah 48:13) and on Day 4 of Creation Week, just as He says in His Word, 'He made the stars also' (Gen. 1:16).

o o o 0 o o o

---

<sup>5</sup> Scheffler, H. and H. Elsasser, *Physics of the galaxy and interstellar matter*, Springer—Verlag, Berlin, pp. 352—353, 401—413, 1987. However, this postulates a complex theory of spiral density waves as a solution to the problem. But this is an ad hoc solution, i.e. there is no evidence for it, and it is an arbitrary assumption merely concocted to solve the problem, and requires much fine-tuning.

<sup>6</sup> This is compatible with Humphreys' time dilation ideas—see <[www.answersingenesis.org/spiral](http://www.answersingenesis.org/spiral)>.

<sup>7</sup> When a light source is moving away from the observer, the lines are shifted towards the lower frequency (red) end of the spectrum, hence the term *Red Shift*. But for distant objects, the red shift is mainly caused by the expansion of space itself which carries these objects. The famous lawyer-turned-cosmologist Edwin Hubble (1889—1953), after whom the HST is named, discovered that distant objects had red shifts approximately proportional to distance from us. Therefore, according to 'big bang' dogma, objects with similar red shifts should have been formed at about the same time.

**Article:** In “Creation,” Vol. 26 No. 3 [Jun. —Aug., 2004], p.15.

“Young Galaxies ... .”

Author: • Andrew Rigg

**‘Young galaxies too old for the big bang’**

A team of astronomers from the University of Texas announced a startling discovery this year. They had used the 4-metre Blanco Telescope in Chile to find a long string of fully formed galaxies.<sup>1</sup> It has sometimes been called the Francis Filament, after team member Dr Paul Francis from the Australian National University.

The astronomers calculated that the super-cluster was 300 million light-years across, and right at the most distant edge of the universe, 10.8 billion light-years away. (A lightyear is how far light would travel at its current speed of 300,000 km/s in a year—9.5 trillion km.)

However, the discovery is a huge problem for evolutionary timescales. These galaxies exist when, according to big bang cosmology, they shouldn’t have had time to form.

The astronomers used a filter to block out light from other sources. This enabled them to pick out galaxies so far from Earth. They expected to find young, faint ‘proto’-galaxies spread evenly throughout the area. Instead, they found 37 *mature, bright* galaxies that seem to be lined up in a string, with emptiness elsewhere. It was exactly the opposite of what they expected from the big bang theory. Further observations from Siding Springs Observatory in Australia confirmed this galaxy cluster was real.

The galaxy cluster lies in the direction of the southern hemisphere constellation Grus (the Crane). At such a distance, evolutionary astronomers assume they are viewing the galaxies as they were around 11 billion years ago. This is allegedly just two billion years after the big bang supposedly formed the universe.

The research team caused a stir when they reported their discovery at a meeting of the American Astronomical Society on 7 January this year. Astronomers around the world were astonished at how mature galaxies could have formed so fast in the young universe.<sup>2</sup>

In the current main evolutionary model, galaxies formed from variations in the density of matter produced by the big bang. Big-bangers imagine that the universe needed billions of years before stars and galaxies could form into the recognizable structures we see near the Milky Way galaxy today. But this new discovery is precisely the reverse of big-bang predictions:

- These galaxies appear to be fully formed, mature structures.
- The galaxies are aligned in a long string.
- The string is colossal— more than 300 million light-years long.

---

<sup>1</sup> Other details sourced from University of Texas/McDonald Observatory Press Release, 12 January 2004.

<sup>2</sup> Why galaxy cluster is too grown-up for early universe, New Scientist 181(2430):14, 17 January 2004.

## ~Young galaxies ...~

Ori-011

Dr Francis himself expressed the problem: ‘The simulations tell us that you cannot take the matter in the early universe and line it up in strings this large’, he said. ‘There simply hasn’t been enough time since the big bang to form structures this colossal.’

Naturalistic cosmologists will undoubtedly find a way to fit this new evidence into the atheistic big bang model. However, this would merely show that *scientists always interpret facts in the light of theory*.

Theory, in turn, depends on one’s *belief system*. The big bang theory is based on *naturalism*—the belief system that discounts God’s recent supernatural acts to create the universe.

The existence of such large, mature galaxies lined up in a beautiful filament makes more sense when interpreted within the biblical belief system. That is, God rapidly and supernaturally created fully-formed stars and galaxies on Day 4 of Creation Week. ‘By the word of the LORD were the heavens made’ (Psalm 33:6).<sup>3</sup>

o o o 0 o o o

---

<sup>3</sup> See also Hartnett, J., Francis; Filament: a large scale structure that is big, big, big bang trouble. Is it really so large? TJ 18(1):16—17, 2004.

**Article:** In “Creation,” Vol. 27 No. 1 [Dec-Feb., 2005], pp.18-21.

“Galaxy games”

Author: • Andrew Rigg

**‘Grown up galaxies in a young universe prompt rethink of big bang ideas’**

This year stretched the imaginations of many astronomers and cosmologists. They have discovered amazing features at the outer reaches of the universe. And they cause headaches for those with blind faith in naturalistic origin theories—including a big bang about 14 billion years ago.

Back in January, a team of astronomers announced the discovery of a massive and distant string of galaxies. By their own dating methods, they were looking at a structure within only 2 billion years of the universe’s inception. This was much too early for such a complex structure to have evolved naturally.<sup>1</sup>

Later this year, astronomers announced another anomalous discovery. This time, they found individual galaxies at allegedly advanced stages of galactic ‘evolution’ in a part of the sky named the ‘redshift desert’.<sup>2</sup> They used the Gemini North Telescope, with an 8-metre mirror, on the summit of Mauna Kea on the big island of Hawaii.

This area of the sky is supposed to be so old and so close to the beginning of everything that it was believed nothing as complex as a galaxy should, or could, exist there.

Under big bang assumptions, astronomers looking into the redshift desert are seeing the universe as it was 8 to 11 billion years ago, at a time when it was ‘only’ 3 to 6 billion years old. This part of the sky had not previously been widely explored. Astronomers believed it contained objects too faint and dim to study properly. However, recent advances in telescope optics have allowed astronomers to make a systematic study of the redshift desert, the Gemini Deep Deep Survey (GDDS).<sup>2</sup>

What the GDDS astronomers found was totally unexpected. Where they had expected to see young, small, still-developing galaxies, they found more than 300 fully mature galaxies, just like those seen near our own galaxy, the Milky Way.

Team member Dr Karl Glazebrook from Johns Hopkins University says the find presents a huge challenge because their ‘star-forming youth is in fact long gone.’<sup>2</sup> He explained:

‘We expected to find basically zero massive galaxies beyond about 9 billion years ago, because theoretical models [based on the big bang] predict that massive galaxies form last. Instead we found highly developed galaxies that just shouldn’t have been there, but are.’<sup>3</sup>

This is a story that is sounding more and more familiar.

---

<sup>1</sup> Rigg, A., Young galaxies too old for the big bang, Creation 26(3):15, 2004.

<sup>2</sup> Faintest spectra ever raise glaring question: Why do galaxies in the young universe appear so mature? Gemini Observatory press release, 5 January 2004, <[www.gemini.edu/project/announcements/press/2004-1.html](http://www.gemini.edu/project/announcements/press/2004-1.html)>.

<sup>3</sup> D Nike, L., Glimpse at early universe reveals surprisingly mature galaxies, Johns Hopkins Gazette, 19 July 2004, <[www.jhu.edu/~gazette/2004/19jul04/19early.html](http://www.jhu.edu/~gazette/2004/19jul04/19early.html)>.

**A creationist view:** Thanks to new developments in Earth-based optical technology and orbiting telescopes such as the Hubble Space Telescope, astronomers have been able to detect fainter light from more distant objects. So they can probe the most distant reaches of space and detect objects so faint that astronomers 10 years ago did not even know they existed.

These new discoveries have shaken current theories of star and galaxy formation:

- Elements thought to ‘evolve’ within the furnaces of ancient stars over many billions of years have been found ‘only’ 2.5 billion years after the big bang, under their own dating system.<sup>4</sup>
- Very complex strings of galaxies, claimed to be hundreds of light-years in size, have been found at a time when only small, isolated proto-galaxies should exist.’
- And now, massively complex galaxies and supermassive black holes ... have also been found too early in the evolutionary life of the universe to be explained by conventional theories.

So what is the creationist response to these latest, amazing discoveries?

In Genesis 1:14—19, God tells us when He created the heavenly bodies—the planets, stars and galaxies that make up our amazing universe. The passage teaches that God commanded, ‘Let there be lights’, and the command was fulfilled with rapid formation of these objects—’and it was so’—all within Day 4. This is further reinforced in Exodus 31:17, ‘for in six days the LORD made the heavens and the earth, and on the seventh day he abstained from work and rested’. Also, Psalm 33:6 declares, ‘by the word of the LORD were the heavens made, the starry host by the breath of his mouth.’

In the big bang model of the origin of the universe, galaxies started small. These small galaxies then began to collide. Eventually, after many billions of years, large, mature galaxies, like our own, were formed. This is called the hierarchical model of galaxy formation.

If the original heavenly bodies were created mature, then we would expect to see fully formed galaxies everywhere, even in the most distant parts of the universe. We should not be surprised to see massive strings of galaxies or to find supermassive black holes in all regions of space. In a nutshell, mature galactic structures are not a problem for creationist astronomers.

Australian physicist and creation cosmologist, Dr John Hartnett, says that these recent discoveries are very significant for a creationist understanding of the universe. ‘This has enormous significance because the big bang astronomers] are saying they don’t see how such a structure could form so quickly according to the big bang model.’

Dr Hartnett believes that the redshift methods used to measure the distances to these objects are flawed.<sup>5</sup> A growing list of evolutionary astronomers and cosmologists, such as Dr Halton Arp, agree that the big bang interpretations of the redshifts are flawed. Arp documented many pairs of objects that have greatly different redshifts, supposedly showing that they are vast distances apart

---

<sup>4</sup> Oard, M.J., The big bang problem of early maturity, TJ 18(1):15—16, 2004.

<sup>5</sup> Astronomers measure the redshift of distant objects, called quasars, to calibrate the distances to objects such as the galaxies in this article.

## ~Old galaxies & big bang~

or1~012

and receding at hugely different speeds. Yet there is also connecting material between them, meaning that they must be the same distance away.<sup>6</sup>

If the distances are wrong, then an object may appear small and dim not because it is incredibly distant, but because it really is small and dim.<sup>7</sup> And faulty distances mean that any theory based on them—such as the big bang—is faulty too!

As telescope technology continues to improve and astronomers are able to probe more easily the darkest depths of the universe, it is likely more and more of these big-bang—defying discoveries will arise.

These mature galaxies present a major problem for evolutionary scientists. But the underlying models have become so flexible that it is only a matter of time until they are modified to explain away such problems. However, for the biblical Christian, these discoveries, and others like them, are sound and exciting evidence in support of the biblical creation account. This account, unlike its evolutionary counterparts, is divinely inspired, so does not need any modification and change whenever new discoveries are made.

o o o 0 o o o

---

<sup>6</sup> For more information on redshift and problems with using it as a measure of distance, see reviews of Arp's books in TJ 14(3):39—45, 46—50, 2000.

<sup>7</sup> Hartnett, J., Francis Filament: a large scale structure that is big, big, big bang trouble. Is it really so large? TJ 18(1):16 2004.

**Article:** In “Creation,” Vol. 27 No. 1 [Dec-Feb., 2005], pp.18-21.

“Redshift reactions”

Author: • Andrew Rigg

‘Grown up galaxies in a young universe prompt rethink of big bang ideas’

**Insert—Redshift Reactions:** Barred spiral galaxy, NGC 4319, and the much smaller quasar, Markarian 205. Light from objects that are moving away from us is ‘stretched’ and shifted in colour towards red (redshifted).

According to the big bang idea, objects with greater redshifts are further from us. From the redshifts, the quasar in the picture should be much further away than the galaxy. But the picture on the cover of the book by the astronomer Halton Arp (lower image) shows matter apparently bridging from the quasar to the galaxy, suggesting that they are very close. NASA’s recently-published image (top) shows no bridge between the galaxy and the quasar. Arp and other experts say that when the original NASA image is adjusted appropriately, the bridge can be seen. Some other quasar-galaxy pairs show similar bridging. Such evidence would raise huge problems for big bang cosmology.

o o o 0 o o o

**Article:** In “New Scientist,” No. 2169 [Jan., 16, 1999], pp.24-28.

“Space oddity”

Author: • ??

**‘It makes up most of the Galaxy but no one has ever seen it. And, says Stephen Battersby, its weirder than you ever imagined.’**

Think of a Galaxy and you probably think of stars, billions of them, in brilliant shining spirals. Or perhaps you picture nebulae—vast clouds of glowing gas. But these are just a tiny part of the whole. What galaxies are really made of is dark and slippery. And it now seems that it’s also very strange.

When astronomers realised several decades ago that most of the galaxy is made of matter we can’t see, they came up with a cosmic menagerie of possibilities for the invisible matter, including massive black holes, microscopic black holes and “shadow stars” that only interact with the world through their gravity. Eventually, two candidates took the lead: MACHOs (massive compact halo objects), which are failed stars, too dim to see, and WIMPs (weakly interacting massive particles), which are exotic particles that interact only reluctantly with their surroundings.

For years, the battle raged between MACHOs and WIMPs, but by the early 1990s it seemed that MACHOs had finally won the day. Now everything has changed. MACHOs are down and out, and exotic WIMPs are in the ascendant. The stuff of the galaxy, it seems, is anything but ordinary.

So what originally led astronomers to believe that we are surrounded by bizarre galactic ectoplasm that outweighs all ordinary matter? It’s all because our Galaxy spins faster than it should. Except near the galactic centre, stars and gas are circling at an average speed of roughly 200 kilometres a second. Even far out, beyond our already suburban neighbourhood, where the Galaxy thins out and the rotation should be much slower, stars keep the same impatient pace. If the Galaxy were only made of the things we can see, it wouldn’t exert a strong enough gravitational pull to keep all these speedy stars orbiting. Instead they would zoom off into intergalactic space, and our night skies would be dull and empty.

This isn’t just a problem for the Milky Way—other galaxies rotate too fast as well. So astronomers were forced to admit that there is more to space than meets the lens: our Galaxy, like most or all others, must be surrounded by a halo of dark matter that dwarfs the small bright island of stars.

But what could this dark matter be? It needn’t be completely invisible, just very dim. And a simple way for it to lie low is in so-called “brown dwarfs”: stars that have less than a tenth of the mass of our Sun. This means they are too small to ignite nuclear fusion in their cores, so they just glow very faintly as they slowly lose the small store of heat gained in their formation.

Could an army of brown dwarfs be holding the Milky Way together? These dark lumps of ordinary matter, called MACHOs, can’t be spotted in the usual way. Instead, you have to look for the imprint of their gravity, a phenomenon called gravitational microlensing.

This ploy was suggested back in 1986 by Bohdan Paczynski, an astrophysicist at Princeton University in New Jersey. If you stare at a distant star for long enough, he reasoned, a MACHO should occasionally drift in front of it. The MACHO’s gravity will slightly bend the path of light from the star, converging it towards us and making the star briefly brighter. He also calculated that



## ~MACHO & WIMPS~

Ori-014

it would be an incredibly rare event, so to catch an example of this refracted glory astronomers have to watch a lot of stars at once. Millions of them.

Since the early 1990s, several different research groups have been doing just that. They have chosen to watch stars in the Large and Small Magellanic Clouds, two small galaxies that orbit the Milky Way. That way, there's plenty of space in between the Earth and the star being watched increasing the chance that a MACHO might pass across our line of sight.

**Too heavy:** Sure enough, in 1993, MACHO sightings started to come in. Over a few weeks a target star would brighten and then fade, in exactly the way predicted by Paczynsk. Astronomers were delighted: it looked though they might have solved the mystery and found the main ingredient of the galaxy.

But the delight was short-lived. Most the twenty or so MACHOs spotted since 1993 are simply too heavy. You can estimate the mass of a MACHO from how long the lensing lasts: the bigger the MACHO, the larger its gravitational sphere of influence and the longer the brightening. And it turns out that the MACHOs seen so far are much larger than expected, at around 0.3 to 0.8 times the mass of the Sun.

This is a most uncomfortable number. If MACHOs are so big, what can they be? They can't be ordinary stars, because with masses much more than 0.1 times that of the Sun they would shine, and the galactic halo would be bright instead of dark. They might possibly be old white dwarf stars, the, dying embers of stars similar to our Sun. But if so, it is hard to explain why space isn't full of heavy elements, the waste products of these old suns.

Double trouble: There is a third possibility, which is a very troubling one for MACHO hunters. In 1994 Kailash Sahu, now at the Space Telescope Science Institute in Baltimore, suggested that the lenses might not be in our Galaxy's halo at all. Instead, he said, they might be ordinary stars in the Magellanic Clouds. If so, the lensing objects could not explain the Galaxy missing dark matter after all.

A hint that Sahu was right came with the discovery in 1996 of a very strange lens in the direction of the Large Magellanic Cloud (LMC). Instead of the simple, smooth, symmetrical rise and fall in brightness, this lens produced a much messier fluctuation with very sharp peaks of brightness. Rather than a single object doing the lensing, it looked as though two close companions—a "binary lens"—had come between us and the target star.

It was a crucial finding, because it turns out that you can use the sharp peaks, together with some complicated geometrical reasoning, to measure how quickly a binary lens is moving across the sky. And the binary lens was suspiciously slow. Rather than matching the speed of the hectic halo of the Milky Way, it was moving more like something in the smaller, more placid LMC.

But this event was only recorded by one telescope. With only these observations to go on, the brightness variation wasn't pinned down properly, so MACHO champions weren't too put out. Then, last June, another binary lens was seen, in the direction of the Small Magellanic Cloud. On this occasion, it was spotted in time for a host of telescopes to be aimed at the lens, catching the second brightening in detail. Again, it moved far too slowly to be in our Galaxy's halo—it looked like a binary within the SMC. "Out of fewer than 20 microlensing events towards the Magellanic Clouds, the only two that allowed a distance measurement were both in or near the clouds themselves," observes Paczynski. It seems very unlikely that most of the halo is in the form of MACHOs."

So MACHOs are looking badly bruised. And now a fatal blow may have come from another quarter: the halo's dark matter can't be made of the kind of ordinary particles that build stars, planets and brown dwarfs. Three months ago, astronomer Dennis Zaritsky of the Lick Observatory on Mount Hamilton in California reported that the Milky Way, and other galaxies, must contain something more exotic.

Most of the lightest elements that we see around us in the Universe—deuterium, helium, lithium—were made a couple of minutes after the big bang, when the Universe was small and cosy, and neutrons and protons were hot enough and close enough together to fuse into atomic nuclei. Astronomers can estimate how much helium was made in this way by measuring the light spectrum of vast intergalactic clouds left over from the big bang. They can then work backwards and calculate how big a pool of protons and neutrons the big bang had to work with, or in other words how much ordinary matter there is in the Universe.

Knowing this number, Zaritsky decided to weigh the Milky Way and other galaxies more precisely than has ever been done, to see if there was enough ordinary matter to account for their mass. To do this, he drew together observations of satellite galaxies of the Milky Way. About a dozen mini-galaxies are in orbit around us, with the two Magellanic Clouds being the biggest and best known. Their movements can be used to weigh a greater volume of the Milky Way and its halo than would be possible by looking at those speedy stars in the galactic disk. The most distant satellite galaxy, Leo I, is 700,000 light years from the galaxy's centre, thirty times as far out as the Sun and fifteen times as far as the stars at the fringe of the galactic disk. Because its orbit encloses everything inside that radius, Leo I can be used to weigh a very large volume indeed.

Combining velocity measurements of all the satellite galaxies, Zaritsky showed that our dark halo goes out at least as far as Leo I, and has a mass equivalent of at least thousand billion Suns, more than ten times that of all the visible matter in the galaxy. What's more, he discovered that other galaxies that are similar to the Milky Way also have vast haloes. Adding it all up, there must be far more matter in galactic haloes than there is ordinary matter. Haloes must be made of something odder.

So, if the dark matter isn't dim and ordinary it must be invisible and extraordinary. This isn't as far-fetched as it sounds. We already know of a type of matter that is invisible: neutrinos. These particles cannot interact with light—they can't absorb it, emit it or reflect it. It just isn't in their nature. They can only interact with matter using the weak force, which is aptly named, so they interact only rarely. And there should be huge numbers of neutrinos left over from the big bang.

**Coming unstuck:** But neutrinos have drawbacks as dark matter. Though they probably have some mass (This Week, 13 June 1998, p 25), they move too fast to be easily captured by the gravity of galaxies, so would not make effective galactic glue. Worse still, they are fermions, a type of particle that according to quantum mechanics is fundamentally antisocial: no two neutrinos in the Universe can share a single quantum state. Remarkably, this means that even the vast spaces of many galactic haloes would seem too cramped for neutrinos to be the dominant mass.

What astronomers need is an exotic particle that interacts only weakly, is more sluggish than the neutrino and preferably isn't a fermion. Fortunately, physicists have already invented two particles that fit the bill.

The first is an axion, a hypothetical particle that interacts using only the weak nuclear force, and was devised to help solve a minor inconsistency in the standard theory of particle physics. Though

axions are astoundingly lightweight, enough might have been made in the big bang to explain all the dark matter in the Universe.

In principle, axions can be turned into microwave photons using a strong magnetic field, and so detected. It is a very delicate experiment, but a collaboration in the US between the Massachusetts Institute of Technology, Lawrence Livermore National Laboratory in California, The University of Florida in Gainesville, Fermilab near Chicago and Lawrence Berkeley National Laboratory, has built a detector that has already ruled out a small range of possible axion masses. But the theory is vague: it only pins down the axion mass to between about a millionth and a thousandth of an electronvolt (an electron, for comparison, weighs half a million electronvolts). The part of this mass range that would produce a useful amount of dark matter is between 1 and 10 millionths of an electronvolt. “I think that whole range will be probed with extraordinary sensitivity within five years,” says Leslie Rosenberg of MIT. Until then, we can’t rule out axions as a dark matter candidate.

But the other candidate—the WIMP—is more promising still. WIMPs come out of another theory designed to improve on standard particle physics. Many physicists believe that to unify the strong nuclear force with electromagnetism and the weak force, there must be twice as many subatomic particles as we have yet discovered. This is the theory of super-symmetry. Each familiar particle has a much heavier “super-partner”: quarks have squarks, electrons selectrons, photons photinos. Most of these particles are exceedingly unstable, and quickly fall apart. But the least massive super-partner, the neutralino, should be stable. And unlike the uncertainty over axions, there are theoretical reasons for expecting them to be important in astrophysics.

“Neutralino WIMPs are required by particle theorists to weigh about 100 times as much as a proton,” says physicist John Ellis of CERN, the European Laboratory for Particle Physics near Geneva. And according to his latest calculations, they should have been created in the early Universe in similar numbers to protons and neutrons. “So they should provide about the right amount of mass to be dark matter.” Bingo—a perfect WIMP. But can anyone prove that they exist?

Plenty of people are trying. Several teams have built WIMP detectors under ground, away from the highly radioactive environment of the Earth’s surface. If WIMPs make up the halo they must be drifting through the Earth all the time, and occasionally one will bump into an atomic nucleus. In a salt mine in Boulby, Yorkshire, a British group has set up experiments around several large crystals of sodium iodide, a substance that should emit a small flash of light when one of its nuclei is hit by a WIMP. The task is complicated by background noise from the decay of traces of radioactive isotopes in and around the crystal, which produces at least a hundred times as many flashes as WIMPs could.

A cleaner technique, employed by the American Cryogenic Dark Matter Search collaboration, is to use a crystal of germanium. If a WIMP hits a germanium nucleus, the recoiling nucleus should heat up the crystal and ionise hundreds of atoms. Both the heat and the ionised charge can be measured, and the ratio of the two should distinguish a WIMP collision from most forms of background radioactivity. “Our detector will soon be competitive with the other experiments,” says Roger Dixon of Fermilab. And it has the potential to be more sensitive still.

But one team, working under the Apennines at the Gran Sasso Laboratory in Italy, has caused something of a sensation by announcing the detection of “a possible WIMP candidate”. At a cosmology meeting in Rome in October, Rita Bernabei of an Italian-Chinese collaboration dubbed DAMA reported an intriguing variation in the Northern-Hemisphere number of counts in their sodium iodide crystals. Over the two years the experiment has been running, more flashes of a

certain energy have been seen during summer than in winter. This is just what you would expect from WIMPs: in summer, the Earth is moving around the Sun in roughly the same direction as the Sun is moving around the centre of the Galaxy. The two motions add up, so the Earth would be moving relatively swiftly through the galaxy's cloud of WIMPs. About 10 per cent more WIMPs would pass through the detector than six months later, when the Earth's overall motion around the centre of the Galaxy is slower.

**Going to ground:** It is only the fairly low-energy flashes that vary in this way, and from that the team calculates that their WIMPs have a mass towards the bottom end of expectations—about 60 billion electronvolts, or roughly the same as an iron atom.

So is the mystery solved? Not quite. Bernabei and her team only describe this as a hint of a detection. The statistical significance is not overwhelmingly high, and they can't be sure that no other errors have crept in. Many WIMP physicists consider even that to be too strong a claim. "It's like seeing a light in the sky and saying you've discovered a UFO," says Peter Smith of the Rutherford Appleton Laboratory in Oxfordshire, a member of the British dark-matter collaboration. "It could be a WIMP signal changing through the year; but it could also be the background changing. Instead of describing this effect in terms of WIMPs, we need to do better experiments."

Bernabei counters that no seasonal variation is seen in the higher-energy events in their crystals. "If a modulation in the lowest-energy region were due to a modulation of the background, an equal or larger modulation would be present at higher energies," she says. But both agree that the question can't be resolved without more data, and every dark matter group has plans to develop more sophisticated detectors.

Not all the detectors will be down mines. WIMPs should occasionally lose energy when they hit nuclei in the Sun and so become trapped by the Sun's gravity. Over billions of years, a huge stock of WIMPs could have built up in the Sun's core. Occasionally these trapped WIMPs would collide with each other and be destroyed, producing high-energy neutrinos that would zip out into space. A few instruments for detecting such high-energy neutrinos are under construction.

One, called AMANDA, is at the South Pole and looks down at about a cubic kilometre of ice for the distinctive patterns of light produced by neutrino byproducts.

But there is a more direct approach: to make a WIMP. The Large Hadron Collider, now being built at CERN, will be the most powerful particle accelerator in the world and it may be able to create WIMPs. Particle physicists will try make a WIMP to prove that supersymmetry describes the Universe, but as fringe benefit they may also prove that WIMPs fill it.

Whether or not the main ingredient the galaxy has been glimpsed under the Apennines, the case for WIMPs has never been stronger. MACHOs have had their brief hour of glory, but after the dust has settled WIMPs will probably prevail.

o o o 0 o o o