

Creation, in Judaism and Science

This week's Torah portion is *Bereshit*, "In the beginning". It is the beginning of the Torah and the beginning of the world. We are treated to the majestic picture of Divine Creation:

Bereshit bara Elokim et ha-shamayim ve-et haaretz --

In the beginning God created the heaven and the earth. And the earth was without form, and void; and darkness was upon the face of the deep...

And God said, Let there be light. And there was light...

And there was evening and there was morning, one day...

[Then God created land and sea, plants, stars, planets, fish, birds, reptiles, cattle, all manner of animals, and finally people] ...in His own image... male and female He created them...

And God blessed them and... said to them, Be fruitful and multiply, replenish the earth and subdue it, and have dominion over... every living thing...

And God saw every thing that he had made, and, behold, it was very good. And there was evening and there was morning, the sixth day. [Genesis 1:1-31]

What I would like to do is discuss creation from a traditional Jewish perspective and a modern scientific perspective, and compare the two. As both a physicist and a student of Judaism, I feel qualified to do so. The topic is doubly appropriate today, because the Shabbat morning service focuses on creation. We say:

Baruch she'amar ve-hayya ha-olam

Blessed is He Who spoke, and the world came into being

We call God:

Yotser or uvoreh choshech, oseh shalom uvoreh et ha-kol

He Who forms light and creates darkness, Who makes peace and creates everything

In the Amidah, we call God *Koneh ha-kol* (Creator of everything).

We sing *kEl Adon*, the song of creation, which calls God "*kEl Adon al kol ha-maasim*" ("Master of all creations"), and mentions twelve different sources of light.

I find it astonishing that in the past hundred years alone, one scientific discovery after another came to validate the Torah's account of

creation. Scientists, who have a natural anti-religion bias, always managed to claim the opposite was true before those discoveries were made.

First, let's look at the first event:

God said, Let there be light. And there was light. [Genesis 1:3]

This wording implies that our world had a sharp, specific beginning. Now, until 1965, most scientists supported the steady state theory, which said the universe had no beginning and no end, has always been here and always will be, forever unchanging. Then, in 1965, new observations confirmed that our world had a sharp, specific beginning, which scientists called the "Big Bang". They were actually able to hear the noise left over from that first gigantic explosion, and ascertain that that noise fills the whole universe! And science now supports the account in the Torah.

Second, take creation itself. The word means making "something out of nothing" -- "*Ex nihilo*". "Nothing" was always understood to mean nothing material, nothing you can see, touch, or perceive with your senses. Scientists were convinced that matter cannot appear out of nothing. Then Einstein came, with his theory of relativity, and said that $E = mc^2$, that matter is just a condensed form of energy, and that visible matter CAN appear out of invisible energy. In the laboratory, physicists can create pairs of particles from pure energy, from "nothing" if you will. All of a sudden, a particle and its antiparticle appear. They even *call* it "pair creation". Conversely, when a particle meets its antiparticle, the opposite occurs. They both disappear in a flash of energy. It's called "pair annihilation."

Third, was the earth empty at first, then life came? Yes. The Torah and science agree on that too. Does science conclude that the evolution of life follows the order given in the Torah: Plants, then fish, birds, reptiles, mammals, and finally people? Roughly speaking, yes, in the sense that life forms became more and more complex.

Fourth, let's tackle the issue of time. Science tells us that the universe is 13.8 billion years old. The evidence for that is twofold. First, dating techniques tell us that some fossils found inside the earth are millions of years old. Second, we calculate that some stars are billions of light-years away. This means that it takes billions of years

for their light to reach us. So what we see today in the sky can be billions of years old.

How do we reconcile all this with the Torah, which says that God created the world in just six days, and only 5,776 years ago? The answer is again provided by relativity. Time passes faster when you move. So, what may have seemed like six days for someone traveling close to the speed of light may have been 13.8 billion years to someone sitting still on earth. Can we verify this? Yes. It's called the twin effect. It is popularized as follows. Two twins are twenty years old. One stays on earth. The other goes off to explore the universe in a very fast spaceship, then returns to earth. For him, his journey lasted five years, and he looks and acts 25. But he is astonished to see that his twin brother looks and acts 80 years old, and has actually experienced a full 80 years! Did we actually do this? Of course not. But we did the equivalent in the laboratory. We created particles that have a very short lifetime when they are at rest. But when we accelerated them to very high speeds, we found that their lifetimes increased, and by just the amount predicted by Einstein!

Fifth, if there was a Big Bang, what came before it? The Torah doesn't say, and science can't say! What does Einstein's relativity say? It says that all measurable quantities at the time of the Big Bang become infinite, which means that the theory fails at that point. It's the only physical theory that predicts its own downfall! All other theories can calculate what happened to a system in the past, or what will happen to it in the future. But when we use relativity to extrapolate the known universe backwards in time, we encounter an impenetrable wall right at the Big Bang!

The Talmud told us this in its own language:

כל המסתכל בארבעה דברים רתוי לו כאילו לא בא לעולם: מה למעלה, מה למטה, מה לפניו ומה לאחור.

Kol hamistakel be-arbaa dvarim ratui lo k'illu lo ba laolam: Mah le-maala, mah le-mattah, mah le-fanim, umah le-achor.

Whoever speculates about the following four things, it would have been better for him if he had never come into the world: What is above, what is below, what was before, and what will be after. [Hagigah 2.1 -- 11b]

It is a warning that you will likely break your teeth if you try! The Meiri, in 13th-century Spain, says that this matter is above our comprehension. The Midrash [Ber. R. 1:10] even tells us that this curtain is suggested by the first letter in the Torah, *bet*. *Bet* is closed on

three sides, and is open only towards the Torah itself. So don't try to find out what happened before it, or above it, or below it. And one can add that the Torah ends with a lamed, which can be interpreted as a wall: Don't try to find out what will happen after it either. Just concentrate on studying IT!

If we can't speculate on what came “before” creation, can we at least say that there was SOMETHING before creation? Yes, we can. The Midrash and the Zohar tell us that, before creating our world, God created many worlds and destroyed them, because He did not like them:

Rabbi Abbahu said:... the Holy One, blessed be He, went on creating worlds and destroying them until He created [ours], and then He said: This one pleases Me; those others did not please Me.

Rabbi Pinchas said: The proof... is [the line in Genesis]:

And God saw ALL that He has made, and behold, it was very good.

[Gen. 1:31]

[ALL that He has made means: ALL the worlds, good and bad. And behold: Only OUR world “was very good”.] [Genesis Rabbah 9:2]

Indeed, the prophet Isaiah says, in God's name:

Behold, I create new heavens and a new earth; and the old ones shall not be remembered, nor come to mind. [Isaiah 65:17]

In the siddur (the prayerbook), we call God “*Adon Olam*”, “Lord of the World”. But we also call Him “*Adon ha-olamim*”, “Lord of the Worlds” [plural]. This could mean “this world and the next”, but also the destroyed worlds we just talked about. Rabbi Levi Yitzhak of Berdichev, the 18th-century Hassidic sage, insisted that these worlds still exist, somewhere. He said, “Everything God created exists forever and never ceases to be.”

Finally, the sum of the lives of all these worlds could well be 13.8 billion years, thus reinforcing the Torah in another way!

But if that is so, why would God not want us to know about these earlier worlds, in some detail? The Midrash explains: If a king builds a sumptuous palace on top of a sewer, or a dung heap, or a pile of trash, he does not want the matter known, and we must respect his wish. [Genesis Rabbah 1:5]

Now, how do we know we are not in a world that God will also destroy in the future? Well, up to a few years ago we thought we were. We thought that the initial Big Bang would cause the universe to expand for some time, then stop expanding and start imploding under its own gravity, and finally disappear into nothingness billions of years from now. This was called the “Big Crunch”. Today, however, the evidence shows that the universe is accelerating its expansion, showing no sign of slowing down, so no “Big Crunch” is predicted.

Sixth and last, let me tackle the creationists’ arguments. In fairness to the most thoughtful among them, it is not aversion to science that moves them, it is not Bible inerrancy, and it is not disgust at the thought of descending from apes. Their real problem is the notion that the world is run by survival of the fittest, by the law of the jungle, by might making right. They ask: What about compassion, mercy, love? We spend a lot of time and money lifting up the fallen; helping the poor, the sick and the weak. We don't want to abandon them. Are we really going against God’s will when we do that? That’s what troubles them, and the argument is sound.

The Jewish answer to them is in the Zohar and the Midrash. The Zohar says that God destroyed the previous worlds because they would not follow the Torah. He asked, and no one would. In our world, only Israel did:

The Torah is the salvation of the world... [We must understand that] God created worlds and destroyed them in the following way: Those who do not keep the precepts of the Law [destroy themselves of their own account]. It is not that God destroys His own works, as some fancy. For why indeed should He destroy His own children? [Zohar Bereshit 1:25a]

So a world without Torah will destroy itself, without God having to intervene. Along those lines, the Midrash notes that “*bereshit*” can also mean “with *reshit*”, that is “with the beginning”, “the beginning” being the Torah. So the first phrase should read: “With the beginning (that is, with the Torah) God created the world.” [Gen. R. 1:1]

So when the world is ruled purely with justice, with cold equations, with a master plan unfolding no matter what, it will not endure. It needs the Torah with its “just right” mixture of justice and mercy. So survival of the fittest *is* a valid concept, but it’s only part of the story.

Other parts are love, kindness, compassion, mercy; and they are not reflected in our physical theories.

Let me conclude. Am I trying to say that the Torah must be interpreted literally? No, of course not. Maimonides, among many others, argued that the Torah is intended to be ethical teachings, not science. He wrote:

Those passages in the Torah, which, in their literal sense, contain statements that can be refuted by proof, can and must be interpreted otherwise. [Rambam, Guide to the Perplexed, 2:25]

I *am* saying that we must not be too quick to laugh at the ignorance of our ancestors and the content of our tradition. Some things that so-called “enlightened minds” find laughable may turn out to be true. As Einstein put it, science has clearly shown that the world is not only stranger than we imagine, it is stranger than we CAN imagine.

Shabbat shalom.