

Introducing Dr. Gerald Schroeder's Approach to Torah and Science
by Rabbi Chaim Jachter

Since the time of Aristotle, Jews educated in the sciences of the day have grappled with contradictions between Torah and science. The Rambam, in his Moreh Nevuchim, is one of the many who have worked to resolve these challenges. For example, Aristotle asserted that the world is eternal and was never created. The Rambam in the second section of the Moreh Nevuchim addresses this issue at length.

In our times, there are three major challenges posed by science. First, the contradiction between traditional Torah belief that the world is approximately 5772 years old and the scientific assertion that the universe is many billions of years old. A second major issue is the scientific assertion that man is millions of years old, with archaeological evidence to support this assertion. The third is the use by some of the theory of evolution to assert that the world as we know it came about without a Director (i.e. Hashem).

In this series of essays, we shall present some of Dr. Gerald Schroeder's resolutions to these problems. While Dr. Schroeder's approaches are not the last word or the only approach in regards to these matters, his is an important voice that is worthwhile knowing. After hearing him speak at the Torah Academy of Bergen County, I concluded that his views should be part of the arsenal of everyone who is committed to fulfilling Hazal's dictum of "Da Mah L'hashiv L'apikores", know how to respond to a non-believer (Avot 2:16). Dr. Schroeder's views are available at length in his books and summarized at www.geralschoeder.com. I thank the congregants at the Sephardic Congregation of Teaneck (Shaarei Orah) for their insights into this topic that I have incorporated into this discussion.

Dr. Schroeder has serious scientific credentials and is also an interesting interpreter of Torah. He is (according to his website) a scientist with over thirty years of experience in research and teaching. He earned his Bachelor's, Master's, and Doctorate degrees all at the Massachusetts Institute of Technology, with his doctorate thesis being under the supervision of physics professor Robley D. Evans. This was followed by five years on the staff of the MIT physics department prior to making Aliyah to Israel, where he joined the Weizmann Institute of Science and then the Volcani Research Institute, while also having a laboratory at The Hebrew University. His Doctorate is in two fields: earth sciences and physics.

Introduction: Aristotle, Rambam and the Big Bang Theory – The Torah Proven Correct!

The Rambam (Moreh Nevuchim 2:25) in his "Guide for the Perplexed" (2:25) concludes that Aristotle's arguments that the world is eternal are merely reasonable arguments but not conclusive arguments. The Rambam surprisingly concludes that if Aristotle would have been able to conclusively prove that the Universe was eternal he would have reinterpreted Bereishit Perek 1 to fit with proven fact. By saying this, the Rambam establishes an important rule: the Torah never contradicts an established fact.

Thus when faced with a contradiction between Torah and assertions made by scientists, we have two fundamental options: Either the scientists are incorrect or the manner in which we interpret the Torah is incorrect (or both).

Rambam stops short of reinterpreting Bereishit Perek 1 because he was not fully convinced of Aristotle's arguments. This issue continued unresolved until the mid-1960's, when the overwhelming opinion of the scientific community still was that the universe was eternal. Then two scientists at Bell Labs in New Jersey, USA, Arno Penzias and Robert Wilson, while scanning the heavens with a special antenna, detected a weak radiation filling all of space. Working with P.J.E. Peebles at Princeton University, this ubiquitous radiation was identified as the residual energy of the big bang creation. It is now known as the cosmic microwave radiation background. Penzias and Wilson were awarded the Nobel Prize for their discovery, and rightly so. Their discovery changed humanity's understanding of our universe. There was a creation, a beginning to our universe. Science has now confirmed that Aristotle was incorrect and the literal interpretation of the Torah is correct.

Thus, the believing Jews from Aristotle's time (the fourth century BCE) until the 1960's who stubbornly clung to the belief that the world was created, contrary to the view of the overwhelming opinion of the scientific community, were correct after all. This is a sobering fact that should be borne in mind whenever one seeks to resolve seeming contradictions between Torah and scientists.

Three Possible Contemporary Approaches to Resolving Conflicts

In light of the experience with Aristotle's disproven theory of the world's eternity one could simply conclude that the exercise of harmonizing Torah and science is unnecessary. The Torah contains divinely revealed truths and, by contrast, scientific belief is constantly changing. A friend of mine related that at his graduation ceremony from Harvard University medical school, the dean of the medical school stated, in the course of urging the graduates to continue pursuing their medical education, that most of what we taught you is incorrect! Thus, one could (as many believing Jews do) reasonably refrain from trying to resolve Torah with assertions made by scientists which might be proven incorrect millennia, centuries, years or even days later. One could argue that the Big Bang Theory proved the Rambam's grappling with Aristotle's theory of eternity was unnecessary therefore we need not repeat Rambam's efforts to reconciling Torah and science.

However, there are those who nonetheless seek to harmonize Torah with current scientific belief. There are those who argue that in Bereishit Perek 1, Hashem teaches eternal values on how to conduct one's life, but does not intend to impart scientific information. This approach argues that there cannot be any conflict between scientific theories for the creation of the world and Bereishit Perek 1, since Bereishit Perek 1 does not intend to teach science. Needless to say, many have found this approach to be very controversial, as it argues for a non-literal approach to Bereishit Perek 1. Non-literal

interpretations, nearly always prove to be very controversial (see, for example, Ramban to Bereishit 18:1).

Dr. Schroeder offers a third possibility. He interprets Bereishit Perek 1 literally and uses only pre-modern Torah sources to interpret this section of the Torah. Yet he presents an approach that renders the literal meaning of Bereishit Perek 1 as completely compatible with current scientific knowledge. I find it particularly worthwhile to be familiar with the sections of Dr. Schroeder's website entitled "Religious Myths" and "Scientific Myths" and to this we now turn our attention. We begin with Dr. Schroeder's rejection of how some believers reconcile issues regarding Torah and science.

The Mabul and the Fossil Record

Some wish to resolve the conflicts between Torah and scientists by arguing that boiling hot water of the Mabul (the flood during Noach's time) distorted the fossil record, making the fossils appear much older than they truly are. Dr. Schroeder argues that the Torah indicates that this is not correct.

"We read in Genesis 4:22, that Tuval Cain, son of Lemech, developed the sophisticated working of bronze metal. Though the ages of Cain's progeny are not listed in the Bible, by juxtaposing Cain's progeny with those of Seth we can estimate that Tuval Cain lived approximately in the Biblical year 1,000 (that is 1000 years after Adam). The Flood occurred in the Biblical year 1659, 600 years after Tuval Cain. Thus Tuval Cain did his work prior to the Flood and so the waters of the Flood should have upset the relics of his work. Yet along comes the archaeologists and discover the relics of an age that they label as The Early Bronze Age. Scientific dating places it at approximately 2800 BCE or in the Biblical year approximately of 1000, overlapping the Biblical timing of Tuval Cain. If the Flood did indeed alter or change the fossil record, it should also have altered the relics of Tuval Cain. But it did not. The implication is the Flood did not alter the fossil record. The Flood is a poor choice to discredit the fossil record as a measure of true history.

Dr. Schroeder demonstrates that archaeology supports the Torah's presentation of Tuval Kayin's achievements. This is similar to other arguments he makes that science often may be marshaled to support Torah belief, as we shall see in coming essays.

Dinosaurs

While many believe that belief in the existence of dinosaurs is antithetical to Torah, Dr. Schroeder, in his website's section entitled "religious myths" raises the fascinating possibility that the Taninim HaGedolim presented in the Torah (Bereishit 1:21) refer to dinosaurs. He tries to bring evidence (from Shemot 7:10) that Taninim refer to reptiles and that Taninim HaGedolim refer to large reptiles, which is the meaning of the word dinosaur. This assertion seems somewhat speculative to this author and many of his students.

Age of Man

Scientific American's April 2012 edition includes a cover that article reports on the discovery of fossils of human being that scientists date as being two million years old. One could argue that just as a 1959 edition of Scientific America reported that most scientists accept Aristotle's theory of eternity and was proven wrong (as discussed last week), so too that which appears in the April 2012 edition of Scientific American will eventually proven wrong as well. Dr. Schroeder presents an alternative approach: "Adam was the first human, the first Homo sapiens with the soul of a human, the neshama. That is the creation listed in Genesis 1:27. Adam was not the first Homo sapiens". Dr. Schroeder adduces three proofs to this remarkable assertion from pre-modern Torah sources. First is the Rambam's Moreh Nevuchim (1:7) describing "animals co-existing with Adam that were identical to humans in shape and intelligence, but because they lacked the neshama, they were animals". Dr. Schroeder explains a Mishnah (Kilayim 8:5) which "discusses 'masters of the field' (Adanei Hasadeh) that were animals but so identical to humans that when they died one could not tell them apart from a dead human. Masters of the field implies farming - a skill that predates the Adam by at least 2000 years according to pollen studies in the border area between Israel and Syria". He also cites Ramban who in discussing Bereishit 2:7 "details the flow of life that led to the Adam, the first human. He closes his comments there with the statement that when this spirituality was infused into the living being, that being changed to another kind of man. Not changed to man but another kind of man, a homo sapiens/hominid became spiritually human".

Dr. Schroeder concludes:

"So from where did these ancients get the knowledge of the pre-Adam hominids? They learned it, correctly we discover, from the subtle wording of the biblical text. Those animals in human shape and intelligence would be the "adam" listed in Genesis 1:26, when God says "Let us make Adam." But in the next verse God creates "the Adam," the Adam, a specific being".

During Dr. Schroeder's talk at TABC he mentioned that archaeologists date the beginning of the creation of cities as coinciding with the Torah's date of the creation of Adam. Dr. Schroeder explained that man without a soul is entirely selfish and would not live a communal existence. Only man with a soul would desire to live a communal existence. Thus, Dr. Schroeder concludes, science does not contradict the Torah, if understood properly.

One may ask, however, for what purpose did Hashem create a human being without a Neshamah. One may answer based on a remarkable assertion of the Tosefot Yom Tov (commenting on Avot 3:14). He argues that although all human beings are created "B'tzelem Elokim" (in the image of Hashem), this refers to divine potential. However, those people who do not observe the seven Noahide laws requiring basic

decency such as refraining from murder, theft and adultery, are not considered to be created in the image of Hashem.

Accordingly, we argue that Hashem might have at first created human beings without a Neshamah to serve as a warning that human beings have the potential to regress to a being without a soul. Indeed, “monsters” such as Hitler and Stalin (Yemach Shemam) may indeed be described as human beings without a soul. According to this approach, one may describe a human being’s Neshamah as “use it or lose”. One who does not respect and express the basic spiritual drives of one’s Neshamah, loses his Neshamah and regresses to a type of human that existed prior to the creation of Adam HaRishon.

Please note that Dr. Schroeder’s fascinating argument that the world is both 5772 years old (and created in six days) and billions of years old, is necessary to support his view that human beings without a soul could exist two million years before the creation of Adam HaRishon. We shall present this argument shortly.

Also note that Dr. Schroeder is undoubtedly correct in stating that the Big Bang Theory is a cosmological theory and the biblical tradition that predates it”, writes Dr. Schroeder, “is striking almost unnerving”.

Rejecting Random Evolution

We focus on the section of Dr. Schroeder’s website entitled “scientific myths” . Dr. Schroeder disproves the commonly uttered assertion that scientific discoveries and the fossil record have proven Darwin's Theory of the Gradual Evolution of Life. Dr. Schroeder writes that

“The exact opposite is the case. As Niles Eldredge, curator at the American Museum of Natural History, NYC, wrote in the New York Times, "The fossil record that we were told to find for the past 150 years (since Charles Darwin) does not exist." Darwin insisted that nature does not make jumps. In fact, the flow of life as recorded in the fossil record has many jumps in complexity. Never did I expect to read in the esteemed, peer reviewed journal, Science, the following: "Did Darwin get it all right?" And the sub-title was no, species appear with a most un-Darwinian rapidity.”

Dr. Schroeder does not reject evolution per se as an explanation of how the world developed he simply argues, based on evidence such as those cited above, that there must have been a Director. Jumps in complexity do not happen spontaneously.

Another argument made by non-believers is that the mystery of the origin of life has been solved. Dr. Schroeder responds:

“Of all the many mysteries in nature, the origin of life is one of the three key [challenges] that have resisted solution. At the present there is no viable

explanation for how the complexity of even the "simplest" of microbes arose over many stages, but starting with rocks, water and a few simple molecules. The other two conundrums are why there is something rather than nothing, why there is existence of any thing in any form; and, what is the origin of consciousness, self-awareness in life that arose from seemingly inert, non-living matter”.

Thus, since no natural explanation exists for these phenomenon, it is most reasonable to conclude that they are a result of supernatural intervention by a Director.

We often hear skeptics argue that “very occasionally monkeys hammering away at typewriters will type out one of Shakespeare's sonnets”. Dr. Schroeder responds:

“Not true, not in this universe. A wrong assumption that randomness can produce meaningful stable complexity. This impossibility of randomness producing order is not different from the attempt to produce Shakespeare or any meaningful string of letters more than a few words in length by a random letter generator. Gibberish is always the result”.

Dr. Schroeder concludes in an essay on evolution that appears on his website:

“Neo-Darwinian evolutionary theory calls out for randomness to set the course of life's development. Evolution, Bible style, also sees life develop from the simple (day three and day five) to the highly complex (humanity on day six), but realizes that in this world, random reactions are simply not up to accomplishing that task. Random reactions alone simply do not and can not produce stable order. That is the lesson of the laws of thermodynamics”.

We should note that the points raised by Dr. Schroeder are self-evident and any reasonable individual could arrive at these conclusions. Nonetheless, it is edifying to hear an Orthodox Jew who is a world class scientist who earned two science doctorates at the Massachusetts Institute of Technology, validate that which believers in Hashem understand as self-evident truths.

Harmonizing Six Days with Fifteen Billion Years

Certainly the most tantalizing and significant of Dr. Schroeder's approaches is his innovative manner of resolving the conflict regarding the Torah and scientific views regarding the age of the universe. He argues that both are actually correct. We should note that Dr. Schroeder's view is a bit challenging for non-scientists to follow; a video available at YouTube (“6 Days=15 Billion Years”) is helpful as an introduction to grasping his assertions.

Dr. Schroeder rejects the common argument that the six days of creation are not meant to be understood literally. He notes that “the Talmud in Hagigah (12A), Rashi there and Nahmanides (Gen. 1:3) all tell us that the word day means 24 hours, not sunrise

and sun set. The sun is not mentioned till day four and these commentaries all relate to all six days, right from day one.”

However, Dr. Schroeder notes that the Ramban “continues in Exodus and Leviticus, that the days are 24 hours each (again, not relating to sunrise and sunset, merely sets of 24 hours). **There are six of them, and the duration is not longer than the six days of a work week, BUT they contain all the ages of the world**”. Dr. Schroeder asks: “How can six 24 hour days contain all the ages of the world”?

To this he provides a stunning response:

Today, we look back in time and we see approximately 15 billion years of history. Looking forward from when the universe is very small - billions of times smaller - the Torah says six days. In truth, they both may be correct.

What's exciting about the last few years in cosmology is we now have quantified the data to know the relationship of the "view of time" from the beginning of stable matter, the threshold energy of protons and neutrons (their nucleosynthesis), relative to the "view of time" today. It's not science fiction any longer. A dozen physics textbooks all bring the same number. The general relationship between nucleosynthesis, that time near the beginning at the threshold energy of protons and neutrons when matter formed, and time today is a million million. That's a 1 with 12 zeros after it. So when a view from the beginning looking forward says "I'm sending you a pulse every second," would we see a pulse every second? No. We'd see it every million million seconds. Because that's the stretching effect of the expansion of the universe.

The Talmud tells us that the soul of Adam was created at five and a half days after the beginning of the six days. That is a half day before the termination of the sixth day. At that moment the cosmic calendar ceases and an earth based calendar starts. How would we see those days stretched by a million million? Five and a half days times a million million, gives us five and a half million million days. Dividing that by 365 days in a year, that comes out to be 15 billion years. NASA gives a value of about 14 billion years. Considering the many approximations, and that the Bible works with only six periods of time, the agreement to within a few percent is extraordinary. **The universe is billions of years old from one perspective and a mere six days old from another. And both are correct!**

An Interesting Proof to Dr. Schroeder

In his talk at the Torah Academy of Bergen County, Dr. Schroeder offered an interesting proof from Bereishit Perek 1's description of the days of Creation that this Perek (at least until man is created) is written from the perspective of the beginning of Creation. Dr. Schroeder noted that the days of Creation is described as the second, third, fourth, fifth, sixth and seventh day but the first day is described (Bereishit 1:5) as “Yom Ehad” (day one) and not “Yom Rishon” (the first day).

Ramban (ad. loc.) explains that since there was not yet a second day, then the Torah cannot describe the first day of creation as Yom Rishon. Only after the second day is complete may one describe the days in relative terms such as the second and third day. However, day one must be presented using an absolute term. This is similar to the fact that only after World War 2 was the Great War referred to as World War 1. Before World War Two, the relative term of the First World War would not be a coherent expression.

Accordingly, since we live many years after day one of Creation why does the Torah not use the relative term of Yom Rishon, since many days have passed since day one until now. The answer is that the days of Creation are not written in terms of our current perception of time, but rather the perception of time at Creation. From the perspective of Creation it is logical to use the term “day one” since day two from the perspective of Creation did not yet occur. Thus, we see that the days of creation are terms utilizing the perspective of the beginning of Creation and not our current retrospective “earth based” vantage point.

We should note that the idea of the Torah presenting only one perspective to an incident is very much in harmony with traditional interpretation of Tanach. It is a tool often used to resolve apparent contradictions in Tanach. For example, the Gemara uses this methodology (Ta’anit 29a) to resolve the contradiction between Sefer Melachim (II 25:8) and Yirmiyahu (52:12) as to whether the Beit Hamikdash was destroyed on the seventh or tenth of Av. The Gemara explains that both are correct but each Sefer tells only one part of the story. Sefer Melachim refers to the beginning of the destruction on the seventh of Av and Sefer Yirmiyahu refers to its conclusion on the tenth.

A more contemporary example is Rav Elhanan Samet’s resolution (Iyunim B’farshiot Hashavua volume 1 Parashat Devarim) of the apparent contradictions between the manner in which the Torah presents the story of the Meraglim in Parashat Shelach and the way it presents it in Parashat Devarim. Rav Samet explains that each version presents only one aspect of or perspective on the event. One understands the entire story only by reading and combining both accounts.

Dr. Schroeder employs a similar methodology in resolving the apparent contradiction between the divinely authored Torah and information yielded from the world created by Hashem. The universe, as we perceive it, yields the story of creation from one perspective and the Torah presents the perspective from the beginning of creation.

Conclusion

While Dr. Schroeder’s approach is stunning and fascinating, it does leave one wondering what if in a few years, scientists prove or conclude that the world is twenty billion years. What if Albert Einstein’s revolutionary idea that time stretches is disproven? In other words, Dr. Schroeder’s conclusion depends on current scientific thinking, which is very much subject to change. Time will serve as the final arbiter of

this particular issue. In this context, time refers to millennia, as sometimes it takes science a very long time to resolve certain issues, just as it took science from the third century BCE until 1965 to realize that the world had a beginning (as we discussed last week).

While Dr. Schroeder's is not the sole authentic approach to resolving conflicts between Torah and assertions by scientists, his writings (at the very least that which appears at www.geraldschroeder.com) should be read by anyone who dialogues with those who are bothered by these conflicts. It is certainly reassuring to hear and to share an approach that harmonizes current scientific thinking with Rashi and Ramban's assertion that the six days of creation refer to six twenty four hour periods.

Postscript –The Big Bang Theory as a Boon to Believers

Dr. Schroeder strongly believes that the Big Bang Theory is a boon to believers. By resolving the discrepancy between the age of the universe as taught in the Torah and that which is espoused by the proponents of the Big Bang Theory, we might have eliminated the impediment to believers embracing this theory. We should emphasize that in addition to proving our belief in creation (as explained in the first part of this series), the Big Bang Theory is also powerful evidence to the belief in God, for as common sense as well as the Rambam (Moreh Nevuchim 1:71) teach that if the world was created in time, it most certainly had a Creator who created it in time. For an elaboration on this point see chapter three of Lawrence Kelemen's excellent work "Permission to Believe".

In addition, it is worth noting that in his 1992 book "Genesis and the Big Bang" (page 67), Dr. Schroeder explains that the energy released in the first moments of the Big Bang radiated at such high frequencies that it would have been invisible to the naked eye, and that only later did it cool sufficiently to produce visible light. According to Dr. Schroeder, Bereishit 1:3-4 which records that Hashem said "Let there be light" and light came into existence...and Hashem separated between the light and the darkness, might refer to this known physical process. "The parallel between the opinion of present-day cosmological theory and the biblical tradition that predates it", writes Dr. Schroeder, "is striking and almost unnerving".

Dr. Schroeder writes (ad. loc. p. 89)

"As the thermal energy of the photons fell to 3000K, thus allowing electrons to bind in stable orbits around hydrogen and helium nuclei, not only did the photons break free from the matter of the universe ('separated' in the language of the Torah), but they became visible as well. Light was now light and darkness dark, both theologically and scientifically".

Accordingly, Dr. Schroeder once argued that the Big Bang Theory, far from being a threat to Torah belief, is actually a boon to believers. In Dr. Schroeder's words "The Big Bang Theory is the best thing that has happened to religion since Moses brought the

Torah down from Sinai”. What remains to be seen in the coming years and generations is whether scientists will sustain or discard the Big Bang Theory.