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God's work. Our hands.

Genetic Manipulation
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[1] Genetic manipulation has to do with rearranging, adding, or deleting genetic material for the purpose of bringing about desired changes in living things. There are varieties of procedures and goals, and varieties of opinion on the propriety of some or all of them, particularly as they relate directly to human beings. Christian faith rarely yields direct or uncomplicated responses to ethical questions, but it can, ought to, and often does influence ethical reflection. It is appropriate, therefore, that the church provide a forum for discussion of this new development in our ability to control genetic material. This pamphlet will seek to describe the present situation, to point to both the promise and the peril of the technology, and to suggest a Christian perspective from which to address the ethical issues arising from it.

The Present Situation

[2] In science, observation tends to lead toward manipulation research tends to lead toward application. It is obvious, however, that not everything that can be done ought to be done. Discriminating judgments have to be made. Most people would like to retain the electric light bulb and to rid the world of nuclear weapons. The question, then, is not whether to manipulate nature. Everyone who mows a lawn or takes an aspirin manipulates nature. The question is how and when to do it, within what limits, under what circumstances, in accordance with what rules, toward what ends. Only since the early seventies have these questions constituted a live ethical issue in relation to genetic manipulation, because only since then has the technology been in place to actually do it. The procedure was initially known as recombinant DNA (dioxyribonucleic acid) research, and is today a commonplace part of the scientific and industrial enterprises.

[3] As one examines this procedure, it is important to note that adaptations to changing environments have always been made by living things, and that some of these adaptations have entered germlines and have passed from one generation to another. Some changes in plants and animals have taken place by design, for instance through the selective breeding of stock animals and the development of hybrid grains. Thus, for many centuries purposeful manipulation of reproductive processes have resulted in successful manipulation of genetic materials.

[4] A very large step toward understanding how such genetic changes take place was made possible in the middle of the nineteenth century by the formulation of the "Mendelian laws" for simple dominant and recessive traits. One century later, in 1953,

James Watson and Francis Crick published their work on the DNA molecule, for which they received the Nobel prize in 1962. In the early seventies, procedures were in place to actually "recombine" DNA molecules, to "splice" genes, to create in the laboratory living things which had never before existed, and which were capable of reproducing themselves.

[5] The fact that this can be done, and is being done, is astonishing. Yet it can be assimilated into one's thought-world without trauma if one realizes that human beings have never been satisfied with allowing genetic change to take place in a purely haphazard fashion. Farmers and stock breeders have always manipulated genetic material, even if their procedures were slow and imprecise. The new thing in our present situation is the almost immeasurable increase in the speed and control of processes by which genetic change can take place in the laboratory. It is analogous, perhaps, to the increased speed and control of processing data made possible by the computer. Computers are now a ubiquitous component of contemporary life. Both in university and industrial laboratories genetic manipulation is also becoming very common. This is not to say, however, that all disputes about the procedure have been settled, or all questions answered.

The Promise and the Peril

[6] Almost everyone who looks seriously at genetic manipulation soon realizes that the new biotechnology has both promise and peril. Writers on the subject looking for titles to express the ambiguity of their attitude toward it come up with phrases such as "The Blessing and the Curse," or "The Prospects and the Hazards," or "The Thrills and the Chills." People disagree about what to stress.

[7] Some individuals are inclined by their basic posture toward life to take risks, to "go for it," to think that things will somehow work out. Such people tend to downplay the peril and underscore the promise. Other-individuals are inclined to play things more conservatively, to calculate carefully any possible reversals, to postpone action until they think "all the facts are in." Such people tend to downplay the promise and underscore the peril. Both groups, however, if they deal with the issue seriously, attempt to take into account probable benefits and calculated risks.

[8] One can at this time only imagine the wide range of possible benefits to be derived from the discovery of this genetic secret, and the development of procedures with which to work with it. At the Deutsches Museum in Munich, Germany, one of the great science and technology museums of the world, a huge model of the DNA molecule stands directly at the entrance to an entire floor of chemistry exhibits. Some compare this new technology to the splitting of the atom or, more dramatically, to the discovery of fire. Gene splicing, creating new forms of life in the laboratory, does place us at the beginning of a new age, and we have only hints of what lies in the future. But even the hints are breathtaking.

[9] Insulin and interferon can now be produced commercially by biological factories, making these materials vastly more accessible. Organisms have been produced in

the laboratory which in turn can produce hormones, antibodies, and enzymes used by the human body. One much-publicized product is a growth hormone, already used experimentally on rats, which will probably soon be available for children who suffer from dwarfism. There are at the present time more than 10,000 such children in the United States alone. The only current source of the hormone is the pituitary glands of cadavers, and it takes from fifty to eighty cadavers to provide a single year's dose for a single child.

[10] It is theoretically possible to engineer the DNA of plants so that crops could - on their own - obtain nitrogen from the air, making fertilizer unnecessary. Plants can be developed which will ward off pests, or grow in salty soil, or require virtually no water. Since DNA is the genetic code of all living things, genetic materials from any living organism, whether plant or animal, can be recombined. There has already been a successful splicing of DNA material from a cow into that of a tomato to produce a new tomato with a tough leathery skin. And this new tomato is now being altered with genetic material from wheat to refine the tomato further into a high protein product.

[11] In June of 1980 the United States Supreme Court ruled in a 5-4 decision that new forms of life can be patented, and thus brought a new bacterium, a laboratory-manufactured variation of the bacterium *Pseudomonas*, under legal protection. It was developed in General Electric laboratories by microbiologist Ananda M. Chakrabarty, and has the peculiar property of a huge appetite for oil, which it eats and turns into protein and carbon dioxide. The theory is that it could be used to take care of oil spills, consuming the oil, producing protein, and then quietly dying when there is no more oil left to consume. It has been engineered, is patented, can be produced in unlimited quantities if desired, but has not thus far been used.

[12] Genetic manipulation is only in its embryonic stages. There are many difficulties to overcome and problems to solve. Genetic surgery on an individual human being, for instance, for the correction of a genetic "defect" such as Down's syndrome, is a likely but very distant possibility. So also is the biological manufacture of vaccines to protect against wide varieties of human disease. Yet the only question now is the amount of time needed to do the. research that will bring about the reality.

[13] Some scientists, with detailed knowledge of the technology and with lively !skills for sketching future scenarios, are able to rhapsodize about the cornucopia of benefits which we can expect from genetic manipulation. Other equally gifted scientists, and a significant number of ordinary citizens, are more inclined to point to the peril than to the promise.

[14] There are many levels of worry about these procedures, from the most general kinds of fear about the unknown to very specific and informed judgments about particular aspects of new developments. It is not uncommon to draw a parallel between the discoveries that energy can be released from the atomic nucleus and that DNA is the genetic stuff of life. It is then said that the peril of nuclear power far

outweighs the promise, and the warning is issued that a mismanagement of biotechnology similar to mismanagement of nuclear technology could result in irreversible damage to our biosphere, the life- environment upon which we and future generations must depend. Since new organisms, once created in the laboratory, may have the ability to reproduce, it is always possible that there may be unleashed some "killer strain" of bacteria for which there is no antidote. The peril does not have to be either direct or immediate. We have seen cancer and other health hazards result from nuclear and chemical wastes, and even from seemingly innocent and beneficial agents such as pesticides.

[15] One can worry, to be specific, about what might happen if the aforementioned oil-eating bacterium would be used on an oil spill and through some quirk in its life cycle it did not die but .lived on to locate and consume additional oil reserves. Or one might worry about ethical implications of the growth hormone mentioned above. What happens when not only parents of children suffering from dwarfism want access to the hormone, but also parents who want their children to grow up to be seven-foot basketball players? The levels and details of worry about the possible peril of genetic manipulation seem to be as impressive as are the levels and details of excitement about the promise. Does Christian faith suggest any clues which may be helpful in sorting out the promise and the peril, and in addressing the present situation?

A Christian Perspective

[16] That which binds Christian people together is their allegiance to Jesus Christ and their conviction that the Christian claim is true. When this commonality is secure, considerable diversities are possible in other matters, including judgments made on moral issues. In fact, Christians differ not only in specific judgments, but in broad perspectives within which those judgments are made. What follows is one Christian perspective. It is not assumed that every reader will agree. Rather, it is hoped that most readers will find the perspective worth considering and discussing.

[17] To the question "What does the church have to do with genetic manipulation?" some Christians maintain that the answer is, "Nothing?" Christianity is, they say, a religion for personal salvation or for the preservation of eternal values. Others maintain that there is a simple and direct line from Christian commitment to a given position on such matters. They say, opposing genetic manipulation, that we ought not to "play God" or, favoring it, that God has given human beings "dominion" over the creation.

[18] Contrary to both of these extremes, the perspective described here is that Christianity provides along with the word of the Gospel some materials from which tentative conclusions can be drawn about the nature of reality and of history, and that these conclusions can legitimately be used to work at decisions regarding new technologies. In this case, there is no simple and direct move from the Bible to a position regarding genetic manipulation. There are, however, implications of biblical faith which may help to inform the response of Christian people to the ethical issues

raised by the genetic manipulation debate. The following are five such implications.

[19] 1. The Christian outlook on reality and history cannot be adequately summed up as either optimism or pessimism but if a choice is to be made, the church must stand with the optimists.

[20] To say that Christians are either optimists or pessimists is much too simple. The prophetic motif of salvation in and through historical process, and the apocalyptic motif of salvation crashing in from outside of history are intertwined in the biblical documents, and each must be qualified by the other. The prophetic does dominate the apocalyptic, however, and that means that hope for the history of this world characterizes the Christian perspective on life.

[21] Hope excludes naiveté, invites participation, and encourages the thoughtful directing of those social and scientific processes over which we have some control. Christians have a great stake in the future. If a new procedure such as genetic manipulation appears to be full of promise, the tendency ought to be toward investigating its possibilities. A negative judgment ought not to be made prematurely.

[22] 2. Because the outlook of the church is characteristically full of hope, its expectations of the future ought to, and often do, feed back into the making of current decisions.

[23] There are those who think that ethics has to do only with unattainable ideals, such as perfect love, toward which people should constantly strive. If this were the case, the Christian life would have more to do with an ideal world than with the real world. Hope, however, is a Bibilical motif which has to do with material reality, with the resurrection *of the body*, with a new heaven and *a new earth*, with the redemption of *all things*. Christians know that God's future kingly rule has already broken in and is operative in this world. New tools for dealing with nature may be means by which God is using us to work at bringing back the whole created order into line with God's own purpose. The Christian is *inclined*, therefore, to underscore the promise rather than the peril of new discoveries.

[24] 3. For the Christian who operates from a stance of hopefulness, believing that God is getting God's work done through human history and through the history of nature, the inclination will be to place the burden of proof on those who oppose a given type of scientific research.

[25] If the potential benefits of genetic manipulation were very few and small, and the calculated risks very many and great, it would not make sense to consider supporting the technology. Since the potential benefits are awesome, and since to date, at least, it has proved possible to regulate procedures and to control possible hazards, it seems singularly strange that some Christians apparently think that their Christian commitments demand that they oppose the entire enterprise. On the contrary, the drive of Christianity toward the future redemption of all things would

seem to suggest that those who oppose the procedure be asked to present solid reasons for that opposition.

[26] 4. Since Christian faith is tied to the passing on of information rather than to the repetition of an inspiration, the church will always have a special interest in the acquisition, interpretation, and dissemination of knowledge.

[27] Christian faith is based not on "spiritual experience" but on Jesus of Nazareth who was born when Quirinius was governor of Syria and who suffered under Pontius Pilate. That orientation to facts, to data, to information, permeates everything that Christianity is about and that Christians believe and do. There ought to be, then, a tendency toward affirmation of those who seek to discover the facts about God's creation and the mysteries of how it works. Participation in the management of the creation is something which Christians accept as both gift and responsibility.

[28] 5. Because of its confidence in the redemptive possibilities of human activity, the church will tend to think that regulation of genetic manipulation is possible because of its awareness of the demonic potential of human activity, it will insist that regulation is necessary.

[29] Christian responses to complex moral issues are rarely either direct or simple. When one takes into consideration both the present situation in genetic manipulation and the promise and peril of this new technology, neither absolute affirmation nor absolute negation seems to be appropriate. As with any new scientific development, the assimilation of this new ability to direct the processes of nature will take time and care. There will be continuing work on regulation as well as on research. The question for the church is whether it will choose to be an informed participant in these developments.

[30] The church has no right to expect to be heard automatically, as though its authority is somehow self-evident. However, because church people know and proclaim Jesus Christ who is Lord of all, the church will - if it is true to its Lord and to itself - speak with concern and passion about those things which have been learned regarding this creation, and about those things which are yet to be learned, about those things which have been done and those things yet to be done. And from time to time the world will recognize in the voice of the church an authentic and helpful word.