

## MORAL PROBLEMS ARISING FROM MAN'S INTERVENTION IN NATURE

One major aspect of the history of the human race on this earth is the story of the impact of man upon his environment. Man has manipulated natural things to fashion shelter and clothing and food for himself. By building dams and by excavating canals, he has altered the course of nature's flow. He has felt free to manipulate both plants and animals. He has not hesitated to use synthetic fertilizers, hybrid corn and pesticides like DDT. His dominion over animals is exercised in improving the breed of thoroughbreds or in the wholesale destruction of pests. In 1950, for example, Australians inoculated rabbits with the virus disease, infectious myxomatosis; over 400 million rabbits, 90% of the rabbit population of their land, were destroyed within two years. Convinced that the whole world—mineral, vegetable and animal—is perfectible, man has turned his intervening hand upon himself. By surgery, synthetic vitamins and antibiotics, he doctors the human body. By the discipline of learning, by the cultivation of virtues and the habit of prayer, and more recently, by psychiatric counselling, he molds the human spirit. A large number of such prosaic interventions have come to be accepted as a matter of course.

The modern revolution in biology has widened the limits of the possible in man's manipulation of creation. It is intended here to give an account of some of the proposed interventions which would have a direct effect on man himself, as a species and as an individual.

A—In 1908 Sir Archibold Garrod launched the investigation of inherited diseases. He called them inborn errors of metabolism. In some of these, the precise chemical nature of the lesion is now known. For example, in sickle cell anemia, a disease which causes red blood cells to lose their normal shape and lowers the efficiency of oxygen transport to the tissues, it is known that one unit (an amino acid) out of 280 has been misplaced. Moreover, because of the genetic code breakthrough of 1961, one can now trace the chemical lesion

of the red blood cell to the exact chemical locus on the corresponding gene. If a means is found to produce a chemical change at that one site on the gene, it may be possible to eliminate for all posterity the inherited disease of sickle cell anemia.

B—Jacques Loeb has been called, with tongue in cheek, the “father of parthenogenesis.” At the turn of the century, he discovered that fertilization of the eggs of many lower animals can occur without sperm. Heat, cold or simple chemicals (e.g.,  $MgCl_2$ , magnesium chloride) can replace sperm as the agent of fertilization. The realization of this possibility in man seems remote. However, research into the molecular events in the process of fertilization has already achieved a successful method of overcoming certain kinds of human male sterility. Some male sperm fluid lacks an enzyme required for the entrance of healthy sperm into the egg. The enzyme is called invasine (or hyaluronidase) because it prepares the egg for invasion by the sperm. If the enzyme is deficient in a man’s sperm fluid, fertilization is impeded. The required activity can be supplied, however, by the corresponding enzyme prepared from bull testes. With the aid of the enzyme from bull, the healthy male human sperm can achieve fertilization.

C—In 1932, Huxley’s *Brave New World* envisioned a system of ectogenesis, the production of infants outside the womb. In a flight of shocking fancy, he described a “Central Hatching and Conditioning Center,” using assembly-line techniques, where isolated sex organs, ovaries and testes, turn out eggs and sperm. These are selectively combined, bottled and incubated under rigid quality control for 267 days until, at term, infants are decanted. The remarkably uniform products of the “Center” would celebrate decantation days, not birthdays, and “mother” would be an impolite word.

Three decades later, Huxley’s scheme seems less fantastic. Biologists have found ways of keeping organs alive and functioning outside the organism. By such techniques, called tissue culture, an isolated cow’s udder can give milk long after separation from the cow. Just a few months ago, the press carried reports of isolated monkey brains which were able to receive (and perhaps to correlate) nerve impulses, long after the rest of the monkey had been cut away.

D—There is significant promotion in scientific circles of the idea that sperm banks be established for the furtherance of human evolution by voluntary choice of germ plasm. Hermann J. Muller, who won the Nobel Prize in Medicine (1946) for his work on the effects of radiation on genetics, has frequently proposed this modern eugenic method. Human sperm can be preserved indefinitely in a deep-frozen, glycerinized condition, while remaining viable for use in artificial insemination at any time. Dr. Muller points out the usefulness of this practice in the case of incompatibility of blood antigens (Rh factor) or in the case of exposure to radiation (and possible genetic damage) through atomic industry, war, space flight or old age. He says:

Thereby a salutary separation would be effected between three functions that often have conflicting needs today. There are, first, the choice of a conjugal partner; this should be determined primarily by sexual love, companionability, and compatible mentality and interests. Second, there is the determination of the size of the family; this should depend largely on the degree of parental love that the partners have, and on how successfully they can express it. Third, there is the promotion of genetic quality, both in general and in given particulars; these qualities are often very little connected with the first two kinds of specifications. By thus freeing these three major functions from each other, all of them can be far better fulfilled (*Science*, 134, 643-649, 1961).

E—The chemical control of behavior has been under study for a number of years. A variety of simple chemicals have been implicated. Serotonin is a psychic energizer; in sufficient concentration it makes for euphoria. Serotonin antagonists, like reserpine and Miltown, are tranquilizers. LSD (lysergic acid diethylamide), one of the most potent substances known, can cause hallucinations if as little as a few millionths of a gram is taken. RNA (ribonucleic acids) may be involved in the molecular mechanism of memory control as experiments with worms (planaria) indicate.

In a series of experiments with rats, A. E. Fisher (*Scientific American*, June 1964) was able to induce certain behavior patterns by applying chemicals to localized cells within the brain. Steroid

hormones were found to act selectively at specific sites in the brain. A male rat, for example, when treated with testosterone, a male sex hormone, at one site in the brain, exhibited maternal behavior. The treated rat would gather shavings to build a nest and then carry rat pups to the nest. (A normal male rat would be hostile to pups.) The same chemical applied at another site in the brain induced male sexual behavior in both male and female rats. Rats can be made to drink by applying acetylcholine to certain brain cells. They can be made to eat by applying noradrenalin to other brain cells.

F—Jean Rostand (in *Can Man Be Modified?*) suggests that superthought may be possible for man, perhaps by the development of superbrains. In the embryo, the normal human brain undergoes 33 cell divisions, resulting in its full complement of adult pyramidal brain cells. If only one more cell division could be induced, the 34th, the number of cells would double and our mental ability might increase.

G—Enzymologists are constantly learning more about the control of enzymes and enzyme systems. It is quite common to regulate the rate of enzyme reactions in the test tube. In the same way, enzyme reactions in the body can be speeded up by the ingestion of vitamins. If such control could be applied specifically to the enzyme system which produces skin coloration (melanins), the day may come when one will choose his own skin color. (And only his enzymologist will know for sure what his original color had been.)

The foregoing selection of examples may shed some light on the dimensions of the possible interventions of man in nature. Experiments performed on animals may eventually be applied to man. What follows now is an attempt to approach the problems in moral terms.

The limits of the permissible have traditionally been set from the concept of nature. That is morally good which is in conformity with nature. That is morally evil which is not in conformity with nature. Human nature, considered completely and in the concrete, is the proximate norm of morality. Nature is revered as sacred because it is a sign of God's intentions. And nature in this context has generally been assumed to be immutable.

But the traditional view, so briefly stated, is an inadequate guide

to moral decisions. Qualifications are offered in the following five points.

1. Nature as a norm ought not to be confused with nature as the object of man's manipulation. On the one hand, one can look to nature for the model, ideal and norm of action. But on the other hand, there is a sense in which it is true that man cannot be satisfied with nature. Far from being immoral, it is, in fact, his vocation to frustrate nature. Man is so commissioned by God himself. "And God blessed them saying, increase and multiply and fill the earth and subdue it, and rule over the fishes of the sea and the fowl of the air and all living creatures that move upon the earth" (Genesis 1, 28). Man's manipulation of the physical substructure of his own nature is beyond the terms of this commission, but it does not seem out of harmony with the spirit of the revealed role of man on this earth.

The conflict between nature as a norm and nature as the object of manipulation may be more apparent than real. The two concepts are not mutually exclusive. Nature in the former sense is understood as human nature taken as a whole, something which concretely reflects the essence of God, and thus is a proximate norm of morality. Nature in the latter sense means whatever God has called into being, creation in its present imperfect state, perfectible by the action of men in the plan of divine providence.

2. The conflict between nature as a norm and nature as the object of manipulation may be resolvable in theory, but it can be quite troublesome in practice. There are those who reverence nature as sacred in the plan of God, a thing to be left undisturbed as far as possible. And there are those who are eager to manipulate nature to exercise God-given talent. In the balancing of these opposite tendencies, each individual will bring his own prejudices, depending on his unique background. When cases of this sort have arisen in the past, popular judgment ("the common consent of mankind") has been quite fickle. Often, what is natural is what one is used to; what is unnatural is what is unusual, foreign and strange. Many routine modern practices (immunization by injecting horse proteins or the use of anesthetics, for example) once seemed strange and unnatural. No doubt, in the future, some things now considered most strange or

even shocking will appear quite "natural" when they have become commonplace.

3. The question of what is natural to man should not be reduced to mere biologism. A biological process has dignity in itself, but it is in a special sense sacred when it takes place in a human person. To know what is good for man, one must see him in the total context of his place in divine providence. It would be most strange if our moral horizon were limited by the contours of an individual organ. Even in a biological sense, what is good for one limited functional system in man may not be good for the total organism. The paradox of galactosemia may apply here. There are few things more transparently natural for man than mother's milk. Yet, in the case of a galactosemic infant, mother's milk is a most lethal food. In fact, the only requirement for infant health in this case is a diet free of lactose and galactose, the nutrient sugars contained in mother's milk.

4. The author of nature has made a creation which is in process. Things change and man knows them in their changeableness. Changeableness is a constitutive element in the nature of things. Yet it is completely compatible with God's immutable design. There is no reason to require of God's providence that it leave things as they are. The nature of things is a changing sign of the unchanging plan of God.

Man's understanding of nature in general and of his own human nature is changing. More than this, his human nature itself is changing. Man, like the animals, is subject to a measurable rate of genetic mutation. He has a growing consciousness of the universe in flux. The will of God, it seems to me, can be seen not only in the static view of the current framework of physical reality, but, even more reliably, in man's intelligent ambition for progressive change. The statement of what is natural for man cannot neglect his natural ingenuity. Man's mind is not an unnatural talent. If man's nature will change willy-nilly, the question becomes: to what extent ought man adjust the rate of change and the direction of change?

5. There are those who are not content to say that human nature, even taken as whole, is the norm of morality. For them, man is not merely the highest in the order of created nature, but he is a

person. A person has conscious experience of himself and of others. A personal being is a higher reality who cannot be explained in terms simply of lower natures. In the person of man, and in his interpersonal relationships, are to be found the norms of morality intended by God.

The thrust of investigations in the sciences today seems to indicate that conscious control of the genetic inheritance of mankind will be possible in the future. Will human interference in this area be justified? Three general answers may be given to the question.

1. *An absolute yes.* Man must actively manipulate his genetic endowment in every way possible in order to achieve utopia. This is the view espoused by some psychologists who believe that our bodies and their emotions are out of date, still suited for survival in the jungle. We must bring our bodies up to date by drastic genetic changes, if necessary, so that we will win pleasure and reinforcement from intellectual pursuits, rather than from food, sex and the desire to hurt our neighbor.

2. *An absolute no.* Attempts to breed men are strictly off limits. Man must not tinker with future generations. Any other approach means taking a chance, with the risks too great to be tolerated. A good number of experimental scientists are themselves of this persuasion.

3. *A middle course.* Genetic intervention is accepted in principle, but each case is to be decided on its own merits. One must be reasonably certain that the proposed genetic change is good. Risk to the species must be entirely excluded. Risk to the individual must be minimal, that is, of the same order of magnitude as ordinary acceptable risks. Trials on animals must have advanced to the stage where there is solid scientific evidence that the experimenter can predict the outcome.

The absolute "yes" brings with it the danger of genetic control by an unscrupulous Hitler, or at least by a "committee on human engineering." Who will decide precisely what traits are a desired improvement? The absolute "no" does not seem to be the answer either. There may be cases when man would have no right to refuse intervention. If a chemical "bullet" were available to go directly to

the gene locus to affect inheritance in a predicted way, could one refuse to correct a defective gene, to cure an inherited disease or to provide a positive, planned genetic change needed for survival?

There is a temptation to put off such questions in the words of the British colonial soldier who reported that "the situation is desperate . . . but not serious." However, the near future may witness a sharp increase in practical applications along these lines. For the present, detailed and definitive judgments would still be premature. All the facts are not yet in. Facile answers of today may not survive the deeper insights of a future age. But it would seem to be advisable now to establish categories in a tentative way, to search out guidelines which avoid the hasty reaction of prejudice against all things new. We must be slow to accept anything so momentous as genetic control, but open to future developments.

OWEN W. GARRIGAN,  
*Seton Hall University*  
*South Orange, New Jersey*