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Genetic Engineering

Seymour Siegel

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If the righteous desired it, they could be creators, for it is written. But your inequities have distinguished between you and Me, saith the Lord (Isaiah 59:2) . . . Talmud, Tractate Sanhedrin 65b.

The achievements of the human mind are seemingly limitless. If it were not for the tendency of human beings to frequently pervert stunning inventions to bad purposes, we could resemble our Creator. In the thrusts of the human spirit we practice the ancient *ethical* virtue of *imitatio Dei*. It is the human potential to do mischief that makes his creative possibilities problematic. When humans attempt to change the character of the species radically, they can harm the human-ness of the person. What we must do as a community is to insure and encourage the development of creative possibilities while attempting to prevent dehumanization.

Before discussing some of the specific issues which are usually subsumed under the rubric of genetic engineering, let me state some basic theological assertions which emerge from the Jewish tradition.

I. Creation

The basic assertion of biblical religion is that in the beginning God created the heaven and the earth. The fact that God created the world gives it meaning, purpose, value. The fact that it is created desanctifies the universe. The heavens declare the glory of God — they are not

God. In pagan religion (and in some modern variations) nature is seen as sacrosanct, holy. In paganism, the gods inhabit nature — therefore, man's greatest good is to conform to nature, not to transform it. The biblical God is above nature. He is not to be identified with any part of it. Therefore, in the magnificent phrase coined by the talmudic rabbis, man is to be partner with God in the work of creation. The challenge which God, so to speak, hurls at the human race is to use its reason, its imagination, and even its *chutzpah* to wrest from nature her secrets toward the end of improving our human estate. If anything or anybody is God-like, it is the human being who was created in God's image and who carries in his soul a divine spark. It is this image which legitimizes the entire medical enterprise. There were those in the ancient world who believed that if God sent illness, He should send the cure. This viewpoint was far from the biblical one. God may have sent the illness (even this was not certain); He wants, however, to see us bring the cure (with His help, of course).

This idea is expressed in a well-known passage from rabbinic literature.

It occurred that R. Ishmael and R. Akiva were strolling in the streets of Jerusalem accompanied by another person. They were met by a sick person. He said to them, "My masters, tell me by what means I may be cured." They told him, "Do thus and so until you are cured." He asked them, "And who afflicted me?" They replied, "The Holy One, blessed is He." [The sick person] responded, "You have entered into a matter which does not pertain to you. [God] has afflicted and you seek to cure! Are you not transgressing His will?"

Then R. Ishmael and R. Akiva asked him, "What is your occupation?" He answered, "I am a tiller of the soil and here is the sickle in my hand." They asked him, "Who created the vineyard?" He answered, "The Holy One, blessed be He." R. Akiva and R. Ishmael said to him, "And you enter into a matter which does not pertain to you! [God] created [the vineyard] and you cut His fruits from it." He said to them, "Do you not see the sickle in my hand? If I did not plow, sow, fertilize and weed nothing would sprout." They said to him, "Foolish man! Have you never in your life heard that it is written 'As for man, his days are as grass; as grass of the field, so he flourishes' (Psalms 103:15). Just as if one does not weed, fertilize and plow, the trees will not produce [fruit] and if fruit is produced but is not watered or fertilized it will not live but die, so with regard to the body. Drugs and medicaments are the fertilizer and the physician is the tiller of the soil."

II. The Nature of Man

Man is "but a little lower than the angels." He is the crown of creation. He, unlike all other creatures is created in God's image. His distinction above all others in the universe lies in his ability to reason, choose between good and evil, and his knowledge about himself. Only man can make himself the object of his own thought. He can imagine

his death and plan for the future. He is aware of his destiny and of the possibility of relating to the Transcendent. Ideally, all should be equal; no one should dominate another human being. "For unto Me are the children of Israel servants. They were not meant to be servants to servants." Human beings have the ability to think, to communicate ideas and concepts. They have the ability to think in abstractions, to manipulate and create symbols. Man is the only creature who can tell a lie, sin. Man's freedom is the source of his ability to do the good as well as the evil. Good is the right use of freedom. Evil is the misuse of freedom. Man is part of nature, irrevocably caught in the necessities of nature, growing, perishing and dying, — he is also above nature, free and in touch with the Beyond. All of these and other traits, attributes and dimensions express the human-ness of the human being.

From a theological point of view we are bidden to thrust into the unknown in order to cure, improve, soothe, and correct nature to further the human estate. We are forbidden to do anything either in manipulating nature or in the way we organize and relate to each other which will diminish the human-ness of the human being by depriving him of these aspects of life which we value as truly and basically human.

With these remarks let us now turn to the specific issues usually included in the idea of genetic engineering. Part of the confusion which the public has shown results from a confusion about what we are discussing.

Recombinant DNA

Recombinant DNA technique is a method in genetic research in which a piece of the DNA (the basic code found in every cell) is cut off and spliced onto the DNA of another organism. The latter organism carries its own DNA and a piece of the DNA originating in another organism. If the host organism is simple like a bacterium, the spliced-on DNA will be produced in great number. This allows for easily-acquired material for research and also a big supply of the spliced-on part of the DNA which might be interferon, insulin, or some other biological substance, potentially very valuable and necessary.

About a decade ago, when the recombinant method was beginning to be widely used, there was a hue and a cry about the potential dangers which might follow from the creation of a new organism. Such books as *Who Should Play God?* by Howard and Rifkin (Dell Books) pointed up the possibility of recombining the DNAs of two organisms and thus creating an entirely new being whose properties are basically unknown.

It might happen that the new organism would escape from the laboratory and cause horrible consequences. The bacterium with the

spliced-on genetic material might cause cancer, eating up of oil and other catastrophes. It is interesting to note, as has been now frequently pointed out, that the discussion was triggered by a letter which appeared in the magazine *Science* on Sept. 21, 1973. The letter, signed by Maxine Singer and Dieter Soll was addressed to the presidents of the National Academy of Sciences and the Academy's Institute of Medicine. The letter reads in part as follows:

We are writing to you, on . . . a matter of deep concern. Several of the scientific reports presented at this year's Gordon Research Conference on Nucleic Acids . . . indicated that we presently have the technical ability to join together . . . DNA molecules from diverse sources Certain such hybrid molecules may prove hazardous to laboratory workers and to the public. Although no hazard has yet been established, prudence suggests that the potential hazard be seriously considered.

It is interesting that on July 15, 1977, another letter emerged from the same group of scientists. An open letter to Congress was signed by 86% of the 157 members present at the meeting. The first paragraph of that letter reads as follows:

We are concerned that the benefits of recombinant DNA research will be denied society by unnecessary restrictions in legislation.

It has been pointed out that what happened to change the mind of the scientists was the spectacular results of DNA methodology so far. There is now mass production of interferon and other important biological substances. There seem to be other breakthroughs on the horizon. Guidelines were formulated by the NIH which were followed by laboratories conducting recombinant DNA research. These guidelines mandated the way laboratories were to be constructed and what kind of organisms should be used to reduce the danger of these experiments to practically zero. The scenarios which caused so much alarm in 1973 have been precluded by the development of new types of bacteria which cannot survive outside the laboratory environment, and by the careful choosing of personnel involved in carrying out experiments. I can testify personally, as a member of the Biohazards Committee of the pharmaceutical firm of Hoffmann-LaRoche, as to the exquisite care which is taken in the protection of the environment and the researchers involved in DNA experiments.

Thus it would seem that the potentially great benefits for mankind in carrying out DNA combining, far outweigh any possible harm. An alert public, a sensitive scientific community and a spirit of cooperation with government have overcome the very real fears which were expressed in the beginning. Therefore, the genetic engineering expressed in the recombinant DNA technology, I believe, presents very minimal risks. We should encourage the scientists who are looking for ways in which, through this technique, mankind can benefit mightily.

Human ingenuity has probed nature; using this knowledge has improved creation and made it yield benefits for us all. Theologians, especially should not only endorse, but also encourage this line of endeavor.

Genetic Therapy

Genetic therapy is a form of genetic engineering which, I believe, presents very few ethical or religious problems.

In genetic therapy, the cells are repaired if there is some deficiency or abnormality. There are several types of genetic therapy possible. (See the entries on gene therapy in the *Encyclopedia of Bioethics*.) One method is *enzyme replacement*. (See article by Elizabeth Neufeld, *loc. cit.*) A defect in a gene will be translated into a defect of the enzyme molecule, so "that the enzyme functions poorly." Many difficulties may ensue from the malfunctioning enzyme. It is possible to replace these enzymes with normal ones, though the process is largely experimental and the therapeutic effects are still to be verified. Another form of gene therapy is therapy via *transformation*. "Gene therapy refers to the future possibility of introducing new, functioning genetic information contained in the molecules of DNA into human cells with the intention of treating human genetic disease. Gene therapy via genetic transformation would envision using isolated fragments of purified human DNA to accomplish this end" (Richard Roblin, *loc. cit.*). This, too, is at the moment highly speculative and not yet proven. Gene therapy via *transduction* "envisions the future possibility of using viruses or viral DNA as carriers for the introduction of new specific, foreign DNA sequences into cells for the purpose of ameliorating human genetic disease." To date, experiments on humans using this technique to cure genetic defects have not been successful.

It would seem that when and if these attempts at genetic therapy are successful and we are able to overcome genetic deficiencies by some form of genetic repairs, there would be no new ethical issues which would be different than those occasioned by other forms of medical therapy; informed consent, fair distribution of resources, etc. As a matter of fact, the successful development of gene therapy techniques might make it possible for parents who discover abnormalities in fetuses to keep their offspring instead of resorting to their destruction through abortion. Since there are possibilities that such genetic factors as gender, skin color, or height might be altered by genetic therapy, several commentators (see, for example, Roger Shinn in the *Encyclopedia of Bioethics*, c.v. Gene Therapy: ethical issues) have raised ethical questions. It seems that these possibilities — though real — are remote and therefore not very relevant to the discussion

carried on today. Other discussions (see, for example, Paul Ramsey, *Pre-Fabricated Man*) focus on the long-term effects of genetic processes. In altering genes of a fetus, for example, we are altering not only its own make-up, but the make-up of all future offspring. A correct gene which would make diabetes impossible in the first generation might render some harm in future generations. The human being is an integrated whole, so that even a defective gene might have some salutary impact on the whole organism. Are we permitted to risk future harm for present benefits? It would seem to me that, from an ethical point of view, we are bidden to do as much good as we can now and pray that the long-term effects will be benign. There is an old rabbinic principle: "*bari vshema bari adeef* — something certain and something doubtful, the preference goes to the certain." If we were sure that we are affecting genetic therapy now, we should go ahead and do it even though we *might* think that in the future there may be some risk.

As we pointed out at the beginning of this discussion, part of the human estate and challenge is to recognize nature as unfinished and needing some improvement when that is possible. This is the theological basis for medical interventions ranging from eyeglasses to pacemakers. Genetic therapy would certainly fit into this conceptual framework. Barry Commoner, in promoting the ecology movement, formulated a law which said: "Nature knows best." This means that "any major man-made change in a natural system is likely to be detrimental to that system" (Commoner, *The Closing Circle: Nature, Man and Technology*, p. 41). Though this "law" seems plausible and even useful in warning against human pride (*hubris*) it serves a cautionary purpose, not a conclusionary purpose.

Genetic Engineering

Recombinant DNA and genetic therapy present few, if any, ethical issues. What most of the discussion is about is what could properly be called genetic engineering which can be understood as applying to techniques which have as their aim the restructuring of the human species — both as to the method of its propagation and its genetic endowment. The new knowledge provided us by the biological revolution of our time has stimulated the imagination of our scientists. Warnings about the ominous future which awaits us and our offspring are heard on all sides. In one of the most popular books on this subject, *Who Should Play God?*, Ted Howard and Jeremy Rifkin warn: "Well-credentialed and well-financed researchers . . . propose the complete retailoring of human life. Name your wildest fantasy, or nightmare, and some authority somewhere is seriously proposing it; from redesigning human stomachs so that people will be able to consume cheap hay and grass, like cows, to the hybridization of humans

with lower primates. There are even some genetic engineers who eagerly await the day when their work will produce . . . the construction of a genetic super-race that will move far beyond homo sapiens on the evolutionary ladder" (p. 15).

Artificial Insemination

The *Journal of the American Medical Association* (June 5, 1972) suggests: "The popular term, genetic engineering might be considered as covering anything having to do with the manipulation of the gametes or the fetuses, for whatever purpose, from conception other than by sexual union, to treatment of disease in utero, to the ultimate manufacture of a human being to exact specification. Thus, the earliest procedure in genetic engineering is artificial insemination, next . . . artificial fertilization . . . next artificial implantation . . . in the future corporeal gestation . . . and finally, what is popularly meant by genetic engineering, the production or better biological manufacture of a human being to desired specification."

The process of artificial insemination was mentioned by the rabbis as early as the fifth century of the common era (see Jacobovitz, *Jewish Medical Ethics*). In general, Jewish ethicists have endorsed artificial insemination by husband (AIH) without question. There has been some controversy about artificial insemination by donors (AID) (see Bleich, *Judaism and Healing*, index, artificial insemination). Those who opposed AID did so on several grounds: 1) possible incest because, since the donor is not known, there is a remote possibility that siblings might marry in the future; and 2) possible adultery (if the seed of another man is placed in the body of a woman already married it might be viewed as adultery); and 3) the unseemly act of treating conception mechanically and artificially. Expressing the strong pronatalist viewpoint of traditional Judaism, AID was accepted as a means of making possible the procreation of children. The latter seems to be the majority view of the deciders. This is, of course, limited to married couples. The Jewish viewpoint would not accept the artificial insemination of a single woman or certainly of lesbian couples. This would be seen as a strong blow against the idea of the family, a basic pillar of the Judeo-Christian social outlook. In general, all of the proposed genetic engineering feats are to be viewed against the background of "family impact." The mere production of children is not enough of an excuse to go ahead with new technology. The raising of children is always seen in the context of the family unit. One could foresee many problems which would affect family relationships. What new forms of sibling rivalries will develop among children who share the same mother but have different semen donors for fathers? How will children (or the wife) relate to the male figure who is present in the home but has no biological function in the birth of the children?

There are also legal problems regarding inheritance and personal status. Notwithstanding these problems, the Jewish tradition is so pro-natalist and so highly valuing of the place of children in a family that it is willing to risk the difficulties and accept the good consequences. Again, it is important to stress that this viewpoint is to be seen against the background of the traditional family. Jewish ethics and morality would look askance at the encouragement of biological procedures which would tend to weaken the traditional family.

Test Tube Babies

The conception of a fetus outside the body of the mother is a phenomenon which was recently accomplished. The moral question involved is to be seen in the light of the viewpoint that to have children is a great commandment (mitzvah). As long as the couple itself is involved, there seems to be no moral objection. "There would be no objection to joining sperm and ovum of a married couple in a test-tube or a petri dish" (S. Siegel., *The Jewish Week*, July 14, 1978). There have been objections raised to "test tube propagation" because of the fact that all the ova are not properly fertilized. Only one is chosen to be replaced in the body of the woman giving the ovum. What happens to those fertilized ova which are not healthy enough to be reimplanted? Is this a form of abortion? Such highly respected ethicists as Prof. Paul Ramsey have raised this question. It seems to me that even if one were to be opposed to abortion, the destruction of fertilized ova outside the body of the mother and before they have become attached to the uterine wall would not come under the category of abortion. Therefore, whatever considerations might arise, the question of abortion would not be one of them.

Another consideration of great importance is raised by Dr. Leon Kass of the University of Chicago. (See R. Restak, *Pre-Meditated Man: Bioethics and the Control of Future Life*, p. 63.) "What is new about embryo transfer is a divorce of the generation of new life from human sexuality ultimately from the confines of the human body. Sexual intercourse will no longer be needed for generating new life. This novelty leads to two others: there is a new co-progenitor, the embryologist-geneticist-physician; and there is a new home for generation, the laboratory. The mysterious and intimate processes of generation are to be moved from the darkness of the womb to bright (fluorescent) light of the laboratory."

The same objection is raised by Professor Ramsey (*Fabricated Man*): "Many of these proposals would irreversibly remove a basic form of humanity; the basis in our creation for the covenant of marriage and parenthood." What Ramsey is saying is to be taken very seriously. Part of our humanhood is that we are made biologically for parenthood by joining together with another human being in the

production of a third human being. This biological fact, argues Ramsey, is part of spiritual legacy, which is a unity of the biological and the non-biological. It is also part of our human legacy to have a realization in the depths of our own consciousness that we have come into the world through the union of two human beings who uniquely are involved in ourselves. The developments of techniques like in vitro fertilization call this into question. "Human parenthood is, in the language of Karl Barth (one of the greatest of the Protestant theologians of the twentieth century) a basic form of humanity. To violate this is already dehumanizing" (*ibid.*, p. 31). By mechanizing the process of procreation we are about to deprive ourselves and our progeny of a profoundly human dimension. Therefore, theologians such as Ramsey and philosophers such as Kass argue that we would be better off as a species if we stopped developing the enterprise before we go too far.

These arguments are very convincing and serve as a necessary warning against excesses. It would seem that they would be more applicable in a situation where the artificial means of conception were to be used outside the conventional family attachments, such as for single women or with sperm, stored for a long time, of individuals who had achieved some distinction, such as Nobel Prize winners. This kind of biological mechanism, especially if it were to become widespread, would certainly pose a threat not only to the traditional family, but also to the basic character of the human species and human parenthood. However, it seems to me, if AID or test tube propagation is employed within a context of the traditional family which would continue to nurture and establish a strong bond with the offspring brought into the world, then the threats to the fundamental nature of human parenthood would be minimal, if present at all. The warnings against "thing-i-fying the *carnal* life" should be taken seriously and form an important part of our considerations concerning genetic engineering.

Host Mothers

Of special interest are recent experimental developments which indicate that it may soon become possible to remove a naturally fertilized ovum from the womb of a pregnant mother and to reimplant it in the uterus of another woman. The embryo would then remain in the womb of the "host-mother" through the period of gestation until birth.

Rabbi Immanuel Jacobovitz, chief rabbi of Great Britain, characterizes such practices as offensive to moral sensitivities when resorted to as a convenience in order to avoid the difficulties of pregnancy (*Jewish Medical Ethics*, 2nd ed., appendix). "To use another person as an 'incubator' and then take from her the child she carried and

delivered for a fee is a revolting degradation of maternity and an affront to human dignity" (David Bleich, *Judaism and Healing*, p. 92). Besides these considerations, there are other difficulties of a more technical nature such as who is in truth the mother of the child, who are siblings, etc.

In general, we would have to employ the criteria stated previously. While we wish to encourage the production of children in families where nature makes this sought-after end attainable, we should be extremely cautious in encouraging procedures and developments which would endanger the preservation of the family.

So far the issues with which we have dealt have been relatively easy to solve. If nature frustrates the legitimate desires of married couples for children, then it seems licit to "outwit" nature so that fertility can be achieved, within the parameters of preserving those aspects of our humanity which we particularly cherish and value, such as parenthood, while being careful about the "family impact" of newer ways of conception and gestation.

The theological and ethical issues become very difficult and complex when they involve procedures where the coming generation will be manufactured "according to specification." These procedures are in various stages of experimental development. They range all the way from cloning of humans to specifying the sex of the child to be conceived, and specifying his physical or mental characteristics. As the technology develops, even a leader such as Dr. R. G. Edwards admits that his research on in vitro fertilization "provokes various thoughts and opinions; the beginning of test tube babies, armies of carefully planned robots (and) playing God in the laboratory" (cited in Rifkin, *op. cit.*, p. 109).

The prospect of modifying the genetic endowment of potential offspring and the further prospect of specifying what kind of characteristics are desired by prospective parent(s) does present very challenging theological and ethical issues.

As usual, Prof. Paul Ramsey has put the issue in dramatic focus: "Men ought not to play God before they learn to be men, and after they have learned to be men they will not play God." Parents would be seen as consumers, alternately selecting and rejecting various possible variations in children. Those who wish only blue-eyed children, for instance, might someday be provided with the technology needed to bring this about. (See Richard Restack, *op. cit.*, p. 78.)

This dramatic and unprecedented modification of the next generation brings in its wake profound theological and moral questions. The central question is that man ceases to be a creature and turns instead to being a creator. Can genetic engineering legitimately be used to realize mankind's most cherished and persistent hope: of creating a perfect world without sickness, travail, endurance, and ultimately without death? Are we dealing with what Ramsey calls "a messianic

positivism"? The corruption of the present world will be overcome not by faith and trust in a beneficent God but in the stupendous achievements of biological scientists. No longer would love and self-sacrifice, a kind of awesome uncertainty about the future, test and refine human character, but trust would be placed in the biological messiahs who would fill orders for people who would want a prefabricated person.

How do these observations square with the theological *chutzpah* which was expressed at the beginning of our discussion? Surely man is a "little lower than the angels." Surely, nature is in hands to modify and change to make his life happier, healthier, and longer. But these achievements must not be won at the price of sacrificing those characteristics of our humanity which we particularly value as being indispensable for the development of humanhood. God wants us to *imitate* Him, not *impersonate* Him. We cannot win happiness at the price of dehumanizing ourselves and our progeny. What benefit will there be if we gain perfect genes and we lose our souls? By all means we should encourage genetic and other types of research to remove disease to make procreation within the family context possible where, because of a quirk of nature, it is now impossible — but we should restrict and restrain ourselves in the search to recreate our own species. The myth of Frankenstein has its origins in the Jewish myth of the golem. The great rabbi Loew of Prague, who lived in the 16th century, created a golem, a lifeless lump to which he gave life, using mysterious kabalistic procedures. When the rabbi's community was being threatened by a murderous mob, the golem turned on the attackers and defeated them. However, since the golem had been unleashed, he could not stop and turned on his creators. The great rabbi turned the golem back into dust. Will our stupendous achievements, with which we can conquer our perennial enemies, turn upon us in the future? Will we be able to turn them back into dust?

It is quite clear that public policy must take steps both to encourage and monitor the achievements and projects of the genetic engineers. Somebody will have to be chosen and given the task of regulating activities in this exciting and awesome new field. There is hope that creative cooperation between the scientific community, the public, and the government will be able to wrest for us, from nature's secrets, ways to improve our life and our humanhood without risking the ironic outcome of destroying that humanhood in a spectacular effort to perfect it.