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9th May, 1966

Rabbi Norman Lamm,  
The Jewish Center,  
131 West 86th Street,  
New York 24, N.Y., U.S.A.

*ans  
May 23, 1966*

Dear Rabbi Lamm,

I have just read with great interest your article in the current number of "Tradition" on "extra-terrestrial life" and I must congratulate you on its timeliness and its significance. It is most important that a brake should be administered to some of the scientists who grossly exceed their scientific prerogative

*פירא . גדולת עבודת פ"א פ"א פ"א*

As you remark yourself there is a considerable difference of opinion in the scientific world about the possibility of extra-terrestrial life. You may not have seen a recent article in the "New Scientist" which presents the biologist's point of view, and I have therefore sent a photocopy under separate cover. Also the physicist Victor Weisskopf (who was for the past few years the Director of CERN and is certainly no less distinguished than the others you quote) says the following in a recent publication:-

"It is often said that science has displaced man and his Earth from the center of the universe, where he fondly had believed himself to be, and relegates him to some unimportant place. Our Sun is only a small and undistinguished starlet in a corner of the enormous expanses of our galaxy, with many other stars like it. What is more, there are probably quite a number of other stars with planets where life has developed. These might be depressing thoughts for some.

But it may also have a different significance. The vastness of the universe, the billions of stars and the space between them are necessary conditions for the development of matter from simple, unordered particles to atoms and molecules and finally to the large aggregates which form animals and sentient beings. The spots at which matter acquires more differentiated shape are very few and selected. They must be considered as the most developed and most outstanding parts of the universe, the parts where matter was able to make fuller use of its potentialities. We find ourselves, therefore, in a very privileged and central position, since our Earth is one of these spots."

Cont....

Rabbi Normal Lamm

9th May, 1966

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Weiskopf therefore seems to put us back into the centre of the universe!

In my own personal opinion the most important problem which you tackle is that of self replicating molecules in the test-tube. I think that the chance of finding evidence of extra-terrestrial life in the foreseeable future is very remote. In fact I will even hazard a guess that once the current American-Russian competition to reach the moon has been resolved this type of research will be abandoned. We will then have a new interpretation of

in terms of economic feasibility. *בנין כלכלי של המחקר*

I myself was engaged recently at a much more mundane level in an article on "The Orthodox Jewish Scientist" which I prepared for a publication entitled "Contemporary Judaism" which is due to appear later this year. I have sent a copy under separate cover. Most of it is doubtless familiar to you, but some of the quotations in the second section (from Nobel prize-winners Feynman, Hinshelwood and Meadawar) may be of interest in showing that at least some scientists are acquiring greater humility as new discoveries emerge.

With best wishes,

Yours sincerely,

*Cyril Domb*

C. Domb

## The Orthodox Jewish Scientist

By: Cyril Domb \*

### 1. Introduction

What factors have caused the orthodox scientist to emerge as a significant force in present day Jewish society? Several decades ago the Torah im Derech Eretz movement in Germany produced a generation of academic personalities who were completely committed in theory and practice to orthodox Judaism. They were constituted into a Jewish academic association "Bund Judischer Akademiker" whose role and influence has been well described by Dr. I. Grunfeld in his book "Three Generations". At this period the great emphasis in university life was on the humanities, and the majority of the group followed this trend. There were some doctors, following a traditionally Jewish field of specialization, but only a small percentage were scientists, (although they contained men of eminence like Professor A. Frankel the mathematician, and Dr. B. Cohn the astronomer). Orthodox scientists were a rare phenomenon outside Germany at this time. In eastern Europe the Jew who entered university life usually assimilated rapidly. In Britain and <sup>the</sup>U.S.A. there were few institutions of Jewish learning and the level of Jewish knowledge of the professional classes was low.

The situation changed substantially in western countries after the last world war. Jewish teachers and spiritual leaders from the continent of Europe stimulated the establishment of Jewish day schools, Yeshivot, and other institutions of learning which helped to raise significantly the standards of Jewish knowledge. Many students arrived at university with a far more solid background of Jewish knowledge than had been possible previously. This was more especially the case in the newly established State of Israel where many of the children obtained an excellent traditional education in the religious schools. During this period science departments at the universities were expanding rapidly, and not surprisingly many of the orthodox Jewish students obtained scientific qualifications, and took up

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William Low is Professor of Physics in the Hebrew University at Jerusalem. He is an international authority on paramagnetic resonance, and author of an important research monograph bearing this title for which he was awarded the Israel Prize for Physics in 1962. He is unquestionably the leading solid state physicist in Israel and directs a large research group at the Hebrew University.

All of the above mentioned scientists treat their Jewish studies seriously. Alvin Radkowsky is a participant in the famous "Daf Yomi" scheme for studying one page of the Babylonian Talmud every day. His professional work takes him travelling all over the United States but he always carries the appropriate Talmudic volume with him on his journeys. He is now in the privileged position of having completed the whole of the Babylonian Talmud in one cycle, and is engaged in his second cycle.

Herbert Goldstein has presented several papers on themes connected with Jewish scholarship at A.O.J.S. conventions. One of the most interesting was a historic-halachic investigation into the length of the cubit.

William Low started his career as a "yeshiva bachur" when he was in England as a refugee at the beginning of the war. He is a Talmudic scholar of no mean ability, and engages in regular joint study with leading yeshiva scholars in Jerusalem.

Many members of the A.O.J.S. in the U.S.A. have Rabbinical as well as scientific qualifications. Moses Tendler was ordained a Rabbi by the Yeshiva University Theological Seminary in 1941 and he joined the faculty that year as a lecturer in Talmud. In 1951 he received a second appointment as instructor in biology at the college. In 1959 he was promoted to Associate Professor, and then to full Professor of Biology in 1964. He is currently engaged in research on the development of new antibiotics and anti-cancer agents. In association with Dr. Samuel Korman he recently announced the discovery of a new chemotherapeutic agent which has been of value in the treatment of advanced inoperable cancer. He is a member of the Rabbinical Council of America and the Union of Orthodox Rabbis of the U.S.A. and Canada.

the American

Azriel Rosenfeld, last year's president of A.O.J.S. similarly received a Rabbinical Diploma from Yeshiva University. He is an expert on automation and holds a professorship of Computer Science at the University of Maryland. Hirsch Mendlowtitz an electron physicist at the National Bureau of Standards in Washington received Semichah from the famous New York Yeshiva "Torah Vedaas". He holds a doctorate of the University of Michigan.

It is significant that most of those holding such dual qualifications are from the U.S.A. The educational system of U.S.A. universities is elastic, and there is no pressure to complete a degree in a given time. It is necessary to obtain a certain number of credits to qualify, but these credits may be acquired over a lengthy period. Hence it is possible to be engaged simultaneously in scientific and Jewish studies. In Britain the courses are much more rigid. The normal pattern is a three year course for a first degree and a similar period for a doctorate. It is extremely difficult to deviate from this pattern and the only possibility of acquiring a good basic Jewish education is to take a year or two off at a yeshiva after leaving school and before entering university. However even in England one can find persons equally at home in science and Talmud. For example, Shammai Hochberg, last year's convener of the British A.O.J.S., who conducts a regular Talmud Shiur in a Stamford Hill Beth Hamedrash, is a lecturer in mathematics at Imperial College, and engages in research in elementary particle physics.

It is interesting that A.O.J.S. has representatives in nearly every scientific discipline. Hugo Mandelbaum is Professor of Geology at Wayne State College, Detroit. Nathan Schlesinger is Reader in the Philosophy of Science at the Australian National University. Percy Grossberg is Professor of Textile Technology at the University of Leeds. Lee Spetner, trained as a mathematical physicist, has now moved over to research in Genetics and Evolution at the Applied Physics Laboratory of John Hopkins University.

Members of the Association represent only a fraction of Jewish Scientists who are professing members of the Jewish faith. They are characterized by strict adherence to Jewish traditional laws and beliefs, and would not consider any occupation or activity which involved breaking away from them.

## 2. Philosophic Outlook

The question most commonly asked of the orthodox scientist is how he manages to reconcile adherence to Jewish tradition with maintenance of intellectual contact with the world of the 1960s. Does he find no conflict between religion and modern science? Is his code of belief and practice relevant to life in the present era?

The man in the street derives most of his knowledge of science from the popular press and popular programmes on radio and T.V. He lives in an age dominated by technical advances resulting from scientific discoveries. He hears of nuclear explosions of fantastic power, of explorations of space far beyond his imagination, of incredible advances in medical science. He is then told of all that has been "established" by science, how the world began, how stars are formed, how man made his first appearance, and so on. With the prestige of science higher than ever before in history, it is not surprising that he accepts what he is told without question, and finds an apparent conflict with what he had previously been told about religion. He knows nothing of the assumptions underlying the scientific statements and is not in a position to appreciate how scientific theories and ideas change from generation to generation. By contrast the professional scientist has become steadily less arrogant and less dogmatic as he finds edifices which were considered a permanent feature of the scientific landscape lying in ruins as a result of new experimental discoveries.

Basically the relation between science and religion does not change. The fundamental assumption of all science that there is a regular pattern in nature so that experiments performed under identical

conditions will lead to identical results is very much in accord with religious tradition. But for the religious person this regularity is divinely controlled and is the pattern in which God created the Universe. God who is responsible for these "natural" laws can revoke them on any particular occasion, and this idea is clearly expressed in the Midrash (Bereshit Rabbah Ch.5). "The Almighty entered into an agreement with all that was created in the Six Days of Creation ... that the waters should split before the Children of Israel ... the sun and moon should stand before Joshua ... the fish should vomit Jonah ... the fire should not harm Hannaniah, Mischael and Azariah ..." The Talmudic sages wished to impress on us in this Midrash that miracles are very rare, and the few isolated cases of contravention of the law of nature are a result of prior specification. Under normal circumstances the laws of nature have overriding priority.

It was probably in the 19th Century that the challenge of science to religion reached its peak. Newtonian laws were applied with outstanding success, and there seemed every reason to suggest that all known physical phenomena should be governed by these deterministic laws. At the same time scientific ideas penetrated into new realms. Geology could give a figure for the age of the earth, and evolution seemed to explain how man arrived on the scene. The latter provided a particular challenge in regard to the significance and interpretation of the Book of Genesis.

It was during this period that philosophers of science (particularly the physicist Kirchoff) noted that science was not concerned with ultimate problems, its function being to describe natural phenomena in the simplest possible terms; that a "why" always remained even after a scientific "explanation". If you asked Newton "Why does a planet describe an elliptic orbit" he would answer "Because there is a law of universal gravitation", but the question still remained "Why is there a law of gravitation".

When faced with the challenge of determinism in the 19th Century the religious scientist had to resort to faith. He could not believe that such a theory was universally valid - without free will and the ability to influence human behaviour for good or ill no religion is possible. He would perhaps be accused of taking an unscientific attitude in this matter, and would doubtless reply that science was based on human reason which was of limited validity. In any ultimate difficulty a religious scientist must be prepared to resort to faith; but the 20th Century has shown that even non-religious scientists can also resort to a type of "faith".

In fact the 20th Century revolution in scientific thought has made the position of the religious scientist far more tenable. The deterministic theory of classical mechanics has been swept away and replaced by non-deterministic quantum mechanics, and the transient nature of scientific theories and hypotheses has become clearly manifest. One of the most striking examples has surely been the search for a theory of the constitution of matter. The 19th Century had been confident in 90 indivisible and immutable elements which were the basic bricks from which all matter was constructed. Then came the discovery of radioactivity with its implication that the nucleus was splitting up of its own accord. In the hands of Rutherford the transformation of one element to another became a laboratory procedure. After a further period of brilliant scientific progress it seemed that a new greatly simplified picture was emerging of three basic constituents of matter, electrons, protons and neutrons. But this idyllic picture did not last long, positrons appeared on the scene and introduced a new aspect of anti-matter which annihilated with matter to release a vast store of energy. And then a large complex of new particles made their appearance, mesons of various kinds, neutrinos, xi, sigma, lambda, delta, etc., some 80 odd to date containing features of significance undreamed of before. Very recently a major pattern was again discovered among these particles, but there is general agreement that the problems they pose are still far

from solution. Even if they are solved most physicists nowadays expect to find more problems lying in wait. No longer is there the confidence of the previous century that nearly all the laws of nature have been discovered and only a little cleaning up is needed.

Old and cherished laws of nature have been modified or abandoned. The conservation of matter and conservation of energy can no longer be considered individually but must be welded into a joint principle. The daring suggestion has even been put forward that matter is created spontaneously "ex nihilo" something which most scientists of previous generations would have found quite unacceptable, and might have characterised as a "religious style" hypothesis.

The philosophers of science have come to realise clearly that science is not concerned with absolute truth. To quote Sir Karl Popper "The Logic of Scientific Discovery" (Hutchinson 1959) p.111 "The empirical basis of objective science has thus nothing 'absolute' about it. Science does not rest upon rock bottom. The bold structure of its theories rises, as it were, above a swamp. It is like a building erected on piles. The piles are driven down from above into the swamp, but not down to any natural or 'given' base; and when we cease our attempts to drive our piles into a deeper layer, it is not because we have reached firm ground. We simply stop when we are satisfied that they are firm enough to carry the structure, at least for the time being." P.280 "The old scientific ideal of absolutely certain, demonstrable knowledge has proved to be an idol. The demand for scientific objectivity makes it inevitable that every scientific statement must remain tentative for ever. Only in our subjective experience of conviction, in our subjective faith, can we be 'absolutely certain'."

The progress of science in the 20th Century has been meteoric and unprecedented, and its horizons have extended in all directions, but this has also engendered a sense of humility and wonder which is much more in keeping with a religious outlook. Richard Feynman, Nobel Prize Winner,

and probably the world's leading Theoretical Physicist has the following to say:- "The same thrill, the same awe and mystery, come again and again when we look at any problem deeply enough. With more knowledge comes deeper more wonderful mystery, luring one on to penetrate deeper still. Never concerned that the answer may prove disappointing, but with pleasure and confidence we turn over each new stone to find unimagined strangeness leading on to more wonderful questions and mysteries - certainly a grand adventure!

It is true that few unscientific people have this particular type of religious experience. Our poets do not write about it; our artists do not try to portray this remarkable thing. I don't know why. Is nobody inspired by our present picture of the universe?"

Are we not reminded of the beautiful progressive description of natural phenomena in Psalm 104, leading to the spontaneous declaration "How manifold are Thy works, O Lord! In wisdom hast Thou made them all.."? It would here seem necessary to look for a reconciliation between science and atheism! Again in his brilliant survey to the British Association last year Sir Cyril Hinshelwood remarks as follows:- "Nature in her own time reveals her secrets to the patient questioner, and the fact is that nature is infinitely cleverer than man". It is not "good form" to refer to God in scientific statements; but if we can overcome this barrier and replace "nature" by "God" we again have a remarkable expression of religious humility.

Ethics and morals have produced their own challenge to science as it has become manifest that science on its own has nothing to say on moral issues. The Nazis could undertake dastardly experiments in concentration camps - experiments which were perfectly valid scientifically but morally reprehensible. It is possible for a state to be among the most advanced in scientific research and teaching, and for freedom of thought and conscience to be very low on the priority list. Nuclear explosives have presented a variety of problems for which a solution outside science must be sought; and the frightening possibilities of certain developments

in molecular biology again pose moral problems which have never arisen before.

At the same time the ethical purity of scientific motive has become tarnished. Many ask nowadays why so much money is spent on space research and high energy physics, whilst researches to help supply the food requirements of starving populations are neglected. What proportion of the incentive in supplying funds is intellectual curiosity, and what proportion the struggle for world power?

Even the conventional picture of the scientist as a cold and unemotional being judging each piece of evidence objectively has been shattered. Albert Einstein, the greatest scientist of this era, could set aside the overwhelming mass of evidence supporting quantum mechanics and continue to search for a deterministic model, proclaiming "I do not believe in a dice-playing God". A few years ago when the "Times" Literary Supplement devoted a complete issue to "The Two Cultures" H.C. Longuet-Higgins, one of the world's foremost theoretical chemists, could write on "A Portrait of the Scientist as an Artist"; and the Nobel prize winner P.B. Medawar could observe - "Scientists are a very heterogeneous group of people doing different things in very different ways. Among scientists there are collectors, classifiers, and compulsive tidiers up; many are by temperament detectives, many are explorers, some are artists, others artisans. There are poet-scientists and philosopher-scientists and a few mystics. What sort of mind or temperament can all these people be supposed to have in common?"

In this scientific climate the orthodox Jewish scientist fits in with little difficulty, and finds himself obliged to make fewer explanations than a generation ago. The theory of evolution which issued its challenge in the 19th Century, is now seen to have the same transitory nature as other scientific theories. By contrast the eternity of the Bible is based on its moral message, and the emphasis at the beginning of Genesis on the dignity and responsibility of man who is the summit of creation formed in the Divine image is as valid today as at any time in human history.

The orthodox Jewish scientist is committed to the traditional view regarding the text of the Torah and Nach and related matters. These are his hypotheses and he searches for a solution to any problem in accordance with these hypotheses. In this respect he is being no more unscientific than Einstein in his attitude to quantum mechanics, or any other scientist who because of some feeling or intuition searches for a solution to a problem in a particular direction; as long as his hypotheses are clearly stated, and he subsequently uses logic and scientific method, his contribution need be no less significant than that of a researcher who starts from different hypotheses.

In giving priority to the views of the Talmud and other Hebrew commentators, the orthodox Jewish scientist differs essentially from the majority of "Judische Wissenschaft" scholars. It is sometimes claimed that the latter are truly objective. A closer examination will reveal that each individual has his own particular bias; this was manifestly demonstrated recently when the Dead Sea Scrolls first appeared on the scene. Within a few years of the discovery of the scrolls some ten rival theories were current each claiming to provide the true solution to the problems posed. It soon became clear that many of the advocates of particular theories were influenced by their own pattern of "vested interests".

The above comments should clarify the rationale of the orthodox Jew in present day scientific society. Any apparent conflict between science and Judaism is due only to a superficial assessment of the role of science. A more profound analysis shows that one who is religiously inclined can derive adequate support for his beliefs from scientific investigations.

### 3. Practical Aspects

The orthodox Jew in the university or government or industrial research faces a number of difficulties in maintaining his traditional way of living. He must excuse himself from work on Sabbaths and Festivals (this includes Friday afternoons during the winter months). Because of his dietary requirements he can participate only with difficulty

in many of the major social and communal activities. Even more important than the determination to overcome practical difficulties is the courage required to be different, and not to move with the general stream. It is perhaps this latter factor more than any other which was responsible for the high incidence of assimilation amongst orthodox Jews who went to the university during the early part of this century.

In the introduction reference was made to the general improvement in facilities for Jewish education in the western world after the end of the last war. In addition to this positive factor the social pressure to conform to a standard pattern has decreased significantly. Universities have become more diverse and multi-racial, and it is now appreciated that each particular social group can make its own individual contribution to intellectual society. And the orthodox Jew can justly claim that his own mode of living avoids many of the current dilemmas of Western civilization. For one day of the week, on Sabbath, he can escape from the tensions and frustrations arising from a pace of life which he did not choose, and create an atmosphere of relaxation and spiritual refreshment. His closely knit family life has been virtually unaffected by the disintegrating forces which have wrought havoc elsewhere. His regular occupation with the humanistic literature of the Bible and Talmud ensures that he does not become obsessed by his limited professional interests.

However, the path of the young Jewish student who wishes to remain loyal to tradition is far from smooth, and one of the important practical duties of A.O.J.S. is to provide an advisory service to students which draws on the collective experience of its members in regard to any problems which may arise. A similar advisory service is maintained in regard to Jewish observance in the scientific and learned professions, and a pamphlet entitled "The Observant Jew in the Professions" was published by the British A.O.J.S. in 1964. The advantages of such collective experience are not confined to students. Scientists in the 1960s are among the foremost world travellers, whether for international scientific conferences, summer schools, special training courses, or

sabbatical leave; the present writer can testify from his own personal career the benefits which he has derived on such occasions from A.O.J.S. contacts in many major cities in the U.S.A.

The discussion in the previous section should have demonstrated the need for reliable information to be passed on to the intelligent layman on basic topics like science and religion; in fact A.O.J.S. feels that this need extends to all aspects of traditional Judaism, and it is important that expositions should be couched in the present day idiom. Hence we try to sponsor public lectures on suitably chosen topics, and to maintain discussion panels for our own members and other interested groups. The latter enable an individual scientist to keep abreast of major scientific developments in fields other than those with which he is professionally connected.

Modern halacha has to deal with problems in which recent scientific and technical developments play an important part. The Beth Din and Rabbanim are therefore in need of technological advice, and A.O.J.S. is ideally equipped to provide this information, since an understanding of the halachic problems involved is a necessary qualification. For this purpose regular discussions with Rabbis and Dayanim have been instituted which help us to increase our basic knowledge of halacha and learn first hand of some of the problems. It should be stressed that we do not in any way regard ourselves as qualified to give a "p'sak din" - this must come from the Rabbanim who are the only people with the traditional authority to give such decisions.

It is particularly distressing that many industries in Israel work a seven day week and this can seriously discriminate against religious citizens. By suitable use of modern methods of automation it is possible to reduce substantially the number of people who need to be employed on the Sabbath. By utilising the knowledge and resources of our members we have already been able to contribute to a solution of this problem in particular

cases, and we hope to be of further help in the future. The Israeli branch of A.O.J.S. has recently been instrumental in establishing a special "Institute for Science and Halacha" which is staffed jointly by Rabbis and scientists. It is hoped that the innovation of working contact between two disciplines which have previously functioned apart will produce fruitful results.

Finally the orthodox scientist aspires to make a useful contribution to communal life in the sphere of Jewish education. He cannot claim to be an expert on Torah and Jewish learning, but he can claim experience in teaching methods, in systematic presentation, in mastery of complex subjects, and in the use of modern educational aids to study. He can make this experience available to Jewish teachers and others responsible for Jewish education. Thus he can bridge the gap between the sacred and secular, a gap which many Jewish philosophers have regarded as artificial and unnecessary.