

שלמה אליהו מילר
רה"כ ואב"ד זכולל טאראנטא

הנה הספרים של סליפקין כבר הוחרמו ע"י גדולי ישראל ומתחלה כשראיתי אותם אמרתי ריח מינות נודף מהם, אולם אח"כ ראיתי מש"כ אודות ששת ימי בראשית והם דברי מינות וכפירה, מלבד שהם דברי בורות ולא הבין כלל שכל חקי הטבע שאנו רואים עכשיו נקבעו בגמר ששת הימים כשעשה הקב"ה שביתה של יום השבת ואמר לעולמו די, אבל מהות הזמן וחקי הטבע בששת ימי בראשית אין להם שום דוגמא למה שאנו רואים עכשיו. וכבר אמרו רז"ל שנים עלו למטה וירדו די'. שלידת קין והבל היתה תיכף אחר ההריון ביום הששי של ששת ימי בראשית. ודבריו בזה הם כפירה בעיקר יסודות התורה. ובאמת הלך בדרכי המלעיגים על חז"ל כידוע שהמשכילים לעגו על דרשות חז"ל והיו חכמים בעיניהם שרק הם המשכילים יודעים דקדוק לשון הקדש, עד שבא המלבי"ם זצוק"ל וחבר בנין נפלא על תורת כהנים להסביר דברי חז"ל על פי עומק לשון הקדש והראה נפלאות מתורת השם ויסודות דקדוק לה"ק שידעו חז"ל. וכן הוא כהיום בקושיות מן המדע על מה שאמרו רז"ל ובמקום שאנו מחויבים להאדירם, הוא בא להשפילם ואם יש קושיא שאינו יודע תירוץ, צריך להודות שלא זכיתי להבין דבריהם וכמו שעשו גדולי ישראל בכל הדורות כשה"י להם קושיא על הגמרא כי לא דבר רק הוא מכם, אם רק הוא מכם שאינכם מבינים, ואם נגשים אל התורה וחכמי התורה ביראת הכבוד ובענוה אז נלך לבטח ולא נכשל בעקרי הדת כמו שעשה סליפקין וידוע דברי הרמב"ם סוף הלכות מעילה שלא תהא מחשבת אדם בד"ת כמחשבתו בשאר דברי חול ע"ש בכל דבריו הנעימים.

והנה המפרשים כתבו על שאלת הרשע מה העבודה הזאת וכו' אשר בעל הגדה כתב שאומרים לו בעבור זה וכו' לי ולא לו ובתורה כתובה מענה אחרת ואמרתם זבח פסח. ופרשו המפרשים שכשומעים דברי מנות אין להתוכח עמהם, אבל לעצמנו אומרים דברי חזוק. ואמרתם לעצמנו ולא לו זבח פסח וכו' אשר פסח וכו'

ומש"ה אני כותב איזה דברים לחזק לבות אלו ששמעו דברי כפירה שתורה"ק אינה אמיתית לפי ידיעת חכמי הטבע ואדרבה הפך בה והפך בה דכולה בה.

הנה חכמי הטבע עד לפני ד' מאות שנה לא ידעו שכוכבי לכת אין להם אור עצמם אלא אור חוזר מאור השמש עד שבא החכם Galileo והראה שכוכב נוגה Venus אין לו אור עצמי אלא אור חוזר. אולם לדעתי הדבר מוכח מדברי חז"ל שקראו שמו נוגה. ומלת נוגה שונה ממלת אור כמו שביאר המלבי"ם חבקוק פ"ג פסוק ד' ונוגה כאור תהיה כתב המלבי"ם נוגה הוא דבר שאין לו אור מצד עצמו רק מוציא האור מדבר אחר כמו הירח וכוכבים [כוכבי לכת] שאין להם אור רק מקבלים ומגיהים אור השמש הזורח עליהם, ולפי"ז מוכח ממה שקבעו חז"ל שם נוגה על הכוכב Venus מוכח שאין לכוכב זו אור עצמו. א"כ דבר זה שלא ידעו חכמי הטבע עד קרוב לשני אלפים אחר כך, כבר נודע לחז"ל.

אודות מהות של אור מתחלה סברו חכמי הטבע שהאור גרגרים Corpuscular Theory of Light עד שאחרי כן הוכיחו שהאור גלים Wave Theory of Light עד שלפני מאה שנה הוכיחו עוד הפעם על אמתת גרגרים photons וגם גלים והאריכו בזה חכמי הטבע Quantum Theory שפעמים

נראה כגלים ופעמים נראה כגרגרים. והנה מלת אור כבר כתב ביד הלוי מאב"ד דווירצבורג שהמלה נגזרת ממלת ירה ומורה על יריית גרגרים של אור אולם יש מלה שניה על אור, נהרה ע' איוב פ"ג פסוק ד' ואל תופע עליו נהרה. ולדעתי בנוי ממלת נהר והוא כמו גלים. א"כ ב' מלות של אור מראים על שתי הבחינות של אור.

גם יש לציין דברי הגר"א באדרת אליהו ומובא נמי מפיו בספר גביעי גביע הכסף שחושך אינו העדר האור אלא בריאה כדכתיב יוצר אור ובורא חשך, והחשך הוא החומר שעליו פועלת יצירת האור, ובזה טועים חכמי הטבע וכמ"ש הגר"א וע"פ דברים אלו אולי יש למצוא פתרון הבעיות ב Quantum Theory ולהבין המציאות של Non-local Reality שמוכח מכח Bell's Theorem אבל כל זה עדיין לא בא לידי ברור והנה יצאתי חוץ מגדרי לכתוב דברים שאינם צריכים לבני תורה המאמינים בדברי תוה"ק ובדברי חז"ל. אבל האמת צריכים לידע ולהודיע שאין לנו שום הערכה בגדלות חז"ל ובאמתת דבריהם.

וע"ז בעה"ח היום כ"ז מרחשון תשס"ו לפ"ק פה טאראנטא



שלמה אליהו מילר

Clarification of the words “mahus ha-zman” in the letter of Rabbi Shlomo Eliyahu Miller Shlit”a

In Vol. 16, 54, on the Avodah discussion group (December 8th, 2005), Rabbi Yosef Gavriel Bechhofer wrote:

WADR, your post is not acceptable as evidence. Only the document produced by RSM himself is, at this point, acceptable as indicative of his POV [point of view]. And there he takes on a Schroederian approach [See Dr. Schroeder’s books “Genesis and the Big Bang” and “The Science of G-d”]

Rabbi Miller wrote as follows (December 11th, 2005):

הכונה במה שכתבתי “מהות הזמן” היינו חוקי הטבע שונים לגמרי בו ימי בראשית ממה שאפשר להמצא עכשיו וכל מה שכתב Dr. Schroeder הוא על חוקי טבע הנוהג עכשיו וע”כ אין שום דמיון ממשכתבתי למשכתב החכם הנ”ל.

(Transcribed from the original draft by Yoel Ostroff)

A Letter of Admonishment Regarding N. Slifkin's Opinions

By Horav Shlomo Miller Shlita

Translated and annotated by Simcha Coffler

The following is a letter written by Horav Shlomo Miller *Shlita*, the *Rosh Kollel* and *Av Beis Din* of the *Kollel Avreichim* of Toronto. The letter was written in *lashon hakodesh*; accordingly, its colloquial form has been maintained wherever possible in an attempt to preserve its original flavor.

A Protest against the Opinions of Slifkin

As is well-known, the books authored by Slifkin have already been banned by the *gedoley yisrael*. When I initially came in contact with his writings, I sensed an aura of heresy emanating from them. Indeed, upon further investigation I discovered that his opinions on the six days of creation are definitely heretical. Furthermore, they are boorish in content; he fails to comprehend that all of the laws of nature which prevail today were first established at the end of the six days of creation when *Hashem* terminated the creative process as represented by the day of *Shabbos* when “He said to His world, enough”.¹

In reality, the laws of nature which existed during the six days of creation have no parallel to those which we perceive today. Our sages have already stated “two arose on the bed and four descended” meaning that the birth of *Kayin* and *Hevel* happened immediately after their conception on the sixth day of creation.² Thus, Slifkin's opinions in these matters are absolute heresy.³

¹ This saying is based on the Talmud in *Chagiga 12a* – “*Rav Yehuda* stated in the name of *Rav*, at the time that *Hakadosh Baruch Hu* created the world, it continued to expand like two clues of warp until *Hakadosh Baruch Hu* rebuked it and brought it to a standstill as it states “the pillars of heaven were trembling, but they became astonished at his rebuke” (*Iyov 26:11*) This accords with *Raish Lakish's* statement; the verse states “*ani E-l Shakai*” (*Bereishis 35:11*), “*ani hu she'amarti laolam dai*” which means “I am the one who has instructed my world, enough”. In other words, before the culmination of the six days of creation, there was no limit to the expansion of creation and thus, no clearly delineated physical laws, but when *Hashem* finally decided that there should be fixed boundaries, he “told” the universe “enough” and established the final limitations of physical law.

² *Rav Yochanan bar Chanina* said, the [sixth] day consisted of 12 hours: in the first hour, his [Adam's] dust was gathered, in the second, it was made into a shapeless mass, in the third, his limbs were formed, in the fourth, he was infused with a soul, in the fifth, he stood on his legs, on the sixth, he named names [of the animals], on the seventh, *Chava* was established as his mate, in the eighth, two arose onto the bed and four descended, on the ninth, he was commanded not to eat from the tree, on the tenth, he sinned, on the eleventh, he was judged and on the twelfth, he was expelled from the garden of Eden and went along his way... (*Sanhedrin 38b*) Accordingly, “four descended” would seem to imply *Kayin* and *Hevel* and in fact, this is precisely how the *Tur* (see *Tur al haTorah*) understands this Gemara. See also *Aderes Eliyahu* on *Bereishis 4:2* and *Bereishis Rabbah 22:3*. However, *Tosfos* maintains that the second sibling that was born was *Kayin's* twin sister, not *Hevel*. Cf. *Tosfos* ad loc. s.v. *viyardu arba'ah and Maharsha*.

³ In other words, Creation is not a process that finds expression in current laws of nature and thus cannot be defined by it. During the *sheyshes yimey bereishis*, the laws of nature were entirely different from those that exist today. This is self-evident from the Torah and can be gleaned from *Chazal*. Furthermore, this has been the collective *mesorah* of all Jews throughout the ages and in fact was uncontested even by gentiles. When a Jew makes *kiddush* Friday night, he is specifically proclaiming the truth of this idea and rejecting that of Slifkin's approach. It is evident from Torah and *Chazal* that the period of creation ended when the

The truth is that he has followed the ways of those who scoff at the sages, like the *maskilim* who ridiculed the exegeses (*drashos*) of our sages while considering themselves all-knowing, assuming that only they were able to understand the precise meaning of words in *lashon hakodesh*. Until the *Malbim ztvk*¹ appeared and composed an incredible work on *Toras Cohanim* to clarify the words of our sages based on the deepest, most fundamental imperatives of *lashon hakodesh* thereby demonstrating the wonders of *Hashem's* Torah and the profound grasp of biblical grammar which our sages possessed.

So too in our time, Slifkin advances questions against our sages from current theories and in place of honoring the words of our sages, he denigrates their opinions. If he encounters a question for which he possesses no answer, it would behoove him to say “I have not merited to understand the words of the sages” just as all of our great scholars have done through the ages whenever they encountered a question on a subject in Talmud; “for it is not a thing that is lacking from you”⁴ and our sages comment, “for if it is lacking, it is from you”⁵ who lack the ability to comprehend. If we approach the Torah and its sages with awe and humility, then we will traverse confidently and not stumble in the fundamentals of our religion as Slifkin has done; the *Rambam's* words at the end of the laws of *me'ilah*⁶ are well known: “one's thought processes in Torah should not be the same as his thoughts in mundane matters”, see there the remainder of his pleasant words.

Words of Encouragement and Support for those who were influenced by Heresy

The *Haggadah* delineates the question of the *rasha*: “of what purpose is this work to you?”⁷ [He says “to you” thereby excluding himself. By excluding himself from the community of believers, he denies fundamentals. Therefore blunt his teeth and tell him:] “It is because of this that *Hashem* did for *me* when I went out of Egypt”⁸, and the author of the *Haggadah* comments “for *me*, but not for *him* – had he been there, he would not have been redeemed”. The commentaries note that the answer given in the Torah is “and you shall say it is a Passover offering to *Hashem*”⁹ which differs from the answer in the *Haggadah*. The commentaries explain that when one hears words of heresy, one should not contend with them, however to ourselves, we should respond with words of encouragement, “and you shall say”¹⁰, but “not to him”¹¹, “it is a Passover offering etc.”¹²,

first Shabbos came and therefore any claim that present laws of nature can duplicate the order of creation is refuting a basic principle of the Torah and Chazal and is thus an espousal of *kefira*.

⁴ *Dvarim* 32:47.

⁵ Cf. *Rashi* ad loc.

⁶ *Hilchos Me'ilah* 8:8.

⁷ *Shmos* 12:26.

⁸ *Shmos* 13:8.

⁹ *Shmos* 12:27.

¹⁰ *Ibid.*

¹¹ The *baal haHaggada's* comment.

¹² *Shmos* 12:27.

Therefore, I have decided to expound upon some matters in order to strengthen the hearts of those who have been exposed to heretical doctrines¹³ which claim that our holy Torah is contradicted by the knowledge of scientists; on the contrary, “delve into it, and delve into it, for all is encompassed within it”.¹⁴

Until 400 years ago scientists were not aware that the light which appears to radiate from planets is not inherent light but rather light reflected from the sun. Then Galileo appeared and demonstrated that the light emanating from the “shining” planet Venus is merely reflected light. However, to my mind, this observation can already be gleaned from our sages who referred to this planet by the term “*nogah*”.¹⁵ The word “*nogah*” (shining) differs from the word “*or*” (light) as the *Malbim* has explained in his commentary on the verse in *Chavakuk* 3:4, “and *nogah* will be similar to *or*”. The *Malbim* writes that *nogah* is a term that denotes an object that does not possess inherent light but rather emits a reflected light just as the moon¹⁶ receives the light of the sun and subsequently reflects its rays. Thus, the fact that our sages have assigned the term “*nogah*” to the planet Venus demonstrates that they understood that this planet did not possess inherent light.¹⁷ If so, we see that knowledge discovered by scientists 400 years ago was already known to our sages over 2000 years ago.

Regarding the essence of light, scientists first thought that light was composed of particles i.e. the Corpuscular Theory of Light¹⁸. Later, they showed that light was emitted in waves i.e. the Wave Theory of Light¹⁹. A hundred years ago, scientists demonstrated that light does possess particle like qualities^a and subsequently scientists proposed the Quantum Theory that sometimes light appears as waves and sometimes as particles^b. Now behold, the *Yad Halevi*²⁰, written by the *av beis din* of Wurtzberg, has written that

¹³ There are obviously some differences in Weltanschauung between certain groups in Orthodox Jewry. Rabbi Miller is aware of this. He is also aware that unfortunately there are certain elements that will spare no effort in maligning Orthodox leadership in an attempt to undermine their words. Just as the teachings of the *Haggadah* are meant for us but are not directed towards the wicked due to their unwillingness to acknowledge them, so too, the comments in the letter are directed only towards people who are open-minded and are willing to listen as opposed to those who choose to maintain pre-conceived notions. The latter group invariably fall prey to spurious depictions of Orthodox dogma effectively eliminating their partiality and thus their ability to countenance the pronouncements made by *gedoley yisrael*.

¹⁴ *Avos* 5:22.

¹⁵ *Shabbos* 156.

¹⁶ Or other planets such as Venus.

¹⁷ See the commentary of the *Gra* in *Aderes Eliyahu* on the verse in *Chavakuk* 3:4 who interprets the *pasuk* in the same manner. *Malbim* himself brings several proofs from all over *Tanach* to demonstrate the grammatical accuracy of this point.

¹⁸ The Corpuscular theory, set forth by Isaac Newton, states that light is made up of small discrete particles called corpuscles. This theory, which relates to the theory Rabbi Miller discusses shortly, photons, explains many properties of light such as the photoelectric effect. However, it fails to explain some effects such as interference or diffraction.

¹⁹ A theory advanced by Thomas Young. Young performed what is known as the double-slit experiment c. 1801; he passed a beam of light through two parallel slits in an opaque screen, forming a pattern of alternating light and dark bands on a white screen (waves emerging from one slit are superimposed on waves from the other slit, thus producing the observed interference pattern of alternate dark and bright lines on the screen). This led Young to reason that light was composed of waves.

²⁰ *Shailos v'Tshuvos Yad Halevi* written by R' Yitzchok Dovid haLevi Bamberger b. 1808.

the word “*or*” has its roots in the word “*yaroh*” (to fling) and denotes the flinging of light particles. There is another word which denotes light “*niharah*”, see *Iyov 3:3*: “*v'al tofah alav niharah*”. To my mind, this word has its roots in the word “*nahar*” (river) which signifies the concept of waves²¹. If so, these two grammatical representations of the word “*or*” represent the two differing forms of the phenomenon of light respectively.²²

The *Gra*'s words in *Aderes Eliyahu*²³ are also noteworthy and are brought down in his name in the book *Giviey Gvia Hakesef*²⁴ as follows; darkness is not an absence of light but rather a creation unto itself as it states “who forms light and creates darkness”²⁵. Darkness is the substance²⁶ upon which light operates²⁷. In this area the scientists err²⁸, not taking into account what the *Gra* has written [with respect to *choshech*^c]. Based on these theories, it might be possible to resolve the conundrums that plague Quantum Theory and to comprehend the existence of Non-Local Reality^d which is evident from Bell's Theorem^e. However, these theories have still not been fully clarified as yet. I have stepped outside my normal boundaries to expound upon things that are essentially

²¹ In other words, something that flows, as opposed to something possessing particulate qualities.

²² The intent here is to show that the words of *Tanach* and *Lashon haKodesh*, which are the words of Hashem, may represent concepts that were unknown until present times. It does not mean to imply that *Chazal* were aware of these concepts.

²³ *Breishis* s.v. *Bara*.

²⁴ Written by Rav Binyomin Rivlin, one of the *talmidei haGra*. Reprinted in *Shklov* circa 1803 by *Yosef Mordechai ben Menachem* Rabinowitz and again in Warsaw by *Yaakov* Unterhandler circa 1897, and in America in 1983. pg. 7

²⁵ *Yeshaya 45:7* In addition, there are other *pesukim* which indicate that *choshech* is a positive creation such as “*ey zeh haderch yishkon or v'choshech ey zeh mikomo*” (*Iyov 38:19*) or “*yada mah bachashocha unihora imey sharya*” (*Daniel 2:22*). For a kabbalistic view of these two *pesukim*, please see the opening *maamar* of *Maseches Atzilus - Ya'areshyah ben Yoseph Pasach* and the *perush Ginzey Miromim* by R' *Yitchok I. Chaver*, a talmid of R' *Menachem Mendel* of *Shklov* who was one of the premier *talmidim* of the *Gra*.

²⁶ Rabbi Miller states, “*v'hachoshech hu hachomer she'alav poeles yitziras ha'or*”. Apparently he understands the creation “*choshech*” as the underlying substratum of all reality and thus light is, in some unknown way, an effect on the substratum of *choshech*. See endnote (d) for further discussion.

²⁷ Although the *Gra* seems to say that *or* is also a *beriah* as it no doubt seems to be, *Yeshaya* still refers to it as *yetzira* in comparison to *choshech*.

²⁸ The following is a quote from *The Emperor's New Mind* (Roger Penrose, Oxford University Press, 1990 page 385) in a section titled *Quantum Magic and Quantum Mystery*: I have made no bones of the fact that I believe that the resolution of the puzzles of quantum theory must lie in our finding an improved theory. Though this is perhaps not the conventional view, it is not an altogether unconventional one. (Many of quantum theory's originators were also of such a mind. I have referred to Einstein's views, Schrodinger (1935), de Broglie (1956), and Dirac (1939) also regarded the theory as provisional.) But even if one believes that the theory is somehow to be modified, the constraints on how one might do this are enormous. Perhaps some kind of 'hidden variable' viewpoint will eventually turn out to be acceptable. But the non-locality that is exhibited by the EPR type experiments severely challenges any 'realistic' description of the world that can comfortably occur within an ordinary space-time - a space-time of the particular type that has been given to us to accord with the principles of relativity - so I believe that a much more **radical change** is needed [emphasis not in the original]. It is important to note that when Rabbi Miller writes “In this area the scientists err by not taking into account what the *Gra* has written” he simply means that the scientists are erring because of their unawareness of the concept of *choshech* as discussed in the writings of the *Gra* and others (see endnote c). Had they been aware of this “substratum” of reality, perhaps other approaches could have been formulated to resolve the conundrums attending Bell's theorem and non-local reality.

unnecessary for Torah Jews who believe in the Torah and in its sages. But the truth is that in today's climate, it is necessary to make known that we have no concept whatsoever of the greatness of our sages or the veracity of their words.

[Translator's note: The footnotes found in this paper are entirely those of the translator. Consequently, any errors found therein are to be imputed solely to the translator, not to the author of this letter. Some of the scientific information found in the following endnotes comes directly from online sources such as Wikipedia.]

^a In 1905, Albert Einstein provided a remarkable explanation of the photoelectric effect, a hitherto troubling experiment which the wave theory of light seemed incapable of explaining. He did so by postulating photons, quanta of light energy with particulate qualities. In the photoelectric effect, it was observed that shining a light on certain metals would lead to an electric current in a circuit. Presumably, the light was knocking electrons out of the metal, causing them to flow. However, it was also observed that while a dim blue light was enough to cause a current, even the strongest, brightest red light caused no current at all. According to wave theory, the strength, or amplitude, of a light wave was in proportion to its brightness. A bright light should have been strong enough to create a large current yet oddly enough, this was not so. Einstein explained this conundrum by postulating that the electrons were knocked free of the metal by photons, each photon carrying an energy E that was related to the frequency, $E = h\nu$, where h is Planck's constant (6.626×10^{-34} J-seconds). Thus, only photons of a high enough frequency, namely blue light, but not red light, had sufficient energy to knock an electron loose from the metal. Brighter light merely consisted of more photons but they don't come out any faster, because each individual photon still has the same energy. If the frequency is low enough, then none of the photons will have enough energy to knock an electron out of an atom. So if you use a really low frequency light, you shouldn't get any electrons, no matter how high the intensity is. However, if you use a high frequency light, you should still knock out some electrons even if the intensity is very low.

^b This is referred to as the Wave-particle duality. The modern, theoretical resolution to of the wave-particle paradox is described by the theoretical framework of quantum mechanics. The framework is deep and broad and cannot be explained in a few short paragraphs. However Wave-particle duality can be briefly described as follows. Every particle in nature, be it a photon, electron or atom, is described by a solution to a differential equation most typically, the Schrödinger equation. The solutions to this equation are known as wave functions, as they are inherently wave-like in their form. They can diffract and interfere, leading to the observed wave-like phenomena. Yet also, the wave functions are interpreted as describing a probability of finding a particle at a given point in space. Thus, if one is looking for a particle, one will find one, with a probability given by the square of the wave function. However, quantum mechanics is also a very abstract theory, and there has been considerable debate over the interpretation of quantum mechanics, which, in a certain sense, has supplanted the debate of wave-particle duality. While the formulae of quantum mechanics make astoundingly accurate predictions about the outcomes of experiments, the philosophical meaning of these formulas are still hotly debated. This is not only because it can be difficult to visualize how something can be both a particle and a wave (a problem this translator possesses in full measure) but also because quantum mechanics has many other puzzling, paradoxical aspects to it. Thus, in a certain sense, the debate over particles versus waves remains alive to this day although it now, more often than not, takes the form of a debate over local realism and quantum measurement in general, concepts discussed in a subsequent endnote.

^c As stated in an earlier footnote, Rabbi Miller writes that "*v'hachoshech hu hachomer she'alav poeles yitziras ha'or*". Apparently he understands the creation "*choshech*" as the underlying substratum of all reality and thus light is, in some unknown way, an effect on the substratum of *choshech*. At this time, it might be helpful to discuss this concept somewhat. As a preface, it should be mentioned that there are four classical elements in Grecian naturalism and they are Earth, Wind, Fire and Water. These classifications pre-dated Socrates; however subsequently it was postulated that there was an incorruptible quintessence that undergirded these elements, a primordial substance of which the stars (which he considered eternal) were composed. Today science has advanced to the point where there are over 100 elements in the periodic table and fire is understood to be a form of combustion rather than an element; however, it seems the

Rishonim used certain components of these Grecian classifications in their *pirushim*. The primordial substance is referred to as *Hiyuli* or *Chomer* and the four elements are referred to as *tzura* or *Arba Yesodos*. Now getting back to darkness, the first time we find the *beriah* of *choshech* mentioned in the Torah is in the second *pasuk* “*v’haaretz haysa tohu va’vohu, v’choshech al piney tihom, v’ruach elokim mirachefes al piney hamayim*” This *pasuk*, along with the first one, is the definitive statement in the Torah about the nature of creation. According to the Ramban, the term *bara* in the first *pasuk* refers to creation *ex nihilo* (*yesh may’ayin*) and is referring to the primordial substance. In the second *pasuk*, *tohu* refers to *chomer* and *vohu* refers to *tzura*. However, the Ramban apparently diverges from standard Greek naturalism and states that the primordial substance for the heavenly bodies is entirely different than the primordial substance of our terrestrial earth. Thus, the Torah states “*Bereishis bara Elokim es hashamayim v’es ha’aretz*” meaning that Hashem created, *yesh mayayin*, the two primordial substances that correspond to terrestrial and extra-terrestrial bodies, referred to in the first *pasuk* as *Shamayim* and *Aretz* respectively. In the second *pasuk*, the primordial substance referred to as *Aretz* then takes form in the *arba yesodos* and is referred to as *choshech*, *tihom* and *ruach*. *Choshech* refers to the element of fire, *tihom* refers to the elements of earth and water, and *ruach* refers to the element of wind. Thus, we see that the concept of *choshech* is clearly not an absence. The Rambam in *Moreh Nevuchim* 2:30 also identifies *choshech* as the *yesod* of *esh*. The *Gra* quoted by Rabbi Miller above learns a different *pshat* in the word *Bara*. *Bara*, says the *Gra*, does not have to mean *yesh may’ayin*. Rather, he outlines the following classifications: *beriah*, *yetzira* and *assiah*. *Beriah* refers to the essence of a thing, *yetzira* refers to its permanent form, such as its size, and *assiah* refers to non-essential elements of its construction like beautifying agents. For example, the essence of a table is its wood, the form of a table is its size and shape, and the paint is a non-essential element designed to make the table more aesthetically pleasing. Based on these definitions, the *Gra* then goes on to say that *beriah* refers to an initial creation by Hashem that would be impossible for the wisest of men to even comprehend creating, even from pre-existing material, such as a fish or a tree. Since the term *beriah* is used in conjunction with *choshech*, this proves that not only is *choshech* a reality, as opposed to an absence, it is one of the fundamental creations of *Hashem*. In fact, the *Gra* goes on to say that *choshech* is unlimited in its nature, as opposed to *or*, and that the natural state of the universe is *choshech*, not *or*. *Hashem* merely gave *or* the ability to temporarily dispel the *choshech* but the natural substratum within which the world exists is referred to as *choshech*. This makes *choshech* an even more fundamental *beriah* than *or* thus making it virtually incomprehensible to man.

^d In order to understand the phenomena of non-local reality that Rabbi Miller is referring to, the EPR paradox should be described. The EPR (Einstein, Podolsky, Rosen) paradox draws on a phenomenon predicted by quantum mechanics, known as quantum entanglement, to show that measurements performed on spatially separated parts of a quantum system can apparently have an instantaneous influence on one another. This effect is now known as "nonlocal behaviour" (or colloquially as "quantum weirdness"). In order to illustrate this, let us consider a simplified version of the EPR thought experiment (due to David Bohm who converted the original thought experiment into something closer to being experimentally testable). We have a source that emits pairs of electrons, with one electron sent to destination A, where there is an observer named Alice, and another is sent to destination B, where there is an observer named Bob. According to quantum mechanics, we can arrange our source so that each emitted electron pair occupies a quantum state called a spin singlet. This can be viewed as a quantum superposition of two states, which we call I and II. In state I, electron A has spin pointing upward along the z-axis (+z) and electron B has spin pointing downward along the z-axis (-z). In state II, electron A has spin -z and electron B has spin +z. Therefore, it is impossible to associate either electron in the spin singlet with a state of definite spin. The electrons are thus said to be entangled. Alice now measures the spin along the z-axis. She can obtain one of two possible outcomes: +z or -z. Suppose she gets +z. According to quantum mechanics, the quantum state of the system collapses into state I. (Different interpretations of quantum mechanics have different ways of saying this, but the basic result is the same.) The quantum state determines the probable outcomes of any measurement performed on the system. In this case, if Bob subsequently measures spin along the z-axis, he will obtain -z with 100% probability. Similarly, if Alice gets -z, Bob will get +z. There is, of course, nothing special about our choice of the z axis. For instance, suppose that Alice and Bob now decide to measure spin along the x-axis. According to quantum mechanics, the spin singlet state may equally well be expressed as a superposition of spin states pointing in the x direction. We'll call these states Ia and IIa. In state Ia, Alice's electron has spin +x and Bob's electron has spin -x. In state IIa, Alice's electron has spin -x and Bob's electron has spin +x. Therefore, if Alice measures +x, the system collapses

into Ia, and Bob will get -x. If Alice measures -x, the system collapses into IIa, and Bob will get +x. EPR assumed that if the two electrons (originally from the same source) are sufficiently separated (perhaps light years apart), then a measurement of spin on the one electron could not possibly have had any instantaneous effect on the other electron (after all, neither matter nor energy can travel faster than the speed of light). The core of the EPR argument against quantum mechanics is that an object over here does not care what you do to an object over there. Yet, in Bohm's formulation of EPR, in actual experiments, the two electrons are examined by detectors at the same time and there is an instantaneous effect. EPR argued that the quantum mechanics must therefore be incomplete – each of the two electrons always had a definite spin (quantities such as spin, velocity or momentum being “hidden variables”) and the act of observation or detection changes nothing (this is called local “realism”). Incidentally, although we have used spin as an example, many types of physical quantities — what quantum mechanics refers to as “observables” — can be used to produce quantum entanglement. The original EPR paper used momentum for the observable. Actual experimental realizations of the EPR scenario often use the polarization of photons, because it is easy to prepare and to measure.

^c John S. Bell (June 28, 1928 – October 1, 1990) was a physicist who became well known as the originator of Bell's Theorem, regarded by some in the quantum physics community as one of the most important theorems of the 20th century. Volumes have been written on this theorem. However for the purposes of this paper, it is sufficient to state that Bell's Theorem is famous for drawing an important line in the sand between quantum mechanics (QM) and the world as we know it intuitively. It is simple and elegant, and at the same time touches upon many of the fundamental philosophical issues that relate to modern physics. In its simplest form, Bell's theorem states: no physical theory of local hidden variables can ever reproduce all of the predictions of quantum mechanics. This theorem has even been called “the most profound in science” (Stapp, 1975). Bell's seminal 1965 paper was entitled “On the Einstein Podolsky Rosen paradox”. He showed that the assumption of local realism - that particle attributes have definite values independent of the act of observation and that physical effects have a finite propagation speed - leads to a requirement for certain types of phenomena which are not present in quantum mechanics. Bell discovered that if in fact the particle has a definite spin as claimed by EPR, then there are testable observable consequences of that spin. When these tests were performed in the early 1980s by Aspect and his collaborators EPR failed, and thus particles over here do instantaneously care about what you do to particles over there. The act of measuring one particle “compels” the other possibly distant particle to snap out of its haze of probability and to take on a definitive spin value that matches the spin of its distant companion. This “quantum entanglement” and non-locality in actual experiments of the pair of particles means that EPR's common-sense local/realistic views do not hold in practice. While this might not directly contradict special relativity, some physicists have a nagging sense that there is more to the story because some kind of faster than light *something* is operating between the two particles (Greene 2004). Rabbi Miller is suggesting that the substratum *choshech* can possibly be seen as the method by which the particles may communicate instantly thus resolving the apparent dichotomy between observed behaviour on a macro (intuitive) level and submicroscopic levels such as atomic physics. It is important to note that Rabbi Miller has only formulated a conjecture based on what he understands as the opinion of the *Gra* and others. Concordantly, *choshech* would be an unknown element, one that surpasses science's ability to comprehend.