

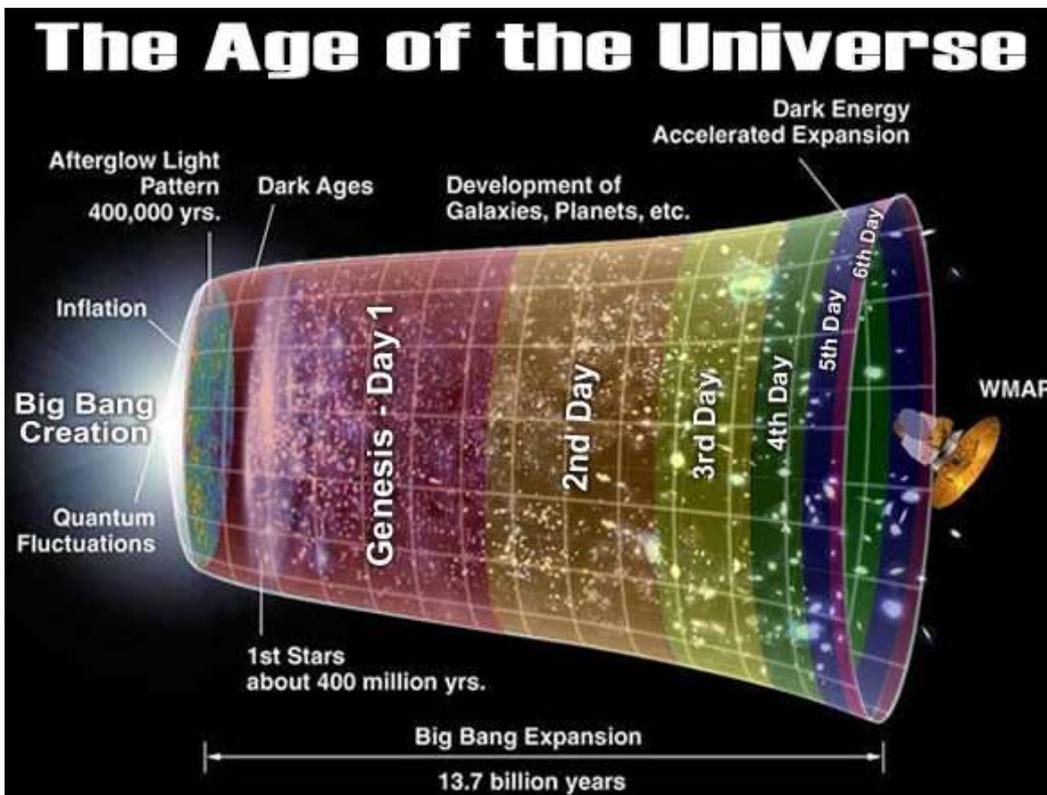
The Age of the Universe

Some of your comments regarding Dr. Schroeder's previous tothesource articles in the Genesis Project series suggest that he does not believe the biblical statement that six days passed between the creation of the universe and the creation of humankind. Dr. Schroeder is definitive: he takes the Bible as it stands.

One of the most obvious perceived contradictions between the Bible and modern science is the age of the universe. Scientific data from the Hubble telescope suggest it is 14 to 15 billion years old. But when the generations of the Bible are added up, they total 5700-plus years. Certainly both can't be right. But Dr. Schroeder believes they both are, depending on your vantage point.

May 16, 2006 Dear Concerned Citizen,

by Dr. Gerald Schroeder



The universe may be only some 5700-plus years old. God could have put the fossils in the ground and juggled the light arriving from distant galaxies to make the world merely *appear* to be billions of years old. There is absolutely no way to disprove this claim. God, being infinite, could have made the world that way.

Most scientists disagree. They say the universe is billions of years old. But scientists can be wrong, even about something as important as the age of the universe. In 1959, a survey asked leading American scientists, "What is your concept of

the beginning of the universe?" Two-thirds answered: "Beginning? There was no beginning. Oh, we know the Bible says 'In the beginning.' That's a nice story, it helps kids go to bed at night, but we sophisticates know better."

That was less than 50 years ago. Then in 1965 Penzias and Wilson discovered that the entire universe, in all directions, is bathed in a sea of very long 'cold' radiation, an echo of the big bang, the radiation left over from that intense hot moment that marked the universe's beginning. This one piece of information confirmed that our universe had a beginning. For this Penzias and Wilson earned the Nobel Prize.

Most respectable scientists now agree with the Bible that the universe had a beginning.

So the biblical creation account got the fact that our universe had a beginning right, when most scientists had it wrong. But for many skeptics, that's about all. They now target the Bible's claim that the universe was created in six 24-hour days as pure silliness. What they don't realize is that the most current science is teaching exactly this, that the world is young and old simultaneously. It all depends on the time and place from which you are looking, and who (or Whom) is looking.

As humans on earth today we use scientific instruments to look back from the creation of Adam to the creation of our universe and see evidence of billions of years passing. These are billions of years using our human perspective. That's our view of time. But the Bible's creation account describes that same flow of events from the beginning looking forward. The biblical account of the first six days of creation, before Adam's soul had been created, is more of an autobiography of God than a biography of man. Let's call this perspective "Genesis time".

As hard as it is for anthropocentric humans to remember before Adam there was God. It's not always about us and how we see things.

It is my theory that Genesis time and human time can be understood, relative to each other, through a careful reading of the Torah, and with the help of modern science.

Contrary to what many of you have said in your letters, I believe these unique six days were six 24-hour days. I reject the ideas that the biblical account is not factual and that the days are not specific periods of time but symbolic "epochs". No such simple explanation is possible because every ancient commentary, with no exception, and that includes the Talmud (in the section called Holidays, ca. 500), and Rashi (ca. 1090), and Nahmanides (ca. 1250) all tell us that the six days of Genesis were six 24-hour periods "not longer than the six days of our work week."

Instead of being our enemy, it is modern science that now helps us reconcile this discrepancy.

At the moment of the big bang, when the universe was still pure energy, there was no matter to record the passage of time because at the speed of light, time does not exist. Once light beams became matter they entered the realm of time. Time *grabbed hold* when matter formed from the light beams of the big bang creation.

This minuscule moment of time before the biblical clock begins lasted about 1/100,000 of a second. The biblical six days of Genesis, what I am calling Genesis time, begins here, at the formation of the first stable matter.

Science has also shown that when space, and the matter in it, expand, it effects the flow and our human perception of time.

Every scientist knows that when we say the universe is 14 to 15 billion years old there's another half of the sentence that we never say. The full statement should be: The universe is 14 to 15 billion years old as *measured from the earth today*. In short, from human time. But the perception of Genesis time sees the development of the universe from the beginning looking forward. For that reason, Genesis 1:5 reads "And there was evening and there was morning one day." The Bible did not write "a first day" because from the Genesis time view there was not yet a second day and first can only be used correctly if there is already a second, first being relative to the second.

But how much of these 14 to 15 billions of years is the direct result of the expansion of the universe? Another way to ask this is, "How would those billions of years be perceived from near the beginning of the universe looking forward, from Genesis time? To find this we need to factor out the stretching of matter and time which so dramatically effects our human perception of time?

Science helps us here as well. Cosmology has quantified the data so we now can calculate *Genesis time* (the "view of time" from the beginning) relative to *human time* (the "view of time" today on earth). It's not science fiction any longer.

Any one of a dozen physics or astronomy textbooks brings the same number. The general expansion factor from the moment of stable matter formation (nucleosynthesis is the term) to now is a trillion. The universe is a trillion times larger than it was at nucleosynthesis.

The Torah tells us that from the perspective of Day One six days passed between the creation of the universe and the creation of Adam.

If we multiply these six Genesis days by a trillion we have six trillion human days. Six trillion human days is a very interesting number. What would that be in human years? Divide six trillion days by 365 and it comes out to be 16 billion human years.

The equation is very simple:

$$\begin{array}{r} 6 \text{ days (in Genesis time)} \\ \times \quad 1 \text{ trillion (degree of expansion of the universe)} \\ \hline 6 \text{ trillion days (in human time)} \\ \div \quad 365 \text{ days in a year (in human time)} \\ \hline 16 \text{ billion human years (in human time)} \end{array}$$

Now take about 10% off for two factors that reduce human time. (1) Adam received the Neshama (the soul of human life) during the sixth day, not at its end. (2) Recent observations tell us the universe is actually increasing in its rate of expansion.

Correcting for these two factors, the 16 billion years becomes 14 to 15 billion year in human time. It turns out that the scientific confirmation of the universe's age at 14 to 15 billion years (in human time) also confirms the universe's age at just under 6 days (in Genesis time), the exact moment the Bible tells us God created the human soul. This is the moment when the biblical account moves from Genesis time to human time.

Not a bad 'guess' for 3300 years ago!

The way the scientific and the biblical 'ages' match is extraordinary. I'm not speaking as a theologian, I'm making a scientific claim. I didn't pull these numbers out of my hat. I used numbers that the best current science is using. That's why I led up to the explanation very slowly, so you can check the science and the biblical account as well.

Now we can go one step further.

Let's look at the development of time, day-by-day. Every time the universe increases in scale by a given factor, the time as perceived at the beginning is divided by that same factor. When the universe was small, its rate of doubling was very rapid. But as the universe got larger, the time it took to double in scale was ever longer. This rate of expansion is quoted in "The Principles of Physical Cosmology," a textbook published by Princeton University Press, and used literally around the world.

Therefore the first 24 hour day (Day 1) of Genesis time lasted 8 billion years in human time. The second 24 hour day (2nd Day) of Genesis time lasted 4 billion years in human time.

The Bible is so certain it brings the truth that it tells us what happened on each of the six days. Now we can see if modern cosmology, paleontology, and archaeology match the biblical claims day-by-day. I'll give you a hint- they match up so closely it will send chills up the spine of even a confirmed atheist.

How did this biblical account of our beginnings get so much of the science correct so many millennia ago, if it did not come from God?

From Adam's (human time) point of view the universe is 14 to 15 billion years old. Science now confirms this. But once you squeeze the expansion out of the universe to find the age of the universe as seen from its beginning (from Genesis time) the universe was created and made in six 24 hour days. Those who believe the exquisite and profoundly simple biblical account of the universe's creation and making should be confident in asserting this truth as well.

The universe, up to the creation of Adam's soul, is 14 to 15 billion years old in human time and it is 6 days old in Genesis time, with no bending of either the Bible or the science. It is the same series of events, told from two different vantage points.

It is satisfying that after centuries in which the Greek view of an eternal universe held sway, science has now confirmed what the opening sentence of the Bible has declared for the past 3300 years: There was a beginning, a creation, to our magnificent universe. This may not be absolute proof for a Beginner God, but it does open the door quite widely for that possibility. It is intriguing that cosmologists appear to have confirmed that just following the big bang creation, there was a one time force, termed inflation, that in a sense got the expansion going. This force or phenomenon is never repeated in the history of the universe. What is intriguing is that the Bible at the very beginning, Genesis 1:2, brings forth a one time force, "the spirit of God hovered" and in Hebrew "ruah Elohim merahefet." "The spirit of God hovered" is never repeated in the entire Hebrew Bible. A one time phenomenon for cosmology and a one time Godly phenomenon in the Bible. And in both cases what follows immediately is LIGHT.

Dr. Gerald Schroeder

More than 100,000 copies of Dr. Gerald Schroeder's book, The Science of God, have sold since its publication in 1998. It's been published in seven other languages.

Day 1

Verse 1-5: In the beginning God created the heavens and the earth. And the earth was without form, and void; and darkness was on the face of the deep. And the Spirit of God hovered over the face of the waters. Then God said, "Let there be light," and there was light. And God saw the light, that it was good; and God divided the light from the darkness. God called the light Day, and the darkness He called Night. And there was evening and there was morning, day one.

Day 2

Verses 6-8: Then God said, "Let there be a firmament in the midst of the waters, and let it divide the waters from the waters." Thus God made the firmament, and divided the waters that were under the firmament from the waters that were above the firmament; and it was so. And God called the firmament Heaven. And there was evening and there was morning, a second day.

Day 3

Verses 9-13: Then God said, "Let the waters under the heavens be gathered together into one place, and let the dry land appear"; and it was so. And God called the dry land Earth, and the gathering together of

the waters He called Seas. And God saw that it was good. Then God said, "Let the earth bring forth grass, the herb that yields seed, and the fruit tree that yields fruit according to its kind, whose seed is in itself, on the earth"; and it was so. And the earth brought forth grass, the herb that yields seed according to its kind, and the tree that yields fruit, whose seed is in itself according to its kind. And God saw that it was good. And there was evening and there was morning a third day.

Day 4

Verses 14-19: 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. God set them in the firmament of the heavens to give light on the earth, and to rule over the day and over the night, and to divide the light from the darkness. And God saw that it was good. And there was evening and there was morning, a fourth day.

Day 5

Verses 20-23: Then God said, "Let the waters abound with an abundance of living creatures, and let winged creatures fly above the earth across the face of the firmament of the heavens." And God created great reptiles (in the original Hebrew, the big ta'ni'neem) and every living thing that moves, with which the waters abounded, according to their kind, and every winged animal according to its kind. And God saw that it was good. And God blessed them, saying, "Be fruitful and multiply, and fill the waters in the seas, and let winged animals multiply on the earth." And there was evening and there was morning, a fifth day.

Day 6

Verses 24-25 Then God said, "Let the earth bring forth the living creature according to its kind: cattle and creeping thing and beast of the earth, each according to its kind"; and it was so. And God made the beast of the earth according to its kind, cattle according to its kind, and everything that creeps on the earth according to its kind. And God saw that it was good.

"The so-called Scientific Revolution of the sixteenth century has been misinterpreted by those wishing to assert an inherent conflict between religion and science. Some wonderful things were achieved in this era, but they were not produced by an eruption of secular thinking. Rather, these achievements were the culmination of many centuries of systematic progress by medieval Scholastics, sustained by that uniquely Christian twelfth-century invention, the university. Not only were science and religion compatible, they were inseparable--the rise of science was achieved by deeply religious Christian scholars.

It is important to recognize that science is not merely technology. A society does not have science simply because it can build sailing ships, smelt iron, or eat off porcelain dishes. Science is a method utilized in organized efforts to formulate explanations of nature, always subject to modifications and corrections through systematic observations."

The Victory of Reason
Rodney Stark

Send your letter to the editor to feedback@tothesource.org.



Gerald Schroeder

BSc, MSc, and PhD all earned at the Massachusetts Institute of Technology PhD in two fields: Earth and Planetary Sciences; and, Nuclear Physics. Formal theological training includes fifteen years of study under the late Rabbi Herman Pollack, Rabbi Chaim Brovender and Rabbi Noah Weinberg.

Seven years on the staff of the M.I.T. Physics Department prior to moving to Israel and joining the staff of the Weizmann Institute of Science and then the Volcani Research Institute and the Hebrew University Isotope Separation Mass Spectrometer facility. Currently teaches at the Aish HaTorah College of Jewish studies in Jerusalem.

Author of GENESIS AND THE BIG BANG THE SCIENCE OF GOD and THE HIDDEN FACE OF GOD. In the first full year of its publication, The Science Of God was on the Barnes & Noble list of non-fiction best sellers and was Amazon.com's best selling book in the field of physics/cosmology for that entire year. Dr. Schroeder has approximately 60 publications in peer-reviewed scientific journals. He lives in Jerusalem with his wife and 5 children.

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