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B.H.
17th of Cheshvan, 5723
Brooklyn, N.Y.

Dr. H. Goldstein
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Greeting and Blessing:

My secretary, Dr. Nissan Mindel, has brought your letter of October 23rd to my attention. I am pleased to note that you took time out to review my letter of the 18th of Teveth, 5722, and to put down in writing your observations thereon. Many thanks.

In reply, I can either follow the order of my letter in the light of your remarks, or take up your remarks as they appear in your letter. I will choose the latter method. In any case, I trust that our views will be reconciled, since, as you indicate in the introductory paragraph of your letter, you are in full sympathy with the aims of my said letter, namely, to resolve any doubts that science presents a challenge to the commandments of our Torah.

I must begin with two prefatory remarks:

(a) It should be self-evident that my letter did not imply a negation or rejection of science or the scientific method. In fact, I stated so explicitly towards the end of my said letter. I hope that I will not be suspected of trying to belittle the accomplishments of science, especially as in certain areas the Torah view accords science even more credit than science itself claims; hence many laws in Halachah are geared to scientific conclusions (as e.g. in medicine), assigning to them the validity of objective reality.

/dealt

(b) A remark has been attributed to you to the effect that just as Rabbinic problems should be dealt with by someone who studied Rabbinics, so should scientific problems be left to those who studied science. I do not know how accurate this report is, but I feel I should not ignore it nevertheless, since I agree with this principle. I studied science on the university level from 1928 to 1932 in Berlin, and from 1934 to 1938 in Paris, and I have tried to follow scientific developments in certain areas ever since.

Now to your letter.

(for the aim mentioned above)

(1) I quite agree, of course, that scientific theories must be judged by the standards and criteria set up by the scientific method itself. This is precisely the principle I followed in my letter. Hence I purposely omitted any references to the Scriptures, or the Talmud, etc. from my discussion

(2) You write that you can heartily applaud my emphasis that scientific theories never pretend to give the ultimate truths. But I went further than that. The point was not that science is not(now) in a position to offer ultimate truths, but that modern science itself sets its own limits, declaring that its predictions are, will always be, and in every case, merely "most probable" but not certain; it speaks only "in terms of theories." Herein, as you know probably better than I, lies a basic difference of concept between science today and 19th century science. Where in the past scientific conclusions were considered as natural "laws" in the strict sense of the term, i.e. determined and certain, modern science no longer holds this view.

Parenthetically, this view is at variance with the concept of Nature and our knowledge of it (= science) as espoused by the Torah, since the idea of מ'ב' implies a change in a fixed order and not the occurrence of a least probable event.

Acknowledging the limitations of science, set by science itself, as above, is sufficient to resolve any doubt that science might present a challenge to Torah. The rest of ~~my letter~~ the discussion in my said letter was mainly by way of further emphasis, but also because, as already mentioned, according to the Torah, i.e. in the realm of faith and not that of science, it is admissible for the conclusions of science to have the validity of natural "law."

(3) Next, you deplore what you consider a "gratuitous attack" on the personal motives of scientists. But no such general attack will be found in my letter. I specifically referred to a certain segment of scientists in a certain area of scientific research, namely those who produce hypotheses about what actually occurred thousands upon thousands of years ago, such as the evolutionary theory of the World, hypotheses which contain no significance for present day research (see in my said letter the par. immediately following the par. you cite); hypotheses which are not only highly speculative, but not strictly scientific, and are indeed replete with internal weaknesses. Yet, lacking any firm basis, these scientists nevertheless reject absolutely any other explanation (including the Torah narrative). It is the motives of these scientists that I attempted to analyze, since their attitude cannot be equated with a desire to promote the truth, or to promote technological advancement, scientific research, etc. I did not want to accuse them, at any rate not all of them, of anti-religious bias, especially as some of them, including some of the originators of the theory, were religious. I therefore attempted to explain their attitude by a common human trait, the quest for accomplishment and distinction. Incidentally, this natural trait has its positive aspects, and is also basic in our religion, since without the incentive of accomplishment nothing would be accomplished.

(4) Your remark about the misuse of the terms "fission" and "fusion" in relation to chemical reactions is, of course, valid and well taken. I trust, however, that the meaning was not unduly affected thereby, since it was twice indicated in that paragraph that the subject was chemical reactions. Undoubtedly, the terms

"combination" and "decomposition" should have been used. - [Actually, I believe, the different usage of these terms in nuclear and chemical reactions is more conventional than basic. Nevertheless, I should have been mindful of the standard terminology].

Here a word of explanation regarding the terminology of my letter is in order. If the terms or expressions used are not always the standard ones, this is due to (a) the fact that I do not usually dictate my letters in English, and while I subsequently check the translation, the perusal may not always preclude an oversight, as the present instance is a case in point; and (b) the fact that I received my scientific training, as already mentioned, in German and French, and previously in Russian, which may also account for some of the variations.

also (5) You refer to my statement that scientists know very little about the interactions of isolated atoms and subatomic particles, and/question its relevance to the theories about the dating of the World. The relevance is this. The evolutionary theory as it applies to the origin of our solar system and planet Earth, from which the dating is inferred, presumes (at least in the case of most of the hypotheses) that "in the beginning" there were atoms and subatomic particles in some pristine state, which then condensed, combined together, etc.

I am aware of the fact that a major part of physics research in this century has been concerned with interactions of individual units ranging from atoms to the most elementary particles known. But as late as 1931, of the subatomic particles only protons and electrons were known and "explored." The bubble chamber was constructed only in 1952, and a field ion microscope (by Dr. Muller of Penn State University ?), reaching into the realm of the atom and subatomic particles - only in 1962. We have good reason to believe, I think, that just as ~~much~~ scientific knowledge was enriched with the introduction of the first microscope, we may expect a similar measure of advancement with the aid of the latest (though it had been preceded by the electronic microscope). Therefore it is safe to assume that all we have learned in the field of nuclear physics in the last few decades is very little by comparison with what we can confidently expect to learn in the next few decades.

(6) You object to my statement that conditions of pressure, temperature, radioactivity, etc. must have been "totally different" in the early stages supposed by some evolutionists from those existing today, and you assert that those environmental conditions have for the most part either been duplicated in the laboratory or observed in natural phenomena. Here, with all due respect, I beg to differ, and I believe the study of the sources will confirm my assertion.

(7) You state that there is no evidence that any radioactive element produces cataclysmic changes, and go on to note that there is a lack of a clear distinction in my letter between cosmogony and geochronology. The reason for the lack of such a distinction in my letter is that it is irrelevant to our discussion. The subject matter of my letter is the theory of evolution as it contradicts

the account of Creation in the Torah. According to the Torah the creation of the whole universe was ex nihilo, including the Earth, the sun, etc. The theory of evolution presents, instead, a different explanation of the appearance of the universe, solar system and our planet Earth. Now, in evaluating this theory, I have in mind that the strength of a chain is measured by its weakest link, and in my letter I attempted to point out some of the weakest links in both areas, cosmology and geochronology. With regard to geology and the changes and upheavals that may have occurred at a time when the whole universe is supposed to have been in a state of violent atomic instability, with worlds in collision, etc., cataclysmic changes cannot be ruled out, such nuclear reactions should have caused changes which would void any evolutionary calculations. Similarly in the evolution of vegetable, animal and human life on the Earth, radioactive process of such magnitude should have produced sudden changes and transmutations which would normally take long periods of time.

(8) You state, finally, that the crucial point to consider in regard to geochronology is the existence of objects and geological formations in and on the crust of the Earth which serve as physically observable clocks, etc. But I have already pointed out in my said letter that such criteria are valid only as of now and for the future, but cannot be applied either scientifically or logically to a primordial state. By way of illustration: Though you do not identify any of the objects you are referring to, let us examine radiocarbon dating, since most of the letters and questions I received on this subject pointed to it. This method assumes that the average cosmic-ray intensity has remained constant for the whole period of the dating and that atmospheric mixing is rapid compared to the lifetime of ^{14}C . Now to mention but one flaw in this criterion: It requires that the shielding power (density, etc.) of the atmosphere remain constant. But the evolution theory is built on the premise that there had been most radical changes. The same conflicting situation exists in regard to other methods of dating. Incidentally, in most recent years geologists in South Africa discovered such a disorder in geological formations in that part of the world that contradicted all the accepted theories of geology. The discovery was publicised at that time, but I do not have the informational media at hand, and I mention this in passing only. I suggest another look in my letter, P. 5, par. beg. "The theory of evolution..."

Should you wish to continue the discussion, please do not hesitate to write to me.

With esteem and blessing *M. Schwartzson*

P.S. I have just been able to trace and borrow one of your books, The Attenuation of Gamma Rays and Neutrons in Reactor Shields. May I say that I was greatly impressed with the effort, material and clarity of presentation. Incidentally, I noted in it your observations about the "discrepancies between theory and experimentation" which I found more than once in your book. Such a statement as "Not only is the simplest organism an incredibly complicated entity

whose chemistry and physics are barely glimpsed at (the underscoring is mine), "but the classical scientific pattern of experimentation is necessarily not available" (ditto) "in studying radiation effects" - is very significant and has a direct bearing on the theory of evolution which involves an age of unimaginable radioactivity both in the universe and our planet Earth.