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## Darwin and Drash: The Interplay of Torah and Biology

I would like to address myself to certain aspects of the interplay between Torah and science. When I deal with science, I shall be discussing biology, the branch of science with which I am most familiar; and when I deal with scientific theories, I shall be referring to the theory of evolution because of its importance and centrality in modern biology. However, I would like to emphasize that these are but models. The lessons to be learned, if any, will apply to other sciences and theories as well.

Torah and contemporary science interact at many levels. I intend to define three levels of interaction and to examine what can be learned from an analysis of each of them. They are: (1) methodology; (2) substance or fact; and (3) *hashkafah*, or world-view.

It would appear that the methodologies of Torah and science are very different from each other. Establishing truth in Torah means looking for a *masorah*, an authoritative statement such as a *pasuk* in *Humash* or *Tanakh*. Of course, *sevarah* and logic play an important role but, at first glance, an appeal would be made to an authoritative text. Contrast this to science, which appears to operate with a totally opposite methodology, i.e., the empirical method. This requires the seeker of scientific truth to reject any prior assumptions and traditions and, on his own, make observations about the world through a series of experiments. He must examine and analyze the results of these experiments and base his conclu-

sions on data verified by his own experience. Nevertheless, the notion that Torah and science are entirely distinct enterprises is only true on a superficial level. In fact, the Torah does recognize the validity and importance of the kind of empirical evidence required by scientific methodology and, in turn, science does acknowledge the significance of tradition so central to religion.

For example, the Talmud (*Bekhorot* 45a) presents a discussion of how many bones there are in a human body. This is relevant to *halakhah* because in order to determine if someone is *tamei met*, we must know if he came into contact with a majority of the human body or not. The Talmud states: מעשה בתלמידיו של ר' ישמעאל ששלקו זונה אחת שנתחייבה: שריפה למלך, בדקו ומצאו בה מאתים וחמישים ושנים. R. Yishmael's students found a prostitute who was condemned to death by the king, boiled away the easily dissolvable tissue on her body and counted her bones. Clearly they resolved a halakhic issue by means of a scientific experiment.

Furthermore, the Talmud (*Sanhedrin* 67b) discusses the earliest age a male must reach before he can father a child. At which point can we say "*bi'ato bi'ah*," that his engaging in the sexual act is a true act of intercourse? Bet Shammai adduces various biblical texts to prove that, in ancient times, some individuals fathered children at the age of eight years old. Bet Hillel, however, rejects this conclusion by arguing that, if one observes the world around him, one would notice that no eight-year-old males ever father children. The fact that this may have been the case in ancient times is irrelevant because לא גמרינן מדורות הראשונים. These days, maintains Bet Hillel, no boy reaches such maturity until the age of nine. It would appear that Bet Hillel rejected Bet Shammai's position because empirical evidence pointed to the contrary.

The primacy of empirical evidence for halakhic decision-making is forthcoming from *Rishonim* as well. The Talmud (*Mo'ed Katan* 11a) states that a certain substance, *kavra*, is medically useful as it undergoes fermentation and begins to spoil. In trying to determine what this substance is, *Tosafot* (s.v. *kavra*) states: ובזמן הזה תופסים סכנה למיכל סמוך. *Tosafot* clearly states that, "in these times" one does not eat anything that is close to spoiling, for nowadays such things are considered to be dangerous. *Tosafot* is not suggesting that the talmudic statement is wrong; only that it is no longer relevant in a time when the accepted view is that eating such foods would prove to be detrimental to one's health. Things have "changed," just as the therapeutic efficacy of various medications and remedies mentioned in the Talmud is no longer considered the same. *Tosafot* could only know that based on empirical evidence which it accepts even in the face of talmudic precedent to the contrary.

Here is another example: The Talmud (*Yoma* 77b) rules that a mother may rinse one hand on Yom Kippur in order to feed her child because of

the concern that it would be dangerous to feed a child with dirty hands. Rashi (s.v. *madihah*) states that a “*ruah ra'ah*” rests on food touched by hands that had not performed the morning’s *netillat yadayim*. *Tosafot* (s.v. *mishum*) discusses this interpretation and then concludes: ומה שהעולם אין נוהרין עכשיו בזה לפי שאין אותה רוח רעה שורה באלו המלכיות כמו שאין נוהרין על הגילוי ועל הזוגות. *Tosafot* states that the particular danger existing during the time of the Gemara is no longer present in its locality. He parallels it to the prohibition of *gilui* (drinking water left uncovered overnight) and *zuggot* (demons that sit in pairs and count upon people to act in certain ways; cf. *Pesahim* 110a), which are also no longer operative. But on what basis does *Tosafot* dismiss a major Talmudic concern? I submit that there can be no basis for it other than acknowledging the available empirical evidence, which points to the contrary.

Here is one final example: The Talmud states in several places that a child born before completing a full nine months of gestation is not a *bar kayyama*.<sup>1</sup> In his glosses to the *Shulhan Arukh* (*Even ha-‘Ezer* #156:4), R. Moses Isserles wrote:

י”א שבזמן הזה אפילו לא נכנסת בחודש הט’ רק יום א’ היו ולד קיימא. ואע”פ דאמרינן בגמרא יולדת לט’ אינה יולדת למקוטעין, כבר תמהו על זה רבים שהחוש מכחיש זה אלא שאנו צריכים לומר נשתנה הענין. וכן הוא בכמה דברים.

The Rama explicitly acknowledges that times have changed, environments have changed, human physiology has undergone changes and we can accept only that which we see to be true. This is the case here with regard to the viable status of a prematurely born baby and, as the Rama concludes, “so it is in several (other) cases.”

It is thus clear that halakhah takes into account the results of empirical evidence as a means of determining truth, even if it means rejecting explicitly formulated authoritative statements to the contrary. Any *pasuk* or *masorah* must be able to face the test of empirical observation.

The opposite is also the case. Science accepts as valid not only empirical evidence but also acknowledges the legitimacy of other sources of truth as well. After all, it is impossible for every individual scientist to personally redo all the experiments ever run before. Every scientist is limited in what he can do. To a certain extent, therefore, the scientific community must perforce depend on oral or written testimony. When I read about an experiment done by one group of people, confirmed by a second group and accepted in the literature, I acknowledge it as truth. A scientist is forced to make certain assumptions, including accepting testimony handed down by other people as valid truth. Science, then, also relies on the validity of indirect testimony. As a result, it can be cogently argued that there are certain similarities between science and Torah, even in the area of methodology.

Let us move on to analyze this idea on a deeper level. Modern science considers itself not as representing a closed body of knowledge or a collection of unchanging data but rather as an ongoing process of arriving at factual knowledge. All scientific truth is only relative, considered to be true only given the facts as known to the scientist who does his work and based only on the body of information currently available to him. True, we all stake our lives on this knowledge every day. For example, we fly in airplanes constructed on the basis of certain currently accepted scientific theories concerning the dynamics of flight. But the knowledge is only relative; with the accumulation of new knowledge, new facts will become available to us which will force us to modify our theories.

Furthermore, I believe that the Kuhnian notion of science and revolutions is somewhat misleading because it does not accurately describe the bulk of scientific progress and advancement.<sup>2</sup> Instead of old theories being rejected and discarded, as he suggests, they are reformulated and modified in light of new data. Take the example of Newtonian physics. In our century, physics has undergone a revolution involving new notions of relativity and quantum theory. Nevertheless, we do not reject Newtonian physics as silly and ridiculous. We still depend upon it for certain activities, like building airplanes or spacecraft. What happened recently is that our ability to study other types of phenomena for the first time—whether it be on a very large scale like the interrelationships between galaxies or on a tiny scale like the activity within the nucleus of an atom—was made possible by a different mode of examining reality. The different theories or modes each have their place, each in its own context. The new does not supplant the old, it supplements the old. Newtonian physics is relevant in the everyday world of human interaction and of engineers; quantum physics is relevant in explaining the interaction of subatomic particles and so on. No one theory can explain all observable phenomena. Quantum physics cannot guide spacecraft and Newtonian physics cannot explain quarks.

What about Torah? Is Torah truth absolute and monolithic or does it allow for the existence of several, even mutually exclusive, truths? Obviously, we begin with the presumption that משה אמת ותורתו אמת (*Midrash Tanhuma, Korah*, #11). Our rabbis also teach us that חותמו של הקב"ה אמת (*Shabbat 55a*). There is no question that Torah is truth, but what is the nature of that truth? Indeed, halakhah allows for the notion of multiple truths. The Rabbis tell us (*Eruvin 13b*):

א"ר אבא אמר שמואל שלש שנים נחלקו ב"ש וב"ה. הללו אומרים הלכה כמותנו והללו אומרים הלכה כמותנו. יצאה בת קול ואמרה אלו ואלו דברי אלקים חיים הן.

The opinions of both Bet Shammai and Bet Hillel are equally true. Although for the sake of practical normative behavior one is given precedence (*Eruvin, ibid.*), such a preference does not reflect on the

larger issue of which of the two is true. Now, how is it possible for two contradictory, mutually exclusive positions to both be true? The answer is that each one is true according to its perspective. Given Bet Shammai's theory and world view, his halakhic ruling is correct. The same is true of Bet Hillel. In this context, therefore, it makes no sense to speak of right and wrong.

At this point I must interject a note of caution. Obviously, Torah truth is not totally relative and not all conceivable opinions on matters of halakhah are equally valid. One cannot make any ruling and claim that it should be cloaked in the mantle of halakhic truth and legitimacy. For an opinion to be accepted as halakhically valid, it must meet certain rigorous standards and criteria in such areas as analysis, investigation, argumentation, precedent and proof. But what is important is that halakhah recognizes that more than one position can be true because it acknowledges that more than one view of reality is afforded human beings. Torah is a multi-value system. It is not either-or, black-white, right-wrong.

If this is true in the realm of halakhah, it is certainly so in the area of aggadah and midrash, where conflicting opinions are even more common. Once again, we do not consider one right and another one wrong. אלו ואלו דברי אלקים חיים. Both are true but each speaks for a different perspective and point of view. Since the entire universe is incomprehensible in one glance from a human perspective, more than one valid interpretation of reality may account for all of existence. Each one reveals a legitimate aspect of absolute, divine reality. So, once again, a parallel exists between the conceptual methodologies of science and Torah. Different theories or opinions can be simultaneously maintained, each relating to or explaining a different phenomenon or perspective.

While the congruence between Torah and science has been maintained in the area of methodology, how true is this with regard to the area of substance and fact? What about those concrete factual areas where there seems to be a conflict between them, like, for example, the issue of creation vs. evolution. The Humash and Charles Darwin present obviously conflicting accounts of how animals and human beings came to exist on this planet. Is it possible to resolve this conflict as well and, if so, how?

Before directly addressing this question, I want to make some preliminary points. First, a comment on the theory of evolution. It is not a dead theory as some have claimed, but I believe it to be central to the whole enterprise of biology today. After one hundred years of the most intense analysis, debate and critical testing, the theory of evolution still stands as the central pillar of modern biology. It provides a way of explaining and

predicting scientific results as any good theory should, with thousands of facts as its empirical base. At the moment, there is no alternative or competing scientific theory to explain the phenomena with which it deals. Although I already mentioned that all scientific theories are relative, the theory of evolution is a firmly rooted one, on the level of the theories of quantum mechanics, relativity, electricity and other well established ways of explaining reality. Indeed, the theory of evolution is *the* scientific theory of contemporary biology.

Also, I am not bothered by some of the issues that concern others, in both the Jewish and general communities, in regard to this theory. For example, some are agitated by the conflict between the apparent random nature of change required by evolution and the “guided” or more gradual or organized kind of “evolution” presented in the Bible. I consider this to be an error based on a misunderstanding of terminology. When a biologist speaks of random mutation, he does not really mean that those changes that occur are completely uncaused and arbitrary, but rather that since we do not know all the details of what occurs, we refer to it by use of the statistics of randomness. This is best illustrated by the famous example of the coin toss. Scientists say that if we flip a coin, it will fall down “at random,” on either heads or tails. All one can realistically talk about is the *probability* of heads or tails appearing in a large enough number of flips. This is what is known as the mathematics of random numbers. But, in reality, what the contemporary scientist is actually saying is, “If I had more information, like the exact weight of each side of the coin, the amount of energy being applied to the flip and the angle of the take-off and landing, I *would* be able to accurately predict exactly on which side the coin will land.” In fact, scientists do *not* consider it to be a random event. They resort to statistics and theories of randomness only out of self-professed ignorance. Randomness, therefore, need not be equated with a lack of causality.<sup>3</sup> The same is true with regard to evolution. To claim that evolutionary theory suggests that evolution occurred as a result of mere accident is to misrepresent the theory of evolution.

Finally, providing a scientific explanation for a phenomenon in no way need remove God from the picture. For example, we talk about how the theory of gravity explains how the earth revolves around the sun and why the sun rises and sets at certain times; but, at the same time, we affirm that God is the cause for all these phenomena. Similarly, today is a beautiful fall day and the leaves outside are starting to turn colors and fall off their trees. What is responsible for this, God or certain natural botanical phenomena? Of course, both are true. The will of God can be explained by various laws He placed within nature to carry out that will. I do not understand why the theory of evolution cannot be placed within this same conceptual category. We accept other scientific theories to

account for natural phenomena without reading out God's primary rule; why can we not do the same in the case of evolution as well?

Having made these points, it is still clear that there are apparently fundamental conflicts between the biblical account of creation and the theory of evolution. Did God create the world in six days or did it evolve over the course of many billions of years?

One approach to this dilemma would be to indicate that Jewish tradition is not fundamentalist, in the Christian sense of the word. Unlike certain Christian fundamentalist sects which insist upon the overt, literal meaning of the biblical text as being the only legitimate interpretation, Jewish tradition is very comfortable with a non-literal approach. Our entire religion is based upon the existence of a *Torah she-be'al peh* which interprets biblical texts often in non-literal or allegorical ways. Once again, however, a word of caution is necessary. Here too there are certain clearly defined rules and regulations that govern which allegorical interpretations of the biblical text are legitimate. (See, for example, *Moreh Nevukhim* II:25.)

It is evident that the rabbis felt that the creation story in Bereshit was not meant to be taken literally. The contents of the first chapter in Bereshit was known in rabbinic literature as *ma'aseh bereshit*. Regarding this, the rabbis taught (Mishnah, *Hagigah* II:1): אין דורשין בעריות בשלשה ולא במעשה בראשית בשנים ולא במרכבה ביחיד. They insisted that it be taught only to a single individual who has already reached a high level of understanding of Torah. Now, if Ḥazal felt that Parshat Bereshit is to be taken literally, this entire halakhah makes no sense for it would then be forbidden to teach this text to first grade children, i.e., on the first day God created light, on the second day He created the heavens, etc. Clearly Ḥazal felt that the essential meaning of *ma'aseh bereshit* is not the literal meaning but the allegorical meaning, one which represents part of the *sod* of Torah and whose dissemination is limited to a few select individuals. Furthermore, another Midrash states that the first six days of creation are "God days"<sup>4</sup> and, after all, כִּי אֵלֶּף שָׁנִים בְּעֵינֶיךָ כִּיּוֹם אֲתָמוּל (Ps. 90:4).

For some, our problem has been thereby solved. Assuming that the biblical account of creation is not to be taken literally, they maintain that the Bible gives expression to the same basic truths as evolution, i.e., that there was a gradual ascent from chaos to order, whether from inorganic to organic matter or from lifeless to vegetable or animal matter. However, if we look closer at the biblical verses themselves we find that this is only a simplistic and unsatisfactory solution to the problem posed above. The Bible presents a very clear sequence of the order in which the world was created: day one—light and darkness; day two—the heavens; day three—dry land, plants and oceans; day four—sun, moon and stars; day five—sea animals and flying animals; day six—land animals and man.

There are a number of fundamental differences between the biblical sequence of creation and the evolutionary theory. For example, the biblical account maintains that the plants were created (day three) before the sun (day four), contrary to any existing theory of evolution. Also, while the biblical account starts the creation of animals (day five) with those from the sea like the evolutionary theory which maintains that life began on the floor of the ocean, it mentions the creation of flying animals (day five) before land animals (day six). No theory of evolution suggests that flying animals, be they vertebrates or invertebrates, evolved directly from the ocean. They all maintain that animals evolved from the ocean to the land and *then* to the air.

In order to resolve the problem, we must analyze the commentary of the Ramban to these verses. Ramban wrote (Gen. 1:1):

ועתה שמע פירוש המקרא על פשוטו נכון וברור. הקב"ה ברא כל הנבראים מאפיסה מוחלטת. ואין אצלנו בלשון הקדש בהוצאת היש מאין אלא לשון ברא. ואין כל הנעשה תחת השמש, או למעלה, הווה מן האין התחלה ראשונה. אבל הוציא מן האפס הגמור המוחלט יסוד דק מאד אין בו ממש, אבל הוא כח ממציא, מוכן לקבל הצורה, ולצאת מן הכח אל הפועל. והוא החומר הראשון, נקרא ליונים היולי. ואחר ההיולי לא ברא דבר, אבל יצר ועשה, כי ממנו המציא הכל והלביש הצורות ותקן אותם . . . והחומר הזה, שקראו היולי, נקרא בלשון הקדש תהו.

Now listen to the correct and clear explanation of the verse in its simplicity. The Holy One, blessed be He, created all things from absolute non-existence. Now we have no expression in Hebrew for bringing forth something from nothing other than the word "*bara*." Everything that exists under the sun or above was not made from non-existence at the outset. Instead, He brought forth from total and absolute nothing a very thin substance devoid of corporeality but having a power of potency, fit to assume form and to proceed from potentiality into reality. This was the primary matter (created by God); it is called by the Greeks "hyly." After the "hyly," He did not create anything, but He formed and made things with it, and from this "hyly" He brought everything into existence, clothed the forms and put them into a finished condition.

Keeping this Ramban in mind let us examine the difference between the type of building done by a carpenter and a sculptor. The carpenter builds by the process of addition, adding one pre-formed piece of wood to another, one wall to another, one room to another. The sculptor, by contrast, works by the process of subtraction, taking a piece of formless matter and forming shapes out of it; the head here, the legs there, etc.

Given this distinction, perhaps a different reading of the biblical creation story becomes possible. Maybe the linear sequence described above is not to be understood in so simple a manner. Let us re-examine the Bereshit creation story. On the first day, according to the Ramban (cf. Rashi) God created heaven and earth and light and dark, each reflecting no complexity but only diffuse potentiality. On the second day, God



consolidated His creation of heaven done of the first day and out of *shamayim*, He created *rakia'*. On the third day He consolidated His creation of earth done of the first day and out of the chaos of earth He made land and oceans. Within the land, He continued to shape and design and created plants, grass and trees which grow from it. On the fourth day, He returned to the heavenly sphere and further consolidated the *raki'a* created on the second day and differentiated it into specific points of light—sun, moon and stars. On the fifth day God returned to earth for yet further refinement and differentiation. The sea and air give rise to all that will respectively live in them. On the sixth day, God further developed the earth by adding living beings—animals and man.

The description, then, is not an attempt to give a linear, chronological sequence but rather a presentation of the process of refinement and differentiation; God acting more like a sculptor than a carpenter. He created by revealing and unfolding potentiality rather than by adding pre-formed parts. Detail is drawn out of chaos in a continuous process of refinement, making finer and finer distinctions, one after another. From this perspective, there is no longer any conflict between the biblical account of creation and the evolutionary theory. Modern evolutionary theory also does not see evolution as occurring in an orderly sequence, moving from primitive procaryote to sophisticated Man but rather as an unfolding, expansion and contraction of various creative possibilities in response to new circumstances.

With this enhanced understanding of the Bereshit creation story, let us look at another statement of the Ramban (Gen. 1:3):

ודע כי הימים הנזכרים במעשה בראשית היו בבריאת השמים והארץ ימים ממש, מחוברים משעות ורגעים, והיו ששה כששת ימי המעשה כפשוטו של מקרא. ובפנימיות הענין יקראו ימים הספירות האצולות מעליון, כי כל מאמר פועל הויה תקרא יום, והיו ששה כי לה' הגדולה והגבורה... והפירוש בסדור הכתובים בזה נשגב ונעלם ודעתנו בו פחות מטפה מן הים הגדול.

The Ramban says that, according to *peshuto shel mikra*, the word “days” is to be understood literally, as composed of hours and minutes. However, its inner meaning is very different. According to that level of interpretation it refers to different levels of God’s revelation.

My point is that when one looks at the biblical text from a different perspective, in this case informed by the insights of evolution, previously unperceived or unappreciated truths about Torah and its commentaries come to the fore.

Now to the level of *hashkafah*. There is a debate between punctuated equilibriumists and gradualists as to the pace of evolutionary change. The former maintain that such change does not proceed at a steady pace

but rather through a series of stops and starts, with times of apparent rapid radiation and development followed by long periods of stability and stasis. The latter see all of evolution as a slow, steady, gradual process.

Nevertheless, both agree that a series of catastrophic events occurred during the history of the earth which had the effect of destroying great percentages of the earth's existing living forms at any given time. A few species survived the cataclysm and began the process of radiation all over again. A growing body of evidence indicates that at least one cause of these periodic calamities is due to large comets that periodically smashed into the earth's surface, changing climatic conditions in extraordinary ways and resulting in the death of as much as ninety percent of all living organisms. An interesting hypothesis has been formulated (and I stress that it is only a hypothesis) stating that these cataclysms do not occur at random but occur at certain periodic times. The suggestion is that they occur in fairly predictable cycles of many millions of years and are the result of an as yet undetected companion star to the sun, known imaginatively as "the x-star" or "Nemesis star." The theory claims that when "Nemesis" approaches the sun, it brings with it increased meteoric activity which inevitably leads to the type of cataclysmic events described above that result in the extinction of many species on earth.

As a result, many thoughtful secular scientists have become deeply pessimistic about man's ability to plan for his future on Earth. If "Nemesis" indeed exists and if it behaves the way scientists speculate, life on earth is doomed to a permanent series of cycles—growth, development, radiation and expansion followed inevitably by doom, desolation and destruction. What world outlook could be more bleak or pessimistic? Does this not stifle and even destroy man's creative impulse? Why build, create, experiment and explore when you know that everything, anyway, is doomed to failure?

What is the Jewish view of the future? It would appear that Judaism is an optimistic religion, looking forward with hope to a Messianic future of peace and bliss. Can the Jewish view be in consonance with the pessimism reflected in the scientific view described above?

To resolve this, I would like to refer to an approach pioneered by Rabbi Joseph B. Soloveitchik, albeit in a different context. The Rav has pointed to a distinction between the belief in Jewish eschatology and the practical functioning of the halakhic system. While Judaism affirms the notion that the world will be redeemed and evolve into a *yom she-kulo tov*, the realistic practical operation of halakhah does not necessarily see the steady progress of ever-increasing good in the world. On the contrary, there is no mandatory concept of unimpeded progress, not in the life of the individual, or in the history of the Jewish people or in the evolution of the universe as a whole. Development takes place in a series

of advances and retreats which the Rav sees as the unique message of halakhic Judaism. It is the role of halakhah, in the view of the Rav, to teach Jews how to accept both majesty and humility, advance and retreat, success and defeat.<sup>5</sup> As a result, there is once again a remarkable overlap between the outlook of contemporary science and the *hashkafah* of Judaism.

Yet, even here Judaism has something special to offer. When a secular individual views this bleak forecast of the future, the best he can do is to adopt a kind of stoic acceptance of the reality. Hopefully, one accepts Man's contingency and the inevitability of his failure with equanimity for it is not the individual's failure in particular but a failure built into the functioning of the world as a whole. Judaism, however, in the thought of the Rav, goes beyond accepting defeat with dignity and equanimity:

While equanimity implies only the absence of a hysterical response on the part of Man, dignity denotes a new dimension of greatness in Man in which his human uniqueness manifests itself. Dignity is not just a psychological idea or descriptive attribute that pertains to Man's behavior, but it somehow reflects Man's inner personality, the core of Man's existential experience.<sup>6</sup>

It is not enough to note Man's similarity to the rest of the natural world but it is also important to underscore his uniqueness. In identifying this uniqueness, the Rav calls attention to what he calls a cathartic element which uplifts Man and gives him the courage to face an uncertain future.

In conclusion, I would like to make a comment about The Torah u-Madda Project as a whole. There are those who question the need for such a program. After all, everyone at Yeshiva University is involved in Torah and in *madda*. Is that not enough of "Torah u-Madda"; why the need to somehow bring the two together? In response, I am reminded of the parable of the two peasants who had an intense desire to meet the king. Recognizing how this is practically impossible, one of them just gave up. But the other thought of every possible way to get into the castle—first getting to know the guards who let him through the door, meeting the various officials who gave him further glimpses into the inner workings of the government, etc. Although he may never actually see the king, his understanding of the king's nature is vastly superior to that of his colleague. Similarly, it is not enough to simply express a commitment to "Torah" and to "*madda*." One must face specific, concrete issues which bring the two together. By doing so, one will gain a new insight into various aspects of Hashem and His Torah that would otherwise not be possible.

## NOTES

1. See, for example, *Yevamot* 42a, *Niddah* 27a.
2. See T. S. Kuhn, *The Structure of Scientific Revolutions* (Chicago and London, 1970).
3. In this paper, which deals with causality as understood by most biologists, I am ignoring questions of the meaning of causality raised by the Uncertainty Principle.
4. See *Bereshit Rabbati* of R. M. ha-Darshan, cited in M. M. Kasher, *Torah Shelemah* I, 94, #448.
5. R. Joseph B. Soloveitchik, "Majesty and Humility," *Tradition* XVII:2 (1978), 25–37.
6. *Idem*, "Mental Health and Halakhah," Symposium on Religion and Mental Health sponsored by the National Institute of Mental Health (New York, 1961), unpublished paper.