

# The Dartmouth Convocation on Great Issues of Conscience in Modern Medicine

September 8, 9 and 10, 1960

SELECTIONS FROM THE ADDRESSES AND PANEL DISCUSSIONS OF THE CONVOCATION

## Opening Assembly

*Chairman:* JOHN SLOAN DICKEY  
PRESIDENT OF DARTMOUTH COLLEGE

THREE years ago this September, Dartmouth held her first Great Issues Convocation. The theme of that gathering focused on the problems of public policy within the Anglo-Canadian-American community. The occasion, which fell on the tenth anniversary of the Great Issues Course in the Dartmouth curriculum, marked the launching of the College's campaign to raise \$17 million as the first major step toward fulfilling the 1969 Bicentennial aim of pre-eminence in liberal learning — from its purpose to its perpetuation. . . . The theme of this second Great Issues Convocation may at first seem narrower and more professionally limited than the international relations of the ACA community, and, in a sense, it is. But from the knowledge of these participants that I have, I suspect that 48 hours from now most of us will feel so stretched out intellectually, that keeping the peace will seem dull, compared with the challenge of getting up early enough to make man healthy, wealthy and wise. I am leaving the "early to bed" aspect of that perception, Dr. Dubos, for further pondering by the learned Panel.

Indeed, when all has been said here, and much more has been done elsewhere in all necessary things, may we well not discover that peace, and health, and wealth and wisdom are, after all, one? . . .

Before we come face to face with some of these issues, a word or two ought to be said about modern medicine, because if it were not for modern medicine, and especially perhaps for modern science, on which modern medicine rests, many of these issues and, come to think of it, many of us simply would not exist — a solution which has at least the superficial appeal of simplicity.

The medicine of which we speak rests squarely on the twin pillars of teaching and research. At this Convocation our attention is mainly centered on the Medical School — on all medical schools — as the indispensable agency for joining teaching and research. But here at Dartmouth, especially, let us not forget that medicine is for man and not vice versa. Any man who aspires to minister greatly to any human ill, or need, must be more than merely a skilled professional. Liberal

learning is that transcending more, which however it is acquired, gives all callings the possibility of greatness.

*Speaker:* S. MARSH TENNEY, M.D.  
DEAN OF DARTMOUTH MEDICAL SCHOOL

THERE'S a rather remarkable, and to me prophetic, passage that appears as a digression in one of the tragedies of Sophocles. I think it betrays that even then there must have been great concern, and certainly great interest, in the extensive range of human science. The passage begins: "Wonders are many but there is no wonder wilder than man — only against Death he has fought in vain, and yet, many a mortal illness he has conquered."

In the almost two thousand years since this passage was written the history of medicine has recorded a remarkable list of achievements against man's suffering and disease. And more recently the growth of medical knowledge and its application have accelerated enormously, due in no small part to the evolution of medicine as a scientific discipline. Historically, medicine was the first profession to join firmly on to the natural sciences, but together with biology it has only recently progressed from classification and dissection into an era more deeply concerned with quantity and circumstance. Though its foundations have become more rational, its practice — that supreme welding of science and humanism — is said to have become more remote and indifferent to human values, and once again medicine has been forced to remind itself that it is often the human factors that are determinant. Now, in the broader context, scientific medicine shares with science as a whole not only the glory of achievement but *all* those problems that are consequent to its deep permeation of our culture. In our attempt to interpret the effect of this phenomenon we have been slow to appreciate that there is a profound difference between what science is and what science does, a difference between its content and its exploitation.

Gillispie has written that "even now science continues to be what it was in Greece, conceptual thought mediating between consciousness and nature. But it is also something more. It has become determinate instead of simply speculative."

Still Bacon's dream of a scientific Utopia has not come to pass. And the reason for our disenchantment may be quite

simple. Science tells us what we can do — never what we should do. While science itself cannot be immoral, neither can it establish a morality. Its objective posture absolutely precludes competence in the realm of values. The popular tendency to equate scientific progress with ethical advance is as fallacious as were some of the early attempts to find morality in the law of evolution. In his allusion to this problem Loren Eiseley commented as follows: "The western scientific community, great though it is, has not concerned itself enough with the creation of better human beings, nor with self discipline. It has concentrated instead upon things, and assumed that the good life would follow. Therefore, it hungers for infinity. Outward in that infinity lies the Garden the sixteenth century voyagers did not find. We no longer call it the Garden. We are sophisticated men. We call it, vaguely, progress."

The purpose of this conference is to examine the issues of conscience in that "progress." The objective is not simply the question of the survival or the extinction of man. But it is, *what kind of survival? A future of what nature?*

"Thus with his wisdom, subtle past foretelling, man wins to joy or sorrow."

*Speaker:* RENÉ J. DUBOS

MEMBER AND PROFESSOR OF THE ROCKEFELLER  
INSTITUTE; CHAIRMAN OF THE CONVOCATION

IT is sophistic that science, I believe Dean Tenney said, "tells us what we can do, but never tells us what we should do." I think more precisely — or I think it is more precise because this is what I had intended to say — "Science tells us *how* to do things, but never tells us *what* to do among all things that *could* be done." And this will be the topic of my discussion tonight among all the things that could be done.

Now in the past this difficulty of selecting among all the things that could be done was not a great difficulty, because there were so few things that could be done. In reality, it is only for two or three decades that scientific medicine has made available to us techniques sufficiently powerful to affect the health of the individual and the health of the community. So that, in reality, there was very little choice. But now, and much more in the near future, there will be endless things that we know how to do.

At first thought, you would say, "So much the better. This brings us nearer to medical Utopia." In reality, however, the greatest difficulty in the achievement of health in the modern world will not come from learning more things and learning to handle a little better what we know, but, rather, from all sorts of social limitations that would prevent us from applying the knowledge that we have. These social limitations cannot help bringing to the medical community extremely difficult problems of conscience in the near future.

What are the limitations which will make it difficult for us to decide how we can use medical science to minister to the ills of mankind? Let me first start with the easiest of all, the one that seems to present no difficulty to understanding — namely, the problems of disease in the underprivileged part of the world. I think there is not one of us in medical science who is not aware of the fact that in 90 per cent of the total world the problems of disease can be traced either to inadequate nutrition or to problems of infection. Now these happen to be two fields in which our theoretical and practical knowledge is enormous. We really *know* what should be done to control the problem of nutrition, to control the problem of infection, but in reality we cannot do what we know how to do for obvious economic limitations. Clearly, there is no

need of discussing scientific problems of nutrition in the underprivileged part of the world. The primary need is enough food of adequate composition and presented in a form which is socially acceptable. Likewise, there is no need to go into deep problems of study of infectious diseases, because what we first have to do is apply the practices of sanitation and to raise the standard of living, which we *know* would solve these problems. So that clearly what is needed here is an economic revolution without which medical science cannot apply what it has worked out.

Now you may say, "Well, these problems, interesting as they are, do not apply to us, because we are a wealthy community, we are medically well-informed, we are socially minded, we are open to change." But in reality we too are prisoners of habit and of social tensions which prevent us from applying medical science. The examples that I shall select to illustrate this point of view are trivial, known to all of you, but I believe this is their very merit, because they will illustrate for you, I hope, the kind of paralysis that can affect the community as a whole in front of problems that are recognized as actions desired by all but for which there are conflicting interests.

First, let me briefly consider one practical problem in which action is prevented by the fact that as a group we are not emotionally prepared to act toward problems that are remote in time. The obvious problem is that of air pollution, which will be discussed at greater length tomorrow. Now, I think we know a great deal about not only the causing of air pollution, the chemical components of it, but also its effects on humans. Well, now, how do you — the public — react to that problem? What disturbs you is that your eyes smart, that you don't feel very comfortable, but that's about all. In reality, the problems of air pollution are such that they affect the health, not necessarily this year, next year, or in ten years, but certainly your health — the health of the community — in twenty years. So, in reality, the kinds of study that have to be carried out are not those that concern your comfort of today, but they are those which concern your health and that of your children in twenty years. Thus it is extremely difficult to enlist public interest, and even the interest of scientists, in such long-range problems. . . . And I think this points to one of the very great problems of medical science; namely, that one can get public support — your support — only if one can point to something in which you, today, are interested, but it is extremely difficult to enlist your support for something which is vaguely in the future.

There is no question, of course, that the problems of air pollution could be solved if we were to redesign automobile engines — all the combustion engines — change the design of smoke stacks, reroute some of your traffic. But, in reality, are you as a community willing to accept the inconveniences, the economic cost, that would have to be accepted, if you want to apply these social, practical solutions of which I speak? What it comes to is this: how much of economic prosperity and of conveniences of life is society — or are you — willing to sacrifice to prevent lung cancer, emphysema, chronic bronchitis, that will become apparent only in the future? In other words: how can we balance the value of human suffering that will occur in some undetermined future against the effectiveness of the socio-economic performance of today? . . .

Another example to relate economic problems to those problems of conscience in medicine has to do with food additives. Agriculture and food-technology are more and more using a very large range of chemical compounds. I think this trend will continue — indeed, it will increase. Moreover, I think it will be perfectly impossible to test all these substances

for their possible toxicity — especially for their long-range toxicity. It would be far too costly, indeed take far too much time, to test all the substances that have been proven or will be proven to be useful in agriculture and in technology. So it seems to me that you as a community will probably be willing to take a few chances — to take many chances — for the sake of lower costs of food production.

All these examples show what is going to be before you. It is not a lack of knowledge of dangers, but the need for a decision as to whether you are willing to take certain risks.

Now, let me move to another related aspect of this problem — namely, the need to choose between different kinds of medical help. More and more rapidly, advances in fundamental knowledge are paving the way for practical methods applicable to the prevention and treatment of disease, but as you may not know as well as all of us who are in this game know, to work out any one of these applications (even when the principle is clear in our mind) is extremely costly — not so much costly in money as costly in terms of the amount of specialized skill that it demands — medical skills, technical skills. So that even if funds were available to deal with *all* the problems that we know we could solve, there are not enough scientists — and there *cannot be* enough scientists to solve them all at the same time.

Now, in case this is vague, let me try to make this matter of choice clear with an example taken from my own profession — the production of vaccine against virus infections. During the past ten years there have been developed wonderful techniques for the production of most any kind — probably any kind — of virus on a large scale, and for the development of vaccine for most any virus — I suspect, any virus infection. So that, theoretically, the problem is no longer the scientific one of *how* to produce vaccine. This is just a question of development. We know how it could be done. The real problem is a social one — of deciding *which* vaccine should be produced. There is a question of choice, and the choice



is the community's, because it involves a decision as to what kind of a disease you, as a community, think it is most desirable to be protected against. This is a very difficult problem from the medical point of view, but it's an even more difficult problem from the social point of view. For example: should emphasis be placed on diseases which are fatal, or crippling, but affect only a small number of individuals — like poliomyelitis, for example; or should priority be given to ailments of the upper respiratory tract, rather mild and self-limited, but of enormous economic importance because they affect a large percentage of the population and disrupt industrial production and other national activities? . . .

Now, I shall approach one of the most difficult problems of medical ethics which we are likely to encounter within the next decade. As all of us know, there are now many techniques available for postponing death in every age group and for almost any type of disease. For example, we can save the lives of children suffering from almost any type of congenital or hereditary defects, and there is no question, of course, that to save such a life is a humane act and a source of professional gratification, but it is a sorry fact that in many cases saving the life of an individual suffering from hereditary defects has long-range consequences, which will then magnify medical problems for the following generation.

Consider if you will the problem that each and every one of us will encounter in his personal life — namely, prolong-

ing the life of aged and ailing persons. This also is a source of great humane gratification, but it must be weighed against the consequences that it entails for the individual himself, and even more for the community of which the individual is a part. These ethical difficulties are not new. They have always been part of medical practice, but in the past they were not compelling because there were so few things that could be done. But in my opinion this kind of difficulty is going to become one that the physician, and the individual, is bound to experience many times in the course of his own life. To what extent can we afford to prolong biological life in individuals who cannot derive either profit or pleasure from existence, and whose survival creates painful burdens for the community?

Let me state here a fact that I shall restate later because I regard it as so important. That kind of decision is not a decision for the physician. In our society our ethics dictate that it is the duty of the physician to save and prolong life — whatever the cost, whatever the consequences. The physician must act according to the ethics of the society of which he is a part, so that it will be for society to redefine these ethics, if the problem becomes one that society is no longer willing or able to carry. . . .

Let me, however, come to a simpler one: all our medical and social structure is built on the assumption that we must make life as pleasant and as easy as possible for everyone, especially for children. There is no doubt, of course, that by so doing we have removed a great deal of the hardships of the past and have made, now and then, for a happier life. But there is no doubt in my opinion that by so doing we have been eliminating from our lives, and especially from the lives of our children, all the stimuli that in the past used to call into action all the adaptive potentialities of the individual, upon which depends his natural resistance to the strain and stresses of life. Here again, I believe that before long we will *have* to reconsider our ethics, having in view not only comfort of today, but preparing for the life of tomorrow. . . .

I realize that in all this discussion I have taken attitudes which in reality have been very painful for me. First, is the fact that I appear to deal with human life as if it were merchandise, the production and maintenance of which must be evaluated against economic costs and social conveniences, whereas I believe that human life has spiritual values that far transcend material considerations. I also seem to be pessimistic and to be skeptical as to the ability of mankind to overcome the dangers that prosperity and social advantage bring in their train. And yet, I know that mankind has experienced in the past many difficulties, far more and far greater than the present ones, and has taken them in its stride. And I seem to foster an empty intellectual attitude by expressing some doubt as to the effectiveness of certain scientific pursuits, whereas in reality I cannot possibly think of a retreat from reason and from science. So to try to clarify my situation, allow me to state once more my conviction.

And my conviction is that experimental and clinical science can solve the biological aspect of almost any medical problem, but that, in practically all cases, the situation would be very costly, especially in terms of specialized talent — and this will limit what we can do. While it is possible in theory to deal with all the new health problems that will be created by our rapidly changing social and technological order, many measures of control that are possible in theory will have to be neglected in practice, because of the limitations of economy and human resources. Hence, there will have to be choices and these choices are not to be made by physicians. These choices will have to be made by society as a whole, because they will involve judgment values.

# First Panel Discussion

## THE ISSUES OF MAN AND HIS ENVIRONMENT

Chairman: WARREN WEAVER

VICE PRESIDENT, THE ALFRED P. SLOAN FOUNDATION

THE purpose of this session of the Convocation is to consider certain problems posed to us by the new environment which man has been creating for himself, largely through science and technology. It is perhaps interesting for us to think for a moment as to why man is facing a new type of environmental problem at the present time.

We know that over long periods of time evolution adjusted man slowly to his environment and furnished for him a set of physiological and other properties which put him into reasonable balance with nature about him. This was a slow process. This was on the whole a painful process. The balance that was thus achieved was in a certain sense a rather low balance, in that man suffered a great deal from miseries, from malnutrition, from physical limitations, from premature death; but nevertheless he was in a reasonable balance with his environment. And then, over the last few hundred years, came Science. And over the last fifty years, in a mad rush — Science and Technology. And the result is that we now live under scientific and technological rates of change which are so rapid that they completely outstrip the mutation rate. We can no longer hope that evolution will succeed in keeping man in balance with his environment. And since we can no longer accomplish this with our genes, we have only one recourse — we must do it with our brain.

Now, let me just mention very briefly a few of the topics which come into play. I will simply mention the topics, because I know that my colleagues here on the panel are going to be discussing various of these. There is the problem of the adulteration of food and of other materials, cosmetics and so forth, of which man makes immediate personal use. There is the problem of air and water pollution, smoke, exhaust gases, pulverized automobile tires, commercial waste and so forth. There is the problem of smoking and lung cancer. There are the problems which we might call those of internal pollution — pollution inside the body — and rather curiously, medicine itself sometimes has dangerous relationship with some of these problems of internal pollution, when we have to make use of blood-transfusions and certain processes of immunization; perhaps in some problems of organ transplants. Then there are the problems connected with the fact that we have completely, in certain localities, upset the ecological balance of nature by spraying certain chemicals all over the landscape and by producing thereby resistant strains. And finally, we have the extremely important and worrisome problem caused by radiation — radiation which permeates the air, the soil, the plants, food, our bones and, worst of all, our germ cells. This comes from X-rays; it comes from fallouts; it comes from the background of natural radiation, from nuclear experimentation, nuclear power and from nuclear waste.

The first five of these problems represent things which, so to speak, we do to ourselves and this poses moral problems — this poses problems of conscience; but they are, I would maintain, of a different order of magnitude than the moral problems posed when we do things to our children, our children's children and their children, and, indeed, when we do things to the whole gene pool of the human race.

Now, I would like to raise just one general underlying problem of morality, which I hope may possibly come to the surface in connection with the discussions of my colleagues. And this I am going to call, for purposes of having a label,

“The Problem of Statistical Morality.” Let me explain very briefly what I mean by this. Most of the great world religions were formed at a time when man was living in a pastoral society; when his immediate family and his immediate neighbors almost completely limited his contact and his responsibility. I suppose the shepherd boy on the hills of Galilee did not have to worry about what harm he was doing to the black man in Africa, or the yellow man in the Orient, or the red man in North America, because there simply was no way in which he could either hurt or help them. But all of this is now vastly changed. We have so many ways nowadays in which we can help and hurt every individual on this planet.

The curious thing is that in our Western culture we have a very definite feeling that it's wicked to kill a man, and we also have a very definite prejudice against even permitting any one known specific individual to sacrifice his life for the common good. I believe it is true that even in warfare we do not permit an individual to go to certain death. We do not indulge in the kamikaze type of thing. On the other hand, we have to, in a great many circumstances, submit a lot of individuals to partial risk. It is wicked to kill a man, but when does it cease to be wicked to partly kill a man? Suppose the risk is only one in a million that an individual be seriously harmed. Most of us say: “I suspect I run that sort of risk every day — that isn't too serious.” But suppose that risk is applied to a million persons. Then you are statistically causing a death, and when that death occurs, it is a comfort to our conscience that we don't know *where* it occurred, or *when* it occurred. But that individual is just as dead as though we knew all about it. Suppose you reduce this risk to one in ten million. Well, then there is a school of thought that would say: “Am I to worry about a risk of one in ten million? Why, we run that risk when we perhaps climb into and out of the bath tub. Certainly, I can't worry about a risk of one in ten million!” But now apply that risk to all the three billion-odd people on this planet, and what is the statistical result of that? The result is that three hundred people are dead. They are dead at some comfortably unknown place and at some comfortably unknown time. But on whose conscience does that rest? Is that a problem of morality for our present civilization?

Well, I hope that as the discussion goes on my colleagues will remember that we now have, over and beyond this business of being our brother's keeper, and loving our neighbor as ourself — we have to remember that every individual on this planet has now become our brother and our conscience must encompass all of them.

Speaker: GEORGE B. KISTIAKOWSKY

SPECIAL ASSISTANT TO PRESIDENT EISENHOWER  
FOR SCIENCE AND TECHNOLOGY

A CENTURY or so ago human activities in the domain of science and technology were isolated into rather non-communicating areas. There was virtually no intellectual cross fertilization between, say, physics and biology. There also was virtually no interchange between physics or chemistry and engineering. In much the same way, medicine then was an activity which had only a loose connection to natural sciences and which grew from the belief that humans are uniquely different from everything else. In the intervening period, the boundaries between natural sciences have almost vanished, as is for instance evidenced by the popularity of so many new and hybrid technical disciplines: biophysics, molecular biology, atmospheric sciences, applied mathematics, cybernetics, materials research, basic engineering research, etc. The same period has also seen a major intellec-

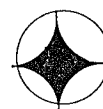
tual reorientation of medicine. Just as the engineering and technology of today are firmly rooted in basic research, mainly in the area of physical sciences, so the medicine of today derives much of its spectacular progress from basic research in the natural sciences. More and more, it seems, scientific knowledge of the inanimate world and of animate objects other than man, is being used to advance the medical knowledge of man. In other words, the basic scientific knowledge gained from research on man's environment is more and more being used to solve the practical problems of medical progress. I wonder if this means that changes in medical education are needed to provide a firmer grounding for the medical student in the physical sciences?

Observations of the characteristics of our national effort in areas of science and technology, other than the medical sciences, lead one to certain conclusions which might or might not be applicable to medicine. One of the most striking of these characteristics has been our nation's spectacular success in the advance of technology. Some ten to twenty years ago the realization that the progress of technology is heavily dependent upon the progress of basic scientific knowledge began to spread among our national planners and among many private citizens, both the philanthropists and those whose prime concern it was to further the growth of industrial corporations. The outcome of this realization produced a flourishing of basic research in this country which, measured in terms of its recent rate of growth and present status, has been without parallel in the world. But even in the face of the enormous and rapid growth of basic science, the demands of our expanding technology are outstripping the supply of new ideas and new basic knowledge that comes from science. This can be costly to us in time, in human resources, and in money, because some of our technological development tends to be just an engineering elaboration of what already exists, be it the annual changes in automobile models, or the development of some weapons systems. In many such cases the shortage of new principles is compensated for by an ever greater degree of complexity and redundancy. It is this sort of thing that certainly induces argument in favor of the thesis that far greater effort proportionately should now be put into basic research, if the healthy future growth of technology is to be assured.

When it comes to an evaluation of the proper balance between basic scientific research, applied medical research and what might properly be called practical medical developments — comprising together what is usually called medical research — I am certainly not qualified to render a judgment. In the last few decades, due to private and government efforts, very rapid progress in medicine has been achieved. Much of it can be traced to basic research in the natural sciences, such as the discoveries of antibiotics, of X-rays, or the synthesis of DDT so important in preventive medicine. Other achievements are due to a more empirical approach involving large-scale projects, such as the testing of tens of thousands of new compounds synthesized in chemical laboratories for their possible physiological activity. Anti-malarial drugs, for instance, were the outcome of such an effort. Have we reached the right balance between basic research in natural sciences and the usually more costly group efforts directed at the cure of specific diseases? The former may, but then may not, provide new principles for medical applications. The latter, if unsuccessful, are certainly less profitable in the acquisition of new scientific knowledge. I hear some say that we do not have enough basic research and that its strengthening as well as an increased effort to train young scientists in relevant fields of science are our major tasks for today and tomorrow. Others assert that this is too slow an approach and

that well-coordinated mass attacks on particular diseases are the highest priority jobs. Still others assert that both types of effort should be pushed harder, but this may demand great safeguards against mutual interference. Which way, then, should we move?

My second problem area is the effect of technological developments on human environment and the conflict that this might create between the health of the individual and the "welfare" of society. The problem is probably more a social and ethical one than a scientific one. However, let me illustrate the problem by some concrete examples. The human race developed — and rather successfully I would say — in an environment of ionizing radiation from cosmic rays and from naturally present radioactive substances. Yet we know that exposure to higher levels of such radiation causes somatic damage and undesirable genetic effects. It must also be accepted that the development of nuclear power and of the industrial uses of radioactive substances are unavoidably accompanied by exposure to some additional radiation. A few months ago the President approved sound recommendations of the Federal Radiation Council on permissible exposure to man-made radiation. These exposures are comparable to the level of natural background radiation, far lower than the levels which have been shown in the laboratory to cause damage, but they do represent an increase in total exposure.



Therefore, we have no scientific proof that the undesirable biological effects of radiation will not statistically be slightly increased. On the other hand, zero exposure level of man-made radiation would mean an end to the uses of nuclear energy, and would result in serious consequences to national security as well as to valuable technological developments.

A similar situation exists in connection with the use of various chemicals in the food production industry. For centuries humans have consumed table salt which usually contains traces of radium, a known carcinogen. From time immemorial lamb meat has been a part of our diet and yet it frequently contains traces of selenium, another carcinogen when ingested in much larger amounts. Should we then insist on mathematically zero concentration of food additives if administration of massive doses in animal experiments has produced an increased incidence of tumors? The consequences of complete prohibition might not be beneficial to society on balance, but to arrive at such an evaluation is far from simple. Thus a hormone, diethylstilbestrol, is fed to cattle to speed growth. Federal regulations now in force restrict its use in such a way that no diethylstilbestrol can be detected in beef with the available analytical techniques, but it may still be present in trace amounts. Were its use prohibited altogether, and the present beef consumption maintained, the cattle industry would have to raise some one-third million additional head. Moreover, beef prices would likely rise and there might be some attendant dietary effects if consumption were curtailed. There also might be a rise in the number of industrial accidents to workers handling the additional cattle. Where, then, is the happy medium?

A distinguished panel of experts whom I brought together at the President's direction struggled with the problem of food additives. It concluded that we know too little about harmful effects of trace additives and will need to know much more if we are to make scientifically valid decisions.

In a totalitarian society which subordinates the welfare of the individual to the abstract concept of the welfare of society as a whole, the answer to the questions I raised would be easy to find. To us, summary decision is not acceptable and so we seek solutions which necessarily are compounded of ethical, social and scientific considerations. Such solutions are based on the rule of reason, as for example in the food additives problem, for they must indeed take account of the "issues of conscience" inherent to the free society.

*Speaker:* WALSH McDERMOTT

LIVINGSTON FARRAND PROFESSOR OF PUBLIC HEALTH,  
CORNELL UNIVERSITY MEDICAL COLLEGE

A FAMILIAR anecdote in our folklore of vulgarisms is the one about the guest inquiring where to dump the garbage and being told: "Oh, we just kick it around until it gets lost!" However practicable this might be for hermits, the habit has obvious disadvantages for any larger social group. Yet as whole nations today we seem to be trying to do just that — to kick around the extensive chemical refuse of our highly industrialized society in the innocent hope that somehow or other it will get lost!

As we have heard from our Chairman and from Dr. Kistiakowsky, the sad reality is that our chemical garbage is not getting lost at all, but is lingering intimately with us, polluting the air we breathe, the water we drink and, to some extent, the food we eat. This problem of our environment and its pollution is certainly an important source of economic loss to our society. What is more, it contributes significantly to the erosion of our spirit, as our surroundings become covered with drabness; and at its worst, this continuous environmental defilement can represent a serious menace to our health. A moment's reflection yields the truth that health is *not* to be considered as the absence of disease. For all living things are diseased almost constantly — our front lawns, our plants, the lower animals and ourselves. In reality what we call health signifies the degree to which a person can operate effectively within the particular circumstances of his heredity and the particular environment in which he lives. As the environment changes, so do the problems in health.

This has always been the case, but in bygone days, when environmental pollution meant a dead horse under the front parlor window, it could hardly escape notice. Today we cannot see or even smell ionizing radiation, thermonuclear radioactive fallout; we cannot see or smell the detergents in our water, or the penicillin in our milk. Even the most dangerous components of smog are not the visible ones but the invisible chemical molecules. And, if today's most serious environmental defilements are invisible, they are likewise inescapable. No longer can one move away from the railroad track and search for a better physical environment in another part of town. Indeed, it has been estimated that by the end of this decade 75 per cent of the people in the United States will be huddled together on 10 per cent of the land area. For air, these 150 million people will have the air over 10 per cent of our large country. For water, they will have the water beneath the surface and what can be brought into that area. You may say that air moves around, but it does not *always* move around and when it completely stops — just for a few days over a heavily populated area — the consequences can be very serious indeed.

Of all the factors that characterize our situation today, it is this inescapability of modern-style environmental contamination that gives us the greatest concern. But this leads directly into one of the issues of conscience mentioned by Dr. Dubos

last evening, and alluded to by Dr. Weaver — namely, the possible serious consequences not, Dr. Weaver, in one's grandchildren but twenty or thirty years from now in today's children. What is happening to our air is such a complete example of this point with its accompanying major issue of conscience, that I propose to concentrate on that in these remarks.

What is the source of the chemicals that pollute our air? As with any other smoke, the chemicals are thrown into the air as a result of burning. In our daily lives we are constantly involved in the process of burning. . . . When something is burned completely it ends up oxygen and carbon dioxide which would be quite harmless in the concentration involved. In general, however, our gasoline and other fuels and other debris are only partially consumed in the sense of being reduced to carbon dioxide and water. Instead, large quantities of intermediate compounds are formed and thrown off into the air. Some of these materials are visible as soot, which on the whole is relatively harmless, and others are the chemical molecules that are invisible.

It is not always realized that both the chemicals and the meteorologic forces involved in London smog and Los Angeles smog are quite different. In London it is sulphur compounds from the burning of soft coal and it is the London fog moving in and trapping the air, keeping it from cleansing itself, that causes the trouble. In Los Angeles it is the action of the strong sunlight itself on invisible chemicals known as hydrocarbons that are emitted from the tail-pipes of our automobiles, and the meteorologic condition is the so-called thermal inversion, where a layer of warm air happens to get on top of the cold air, and hence pins the air down. So it is fog in London and sun in southern California that end up in the same way. . . .

Both types of smog are highly irritating to our eyes and the delicate membranes of our nose; both can be shown to damage crops and both are injurious to small animals. If something were happening to our people from the pollution of our air, it presumably would be happening to relatively large numbers of people at once. By the same token, it would have to be something that could occur undramatically in each individual person, otherwise it could not fail to get public notice like an epidemic of poliomyelitis. Knowing that air pollutants are highly irritating to the eyes and the delicate membranes of the nose, it hardly took amazing medical detectives to start looking in the most logical places for disease, if it were disease-producing. Then, of course, the places to look were the bronchial tree and lungs, because these represent the one part of our inside organs, so to speak, that is constantly exposed to our outer environment. And when one does look into this matter, it becomes immediately clear that a commonplace bronchial-pulmonary disorder, both chronic bronchitis or emphysema depending on the size of the larynx, is showing an alarming increase in some places, including Great Britain and California.

This is a disease, or closely related group of diseases, that is characterized by chronic cough, eventual loss of breathing capacity and, in time, by failure of the heart. Just how chronic bronchitis or emphysema gets its start is not certain, but the process apparently begins one or two decades before the symptoms of the breathlessness are first noted. There are a few straws in the wind, but no absolutely sound evidence that the continued exposure to polluted urban air can actually start bronchitis-emphysema. Once the process gets its start, however, there is excellent evidence that both the sulphur type and hydrocarbon type of smog can affect it adversely, and the disease is certainly showing an alarming increase. . . .

The problem here, therefore, is the familiar one in biology, in medicine — namely, if a substance or mixture of substances present in low concentration can be highly injurious to certain especially susceptible people after only a few days of exposure, how do we know that two or three decades of exposure will not be similarly injurious to a lot more people in addition to just those who are especially susceptible? Indeed, most of us with biologic experience would predict that would be exactly what would happen in such circumstances. But it is this lack of unequivocally solid evidence that here poses our dilemma or issue of conscience. . . .

In medical matters it is frequently necessary to take action after the careful weighing of evidence that would not in itself constitute evidence in the legal sense, and from the present medical evidence here, the probabilities of a serious health threat for future generations are so strong that it certainly is practical wisdom to act now. But whatever environmental contamination we seek to correct in air, water or food, we are facing a problem of formidable proportions, for the contaminations are not the work of evil men, or even slovenly neighbors, as was the case twenty-five or fifty years ago. Instead, today's contaminations are the impersonal reflections of our highly organized society.

To track these contaminations, therefore, inevitably sets up tremors across the whole delicate network of that society. We can continue to breathe what is very probably toxic air on the premise that it is an unavoidable by-product of our wonderful society and that, on balance, life is pleasanter with the polluted air than it would be without. Or, we can choose to have our wonderful society and have clean air too. But to reduce the pollution significantly would require changes in our personal habits and very costly changes for our industry and for our government.

It is as pointless to search for a culprit in this situation as when the living room has been badly cluttered by four small children. Unlike the veteran parent, we cannot choose the easy way of: "I don't care who did it! *You* pick it up!" We must pick it up all together!

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**Sir Charles Snow:** Our society, as Dr. McDermott said, is becoming increasingly articulate. We're becoming, in St. Paul's words, "members, one of another," not only in local societies, but all over the world. But the trouble is, that is not making us better people. It is, in many significant senses, making us worse people, because we're lacking the extended imagination, the foresight, which Dr. Dubos talked about last night, which is one result of scientific knowledge, yet one that has astonishingly little effect upon our moral actions. For instance, no one at this table — no one in this hall — if he were going to perform an act or take a decision which would mean that some wretched child in the Amazon Valley, of no great importance to anyone but himself and his parents, got leukemia — not one of us would take that choice unless the arguments were stronger than I've ever heard. We should not do it, and yet, people around this table, and people in this room, have taken decisions that mean just that. That is brute hard fact of the modern world. Things that we've done have meant the deaths of completely anonymous people in a random way in different parts of the world. . . .

And I'm inclined to think that the reverse, or obverse, of statistical morality is technological cynicism. And I believe that technological cynicism is a state which grows the more advanced one's country is. I believe this technological cynicism is deeper in Sir George's country and mine and in yours, sir, than it is in less developed societies. I believe it's growing

upon us day after day; the actual tone of voice in which we discuss these problems is not the tone in which decent men should discuss them, and we do it in a sort of dry flip way, which means we're not immersed — we're not using the extended imagination.

Now, as to what we should do. It is clearly not easy. Some of these problems are going to be much more intractable than others. But that, itself, is a moral trend, because if some problem is not easy, one's inclination in a climate of technological cynicism is to say all the problems are not easy, and that none of them should be tackled at all. Therefore, it seems to me that the first thing is to tell the truth. I believe that is the first duty of all scientists — I believe it's a built-in feature of science itself, and one which makes me feel that it's wrong for us to say that "science is ethically neutral." I never have believed that — and I don't now! I believe that the very fact that truth is part of the very grain of science means that we have an ethical component right in us.

The first thing, then, is to tell the truth. The second thing is *not* to leave it to society in quite as easy a fashion as some of my wiser friends, and Dr. Dubos last night, would suggest. We happen to know just a little more, we happen to be a little more articulate, we happen, if we're not very bad men indeed, to have our consciences a little sorer, because this kind of statistical morality is something we have to live with.

**Dr. Hermann J. Muller:** I'm glad to hear this new term "statistical morality" from two independent sources this morning at a conference dealing with medical matters. I'm glad that it is getting near the consciousness of the medical profession in this way, because I have for a long time felt that it was a concept much needed and largely ignored not only by great multitudes, but by the professions that should be most directly concerned with the idea, namely the medical profession and the legal profession. . . .

Coming back to the matter of radiation, the present damage from nuclear weapons fallout is a relatively small fraction of the damage that is being done by the medical use of X-rays. But there again, the medical men will say they're using these for our own good — you've got to balance that against the deaths and suffering that would occur if they weren't used for purposes of diagnosis and therapy. And they can say, "We have direct evidence that these diagnoses save millions of lives." At the same time I quite agree with Sir Charles Snow that before you can make any new assessment at all you've got to know the truth.

And, therefore, the way to convince people that they should allow their physicians to use medical X-rays is not to blind them to the fact that there *is* damage, but to let them know that there is — admit it — and then decide where the damage is least and the benefit is most. Medical X-rays confer benefits, but the question should be raised in connection with them — could they in some cases be replaced by other methods not carrying the same risk of damage, or could they be replaced by other means of using medical X-rays which didn't involve the same amount of damage? We find today that with a little research it has been possible, although at great expense, to have ways of getting X-ray diagnoses that use ever-so-much less radiation. Now, this wouldn't have been developed, I think, if it hadn't been that some people (not including myself, I'd like to have you know) were alarmists on this matter. I have, of course, been called an alarmist, because I've tried to tell what I think is the truth about it, but I have never, I think, claimed that there has been more damage done than the minimum we know is done.

Well, if that had not been said, ways of reducing the damage would not have been looked for. Here, then, we come to

the question of medical conscience. At the time when I was bringing up the matter of the damage done by medical X-rays, I was told (and I wish you to know that I am not a medical man) people from outside medicine should not talk about medical questions, especially shouldn't stir up the public about medical questions — this should be left to the medical profession. I waited thirty years for that to happen, only occasionally speaking about it, and *nothing did happen*. The whole matter was ignored. Why is it being considered now by the medical profession, with all due respect to them (and I have a great deal)? It's because of the atomic bombs! If the atomic bombs hadn't dropped, the medical profession would still be giving radiation in the same old way, as many of them still are, and there wouldn't have been any attempts made to reduce the damage — or to devise better ways. I think this illustrates, on the one hand, what was said last night, that it is not merely for the medical profession to decide these matters of medical ethics.

But I think, on the other hand, that it is up to the medical profession, too! And very distinctly so! I think it is up to everyone in fields they're conversant with to speak up and try to work out the truths together with others whose fields overlap, and even with complete outsiders, because *only* with such free discussion, and not with dictatorship, can we arrive at the decisions that will benefit mankind. And scientists especially should speak up on these matters, because I think that it is by no means true that science has no contributions to make to axiology — that is, to the science of values.

## Second Panel Discussion

### THE ISSUES CONCERNING MAN'S BIOLOGICAL FUTURE

Chairman: SIR GEORGE PICKERING

REGIUS PROFESSOR OF MEDICINE, OXFORD UNIVERSITY

WE propose this afternoon to discuss with you three of the more important problems concerning "Man's Biological Future," and these problems arise in two ways. First, because of what we've already done and second, what we might do. Now, what we've already done has posed two new problems — one, an enormously large one, and one, a rather small one.

The enormously large one is concerned with the future size of the population of the world. As you know, populations have been in balance with the natural enemies of man — disease — over countless years and in some of the large centers of population, owing to the application of medical and scientific knowledge, the death rate has suddenly fallen without a corresponding fall in birth rates, with the result that the population of the world is likely to increase to such an extent that within perhaps the time of our grandchildren the population may outrun its food supply.

The second problem arising out of what we've done is of puny proportions as compared with the last, but it is an issue which particularly concerns medicine: "Should we keep certain extremely sick people alive indefinitely?"

With the use of all the paraphernalia of modern medical science it's possible to keep nearly anybody alive for an indefinite period; with the use of artificial respiration, artificial circulation, artificial kidneys, transfusion and antibiotics it's possible to keep the sickest people alive for quite a long time. Now this has presented society with certain new problems which society, meaning you, find disturbing. What ought the doctors to do? The issue to the doctor is of two kinds.

The first is euthanasia. As you know this is an ancient problem and for a long time there have been people who have held that when one gets sick or old, and life no longer has anything pleasant in it, one ought to be put down as a favorite dog or a favorite horse is put down, and that this is one of the things that the doctor ought to do. My own view is that this is not a fair request for society to make of the doctor, because it is the doctor's duty to save life and I don't think he can ever take it.

The second problem is: Should one keep certain very sick patients alive indefinitely? Now this, I think, is a different issue. My own view is that the doctor-patient relationship demands that the doctor must keep the patient alive unless the circumstances are very exceptional. I can illustrate what I mean by two examples: About two years ago a young woman was admitted to the hospital in which I worked, after an automobile accident, and she was unconscious. She would have died had it not been for artificial respiration, which kept her alive. Two years later she is still alive, but she is unconscious and it's doubtful whether she will ever regain consciousness so long as she lives. Now, I have no doubt that it is our duty to keep that patient alive, because the discipline of a hospital demands that this should be done, and it's not doing anybody any harm.

Another example: A distinguished scientist whom I knew very well had a series of strokes. He couldn't walk; he couldn't talk; he was bed-ridden; he had to be fed, and he was incompetent both in the urine and feces; and he was looked after by his devoted wife, who was unable to go out of the house the last year of his life. The last time I went to see him he was breathing at 40 per minute and I knew that he had bronchial pneumonia. Should I have informed his physician so that he could give him antibiotics? This was a question that I had to settle with my own conscience. I couldn't ask his wife. What I did was to say nothing, and four days later that man died. And that I think was right, because this was ruining a devoted woman's life.

Now, a problem of quite a different order is what we ought to do in the future about trying to improve the human race, and when I talk about "the human race" I'm not talking about *one* race against another — for instance, an Arab against a Chinaman — because I think that kind of question has led to so much trouble in the past that we ought to keep off it! But what I mean is: Ought we to be breeding children as we breed dogs and race horses and within our community?

This became an exciting problem about a century ago when the acceptance of the evolution theory opened people's eyes to the possibility of evolving better human beings. And it particularly excited Francis Galton who was a cousin of Darwin, and whose observations of man had convinced him of the reality of human inheritance. Galton thought that it was our duty to breed better human beings and he suggested that the State should make awards to young men and young women to enable them to marry and produce children. In other words, that the State ought to run a sort of stud farm with selected young men and young women — selected, of course, on their genetic characteristics, to produce better babies.

This problem has received new urgency because of new knowledge obtained in genetics and because of new knowledge of reproductive technique. If I may again use the analogy of animal husbandry — because after all, if we detach ourselves, that is what this problem is — when we realize that it is possible to collect sperm from a bull and to store these and transport them all over the world, and to have progeny from that bull by artificial insemination, one realizes what enormous possibilities there are in terms of the human race. There



obviously are social consequences of all that, but I'm not going to follow that up. I'm now going to ask the Panel to take over and I shall call first on Dr. Chisholm.

*Speaker:* BROCK CHISHOLM

DIRECTOR-GENERAL OF THE WORLD HEALTH ORGANIZATION, 1948-1953

I THINK it might be most profitable if I spent the minutes at my disposal in talking about conscience, which is the basis of our discussions here — "The Great Issues of Conscience in Modern Medicine." Most people tend to take for granted that they know what they mean by "conscience" and that "conscience" is in fact what they mean, which is not necessarily true.

For most people conscience is something that is not questionable — that gives an answer without thought — that is a feeling, which produces in relation to certain ideas, or certain forms of behavior, a feeling of virtue or, on the other hand, a feeling of guilt or shame. For most people this voice, which is internal, is accepted as ultimate authority, their basic authority. It occurs to relatively few people that the language in which conscience speaks is for each of us entirely accidental. It is determined by the family in which we were brought up and by the attitudes which were about us when we were small; and largely its development is finished by about six or seven or possibly eight years of age. Relatively few people of the human race, generally, do undertake to help their conscience to continue to grow and develop toward maturity. Conscience for most people, then, is simply whatever they believed when they were small children.

All through the development of the human race, consciences have been valuable. They're a short-cut. They make it unnecessary to think about a great many things and, if the attitudes of the parents who inculcated attitudes in their children were sound at that time and continue to be sound, then conscience can be very valuable. But in general, consciences are not *necessarily* to be relied on, unless one has examined one's own conscience very carefully in relation to every conceivable situation and adjudged it reliable in terms of the evidence and the present situation, and not in terms of the attitude of the ancestors, which may or may not continue to be valid in changed circumstances.

There is considerable authority now in support of such an attitude. For instance, in the Constitution of the World Health Organization there are two statements that are relevant to this discussion. One is the definition of the word health. This statement, by the way, has been subscribed to by some ninety-two governments on behalf of practically *all* the people in the world, so that it is a highly authoritative statement defining the word "health." "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." This is an important statement because it indicates the requirement placed on individuals now in this generation that did not exist in previous generations. No one was expected to be socially healthy in the past.

There's also a further relevant statement about children. "The healthy development of the child (healthy meaning physically, mentally and socially) is of basic importance. The ability to live harmoniously in a changing total environment is essential to such development." This means that generations from now one must be able to live in ways appropriate to new circumstances, whether or not those circumstances were known to his parents or any of his ancestors. And this is important because we are now trying to live in circumstances

totally unknown to any of our ancestors in the past. The conditions of survival of the human race are now different from those of any previous time. And the ancestral patterns, we can be quite confident, are not adequate for survival in this or in future generations, because our ancestral attitudes inevitably and invariably led to warfare, which now for the first time in human history has become synonymous with suicide. This is new in the world! A situation totally unknown until just the last few years. We have no precedents to work on, no previous experience of this situation, and we have no education for coping with it. Nor can we count on our consciences in reference to this situation, because our consciences are based on what our parents believed when we were little children, very often what they got from their parents. It would seem that the time has now come when man can no longer afford to submit himself to the accident of the time and place of his birth, as almost all people in the world have done up till now.

There has been a thesis, almost a faith on the part of most of the people in the world, which is still extant and forms the basis of many attitudes. Roughly, it can be stated in such words as these: The welfare, the prosperity, the prestige, the power, and so on, of the group into which I happen to be born, or adopt at birth, is more important than the welfare, the prestige, the power, and so on, including the lives of all the rest of the people in the world — all put together! On the face of it, of course, this statement is manifestly absurd. Because the group that I happen to belong to by birth *can not* be more important in all these ways than everybody else in the world put together. And yet, this is the impression that children are getting all over the world — that our loyalties can be limited to the group into which we happen to be born.

In these new circumstances, in this kind of world around us now which never existed before, we can no longer afford to go on that way. We are going to have to help our own consciences to grow up to a degree of maturity that will allow us to function as members of the human race, which we have *not* been educated to do in the past. . . . The unit now, for the first time in the world's history, has become the human race. We will survive as a human race, or not at all! This is a situation again totally unknown to any of our ancestors and we have no learned, or early-learned, or hereditary concern for this situation. We have no conscience-values generally that concern themselves with survival of the human race. Indeed, we haven't even got a government department in any country that I know of that is set up to concern itself with the "survival of the human race." And if there is any question about which we have no government department, it obviously is not very important!

And yet, this is the *overwhelming* question of this generation — the survival of the human race! In order for us to learn how to cope with this, and all the problems that go with it, including, and perhaps more important than any other, the population problem, we're going to have to deal with our own conscience values. And this is an extraordinarily difficult thing to do! Because in effect it means dealing with our own prejudices, and our own limiting loyalties and demanding of ourselves that we grow up to a level of maturity that was not even considered in any previous generation. If enough people in enough places can grow up — mature — to be able to function adequately as members of the human race, then we can begin to be reasonable about population explosion, about genetics, about food supply, about nationalism, about all sorts of things with which we are not coping effectively now. And this is a personal problem for each individual. These problems can *not* be effectively coped with by any international agency, or any government, not until enough people in each country

want their government to cope with these problems. That is a matter then of individual growth — individual recognition of responsibility. Responsibility now will have to extend itself to responsibility to the human race.

How to go about this change — how to undertake such growth is a problem for the educators of our cultures largely. Doctors, obviously, as indeed all the people working in the field of health, have an immense responsibility in this field. That responsibility is defined in the two statements that I gave from the Constitution of the World Health Organization. If and when we can assume responsibilities at that level, then all these questions of problems facing, and at the present time reasonably frightening, the human race can be tackled logically and sensibly without the emotional overtones that make it so difficult to talk about them reasonably now.

*Speaker:* HERMANN J. MULLER

DISTINGUISHED SERVICE PROFESSOR OF ZOOLOGY,  
INDIANA UNIVERSITY

THE typical attitude, in our time, of the progressive liberal who has been exposed to some discussion of evolution has been a blindly optimistic one. He notes how far the line ancestral to man has come in the two to four billion years of its history. Like the gambler who has had such a fabulous streak of luck that he believes it cannot ever fail him, he ignores the multitudes who fell by the way and thinks that that cannot happen to him, even though some of them had done about as well as he, up to their point of failure. He caps his argument by pointing to the unprecedented new means of progression, cultural evolution, that man alone has been possessed of. Noting how much faster it can be than biological evolution, he is inclined to take the position that it has now superseded biological evolution entirely, and rendered it quite unnecessary.

It is true that for hundreds of thousands of years, as men's cultural evolution proceeded, it increasingly brought into being "artificial" conditions of living, and that these conditions unintentionally promoted the natural selection of biological traits and proclivities that in their turn were conducive to cultural activities and development. Thus, biological and cultural evolution were reciprocally reinforcing. At last, however, with the generation of modern science and technology, including more especially medicine, cultural evolution has entered a new phase in its relation to biological evolution. Its very successes have made facilities available that no longer afford effectively differential advantages in a competitive struggle for existence to the healthier, the abler and the more moral individuals, families, or small groups. Instead, these modern methods of overcoming natural obstacles are so nearly foolproof, knave-proof and proof against men's bodily ills as to accord to many of the genetically inadequate individuals ample powers of reproduction which they, in consequence of or in compensation for these defects, are likely to indulge unduly.

As in the parallel case of arriving at world misery through the overpopulation made possible by medical victories over death that have not been balanced by adequate medical aid in the control of birth, so here too. But whereas in the former case the promotion of the mere quantity of life results in the choking off of life's finest expressions, in this case the innermost and most precious core of life, its genetic quality, is subjected to a deterioration that is actively promoted by medical practices. Mutual aid, the uplifting of the weak by the

strong, the process that constitutes the heart of civilization, is defeating its own purposes when administered so blindly as to bring about a continual increase in the need for such aid, and in the burden that it entails on the whole community. Thus what medical practices, and in fact all our powerful modern aids to living, are giving people with one hand they are in the long run taking away with the other hand. That other hand is the one that fails to extend to them the techniques and the hardwon fruits of human inquiry that would enable and induce them to exercise discrimination in their procreative decisions.

It has been known to geneticists for decades that the vast majority of mutations are detrimental, in that nearly every one of them occasions, at least to some small degree, one or more of the many thousands of possible impairments, bodily, intellectual, or in the genetic basis of the emotional organization or moral fiber, that our organism is subject to. The reason that evolution succeeded with us in spite of this prevalence of undesirable changes is that the very rare mutant who happened to be superior won for himself or his small group of relatives a chance of leaving more descendants, while the thousands of mutants less fit than the already established type tended to die out. It is not commonly realized that even the maintenance of the genetic *status quo* requires an active selection of this kind. For, the more that selection is diminished by aiding the reproduction of the genetically unfortunate, the more must the population accumulate from generation to generation all the constitutional ills that body and brain can fall heir to, as new mutations continue to occur and accumulate.

Although this process is, even at its worst, a far slower one than the present rate of aggravation of human overcrowding, nevertheless its substantial magnitude can be gauged from a surprising conclusion arrived at by modern genetics. This is the fact that at least one in every five persons, on the average, is encumbered with a mutant gene that arose "spontaneously," as we say, in a reproductive cell of one of his parents. He received this, of course, in addition to the many other mutant genes that had arisen in earlier generations and had been regularly transmitted to him by his parents. Moreover, in arriving at this tally of at least one in five persons having a new mutant gene, we are leaving out of the reckoning any newly arisen mutations that may have been induced by one of the many novel practices of our day, such as exposure to radiation and to possibly mutagenic drugs, cosmetics, contraceptives, food additives, industrial wastes that are thrown out into the air or water. None of these suspect chemicals has been adequately tested in this regard, that is, as to whether it is mutagenic. It is obvious that unless people of the genetically least fortunate fifth of the population, when saved for reproduction by the triumphs of modern medicine and other technologies, reach a firm decision not to pass along their burden to posterity, the genetic quality of future generations must inevitably undergo decline.

We see, then, that since our new techniques of healing and of prophylaxis are breaching the natural dam of selection that holds up the genetic quality of our species, these techniques must now be balanced by new attitudes regarding the goals to be aimed at, and also balanced by other techniques that can materially implement our progress toward these goals. Both the general public and the members of the medical profession must be given, from childhood on, a more meaningful education in the fundamentals of genetics and evolution, one that they will carry into their judgments and decisions regarding their work and their own living, and into their sense of values and moral feelings. When they have been awakened to our increasing human load of mutations and of all that this

implies, they must come to recognize their own obligation to aid in the production of a future generation not worse, genetically, than their own, but, if possible, better. They must rise above the antiquated view that reproduction is chiefly the means whereby parents may indulge their selfish vanity in the idiosyncracies that chance to characterize their own stirps, or the stirps of the clan or so-called race they happen to belong to. They must replace this anachronistic attitude with the more ethical, civilized view that reproduction is chiefly the means of bringing into existence a family, and a generation, of more truly *human* beings; that is, beings who have been endowed as far as possible with those genetic virtues of health, stamina, ability, loving-kindness, that the elders in their deepest hearts wish that they themselves could have had in greater measure. This is, after all, but the Golden Rule, applied in the realm of human genetics. If, as some critics claim and others deny, this means a kind of abnegation, it is abnegation of that type which rises above self, into the glory of acts of achievement and creation that bring the deepest sense of fruition.

The early communists' dreams of plenty of material goods, reasonable hours of labor, and a worthy education for everyone are more than half way toward realization in our own moderately free society today, because our techniques of *production* have advanced so much as to make all this possible. Similarly, the dreams of Galton and the early eugenicists, of a voluntary reproductive selection whereby the genetically less fortunate would contribute fewer progeny and the more fortunate a larger number, are now at last becoming possible of attainment, because of modern advances in the techniques of reproduction. For example, the fear that atomic war or the ill-managed disposal of waste from atomic reactors will contaminate the hereditary material entrusted to us for future generations is in part an unnecessary fear, if only we will avail ourselves of at present available techniques by maintaining, underground, banks of deep-frozen spermatozoa from every man. This would be a procedure far less costly than that of establishing bomb shelters for all. In these banks the germ cells of men, at any rate, would be kept far freer from *all* mutagenic influences than are the germ cells within the body. Perhaps a relatively small amount of research would make a similar procedure possible for women.

At the same time, the storage banks would make these germ cells available for indefinitely long periods of time, so that they could be utilized even after the decease of the individuals themselves, thereby, in a sense, evading their bodily deaths, supposing for instance that they were killed in war. Surely, under these circumstances, many couples, desiring to make a significant contribution to the good life, would decide to take advantage of such an opportunity for genetic choice by having, right in their own family, a child who had derived his genes from the source they held in deepest regard, rather than a child whose genes had been determined purely by the chance of what their own genetic composition was. And they would tend to bring up this child of choice rather than chance as their very own, with all their warmth, their tenderness and their justly founded pride.

Important new techniques are likely to break through into general use by way of many different channels, in consequence of the diverse benefits they offer. Breaking through in various ways, of which that just sketched is only one example, the new techniques of reproduction must eventually come to afford the necessary balance to our present genetic predicament. Reversing the present downward genetic trend, they offer the hope of not merely compensating for ailments and weaknesses, but of allowing a resumption, under conscious guidance this time, of our progression toward an ever higher

estate. Thus we should be able to give free rein to our advancing medicine, while at the same time actively helping future generations. And we should thereby have advanced from barbarism to civilized practices in that major field of human life that has till now remained in its essentials the most untouched by culture, namely, the field of reproduction.

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**Dr. McDermott:** I find myself at quite large dissent from much of what has been said. I refer first to the problems of population control. And, in order to get the record absolutely straight, may I make the point that I am not a member of any organized church. Nevertheless, it seems to me that the argument put forth, which is the conventional argument, is unconvincing, and having devoted considerable thought to this, as we all have — and I happen to be especially engaged in research in technological development — I find myself, perhaps rather reluctantly, coming to the conclusion that population control on a programmatic basis, at least, is simply unconvincing.

What are the reasons for this stand? The strongest argument has to do with the food supply, but it seems to me that all the rest of the arguments have to do with our viewing with Western eyes a situation that is not Western at all. Several times this afternoon the statement has been made that our birth rate is going up because of the application of modern medicine throughout the world. Now, no one has yet mentioned the Island of Ceylon, but whenever you scratch a demographer, he always comes up with Ceylon, because the two things have occurred together: modern medicine has been applied and the birth rate is going up. But birth rates are going up in many other parts of the world and I think all of us who are familiar with the problems in the economically underdeveloped area, know that despite the valiant efforts of W.H.O. and UNICEF and other wonderful groups, it's *illusion* to believe that the benefits of modern medicine are being applied on any world-wide scale at the present time. . . .

I have had some experience in doing an absolute birth-rate count. By "absolute" I mean no samples — to go out there and count the babies in an underdeveloped situation. And when one does that, I think, as all demographers would agree, the birth rate is indeed higher than the anticipation rather than lower. So that the birth rate is going up — it fluctuates — it does go up high in various parts of the world, but the case that this is occurring because of the application of modern medicine . . . I believe that I challenge.

The second point has to do with the idea that if the population gets so large all our gains in the standard of living will have been lost. If this affects the food supply — in other words, if the population actually does outrun the food supply, which by pencil and paper one can show quite easily, but in history has not yet been demonstrated — then I will become convinced. But as for the other aspects of the standards of living — *these are in Western eyes!* In the middle of an Indian village there are no television sets to buy; there are no colleges with tuition, yet — I mean, they will come. There are none of the things that we call "a standard of living." It makes no difference if there are eight or there are two, so that except for the food supply I think that neither of these cases — that modern medicine has been applied on the one hand, or that the standard of living will be reduced on the other hand — is there.

**Aldous Huxley:** Whether, as Prof. Muller suggests, we can as a matter of practical policy impose or get people to accept a system of eugenics seems doubtful. I think the best we

can hope for at present is possibly to encourage certain forms of negative fear of eugenics — that is to say, of discouraging people with obvious genetic defects from reproducing their kind; and for the rest it seems to me we have to find out what are the best environmental conditions for eliciting the enormous potentialities of human beings. I think it's quite clear that most of us are functioning in the terms of engineering at about 15 per cent of capacity. And it would be very nice if we could function, say, at about 20 per cent of capacity. I think there's very good reason to suppose that if we set to work, not merely to develop the conceptual part of the mind, but actually to educate the mind-body which has to do the learning and the living, to educate the perceptions, to educate the whole muscular system, to educate the imagination — then, I really do think that even given the present not extremely high level of genetic accomplishment, we could get a great deal more out of ourselves than we are getting now. It is possible, of course, that in the future positive eugenic policies may come into play. I don't know, but I think this is extremely remote. And, of course, we are at present pretty much in the dark as to what exactly we are selecting.

If I may quote my own excursions into this field, in the prophecy of the future which I wrote nearly thirty years ago — I placed it five or six hundred years ahead, but unfortunately a great many of its forecasts are already coming true — in that prophecy I made it clear that there would be a simultaneous attack on the human problem, both from the genetic and the environmental side, and there it was a totalitarian regime which artificially produced certain types of human beings which were useful for specific social purposes. And this, I think, is by no means out of the question. I think it is possible that this could be done. I don't think there's any likelihood of it's being done in the near future, but unfortunately I think it is quite clear that the whole idea of human breeding does lend itself very much to some kind of totalitarian manipulation. And for the present, perhaps for this reason, I feel we should concentrate more, first of all, on avoiding the more obvious genetic defects, preventing the more or less genetic defects from being multiplied, and in the second place, on seeing what can be done with the capacity that we already have.

**Sir Charles Snow:** A number of the speeches have borne on topics which we raised this morning on problems like statistical morality, the extended imagination and what I think, from Mr. Brock Chisholm's extremely moving speech, I should now like to call the "extended conscience" — that is the conscience that contains in it an element of foresight. And foresight seems to me, the more I think of these things, perhaps the most essential quality that sensible men have got to train themselves into. . . . And with this extended conscience, it seems to me, one has got to think about problems such as the future size of the population. I think that beyond a reasonable doubt there is a limit beyond which the race can't reasonably, or tolerably, exist. I thought Doctor McDermott with great charm and blarney slightly got away from facts which I think are there only too plain for us all to see. I agree that at the moment the gloomier prophecies are not coming through. That is, at present so far as we can see the available food supply is keeping up a little more than the population is going up. That is true. It is also true that there are many people by temperament — and I think that with those I would include myself — who are not so indisposed to see an increase in population. That is, there are some people who like crowds, and some people who don't like crowds. And so, by temperament, I have nothing against a world

which is appreciably larger than it is now. At any rate, I don't hate great urban aggregations, as Mr. Huxley does. . . . There is something to be said for an increase in population. Don't let us take it too tragically, if we can keep it within terms which the race can materially survive. But there is a limit, I have no doubt, and I'm afraid that that limit is very nearly upon us.

But I would say this, because among Dr. McDermott's charming blarney there is also humanity: It is very important that we do this with the best psychological manners at our command. It mustn't come from the West, sitting fairly pretty, having substantially controlled this problem ourselves, having quite enough room at our disposal, far more than enough. It is not for us to say to the East, "This is about the size you ought to be." . . . The West must be very careful what it says. Any real move for the control of numbers of the human race must, I am sure, come from countries where the explosion is now about to begin, or has just begun. On that I am quite clear, and I think we must constantly remember it. . . .

I would like to say a rather similar word about eugenics. I think it is not for us in our generation to try and tell future men everything they should be like. I don't think we're omniscient. I think we've got to show a proper humility. They may choose to be very different from what we would like them to be. And, therefore, I find myself very strongly on Mr. Huxley's side. I think we've got to make the environment tolerable. "Leave if you like" is a strange legacy to our descendants. Dr. Muller's great pool of sperm — that seems to be one of the really original bequests one generation might ever leave to another. But leave it there for them to make the choice. They are going to live in a very different world. They're going to live in a world, as Dr. Chisholm began by saying, which will be in many ways unimaginably different from anything that we have lived through. They have got to make that other world. Let us leave *that* for them. We can't take too much upon ourselves. If we leave them a world which is tolerable, which is not faced by great biological disaster, then I think they will probably feel that we have done our best.

## Evening Assembly

*Speaker:* MAHOMEDALI CURRIM CHAGLA

INDIAN AMBASSADOR TO THE UNITED STATES AND MEXICO

**I**T is an honor and a privilege to address this Convocation on the Great Issues of Conscience in Modern Medicine. The honor and privilege become even greater when I am sharing it with so distinguished a writer and humanist as Mr. Aldous Huxley. I have always been a great admirer of Aldous Huxley's writings. I remember reading his earlier book of poems *Leda* and I have always regretted that he deserted the muse of poetry. His novels provided a thrill and excitement to English literature that it then lacked. And for many years now Mr. Huxley has preached the message of humanism and held before a rather skeptical world the values which it is fast forgetting or ignoring. It was indeed an essay of Mr. Huxley's which vividly brought home to me the problem that the world is facing in the population explosion which is taking place before our eyes and which, with that delightful knack of refusing to notice unpleasant facts, we pretend is not explosion at all but just a natural phenomenon which God in his goodness has ordained and which we sinful mortals must accept with proper Christian resignation.

Let us first look at a few figures. The population of the world in the 17th Century was 500 millions. It is about three billions at present. Every ten seconds 31 new babies are born into the world. In my own country, which is about one-third the size of this country, the population is more than 400 millions and is rising every year by about eight millions. In China, which is the problem country of this decade, the population is 600 millions and the Government of that country welcomes a continuous increase in the population as providing it with a greater potential for expansion and, may I say so, aggression.

The great crisis of this decade is not one of differing ideologies. The great enemy and the threatening menace that we have to face is not communism. The really explosive factor is poverty. The per capita income of 1¼ billion people in one hundred less developed countries is less than \$100 a year as compared to the per capita income in the U.S. of \$2,100. In my own country it is a little more than \$60. And by a curious twist in the working of natural laws, the largest increase in population is taking place in these underdeveloped and poor countries. What does that mean? It means that population explosion is increasing every day and every minute; the number of people living below the minimum standards of subsistence, the number of people who are uneducated, who are unemployed, who are frustrated and who have no hope of a better future for themselves or for their children, is also increasing.

It is poverty and distress that is the most potent source of communism. The last twenty years have seen many countries in Asia and Africa achieving freedom. They have thrown off the colonial yoke, but are still left with a colonial economy. Freedom after all is only a means to an end. It acquires significance only if it can satisfy the inner craving of man. Is it surprising if these newly freed people of the world should compare their own standards of life with those in this country or in the affluent countries of the West? The aspiration for a better life is a laudable one but the great question mark of today and tomorrow is whether that aspiration can be satisfied in a free society. The answer given to that question by Russia and China is that the only way to fight poverty and bring about industrial and economic development is to regiment people and to prefer material progress to the welfare of the spirit and the soul. We in India are attempting to give a different answer. In our last thirteen years of freedom, we have maintained democratic institutions and have granted full freedom to the individual in thought, expression and even to a large extent in action, and at the same time we have launched upon the gigantic task to raise the standard of our 400 millions. But we must fight poverty successfully within a measurable period of time. Otherwise we will have demonstrated to other independent countries in Africa and Asia that democracy and free institutions are no answer to underdeveloped countries: they are an exotic plant that can only flourish in an affluent society. People will turn to totalitarian methods if they are driven by poverty and if they can find no relief by adhering to free and democratic institutions. The continuous increase of population in underdeveloped countries constitutes a growing threat to freedom and democracy.

We in our country are about to complete our second Five Year Plan and in the last ten years we have made considerable progress in transforming the economy of our country and in raising the standard of our people. We are particularly concerned about our food production. Our country is a country of villages and farmers and up to now, to a large extent, our economy has been an agricultural economy. The farmers press heavily upon the land. They need fertilizers and the land is so parcelled out that the only solution is a

system of cooperatives. We are industrializing our country in order to take people off the land and we are setting up fertilizer factories and large irrigation dams. We have increased our food production considerably, but whatever we do we have all the time, as we march forward, to look behind us at the specter of increasing population. The population is always catching up with our progress.

This country has given us a great deal of economic aid. She has given us a great deal of food supply out of her abundant grain surpluses. It is clear therefore that there is a full and clear realization in this country of the important role that India is playing in Asia and how important it is that her economic experiment should succeed. The new nations in Asia and Africa are watching India to see whether democracy can solve the problem of poverty. It seems to me that this country should not only be interested in giving economic aid to India but also equally interested in the fight that India is putting up, with which I shall deal later, to control her rising population.

At one time a rising population did not present a serious problem to India. There were always epidemics, or local wars or a heavy infant mortality and a low expectancy of life to counterbalance the large number of births. I may also point out that people in those days looked upon a large number of children as an insurance — so few survived that a large family seemed to be essential. But all that has changed now. Advance in medical knowledge, steps taken to improve standards of hygiene have eliminated many diseases in India which took a heavy toll in lives. There are no epidemics now and if one breaks out it can be immediately put down. Civilization no longer believes in small local wars — we have to wait for a nuclear holocaust. The result has been a sharp fall in the death rate. But the birth rate has remained the same. So in a sense we have been suffering from the civilizing effects of science and medical research. Civilization has shown us how to reduce our death rate but so far has failed to point the way to a controlled population. I think this is one of the most important issues of conscience in modern medicine. Medicine must advance on both the fronts. If it considers life is sacred and everything must be done to prolong it, it must also prevent human beings being born into an existence of poverty, destitution and frustration. The sanctity of life demands that the dignity of the individual must be upheld. What dignity will millions of children have who are being born today?

This country has fought a ceaseless war against disease in different parts of the world. There are national institutes of health and other organizations which are carrying on unceasing research in cancer, malaria, typhoid and other fell diseases which the human flesh is heir to. But Government and official institutions fight shy of doing research in the problem of human fertility. Why? To my mind increasing population is a more terrible sickness from which a country can suffer than the diseases with which medical science is presently concerned. Cancer or malaria can only kill the body. When you have unwanted children, when you have children whom you cannot feed or clothe or educate, you maim the soul — you leave a scar which destroys the equanimity of mind and twists and distorts the human personality.

I have heard it being said that this country should remain neutral on the question of birth control or family planning in a foreign country. I have no desire to interfere with the domestic policy of this country. Indeed, it would be wrong, looking to the position I am occupying here, to criticize or comment on any matter which is primarily the concern of this country. But this is something which concerns the whole world. This country is not neutral when it is a question of fighting disease in other parts of the world. It has poured out

millions and billions of dollars in order to improve the standards of health everywhere. There are few countries which have shown such missionary zeal in the cause of human advancement. I am sure that if it is once realized that the increase in population is a grave menace facing the world, then this country will also realize that this menace must be fought on a global basis and all the resources of the civilized world should be utilized to fight this menace.

I should like to say a word about the ethical or moral aspects of the problem. To my mind morality consists in giving the least pain to fellow human beings and contributing to the largest extent to their well-being. This is not, I fully appreciate, a philosophic definition of morality. But it is a pragmatic one and can serve as good a guide to human conduct as any other. Applying this test, I think you are causing more misery and suffering to untold millions by denying a knowledge of birth control technique than by doing everything possible to bring home to the people in this country the vital urgency of the problem of population explosion that is facing the world. Nor am I impressed by the argument that it is morally wrong to take life — that we should trust to a benign and benevolent Providence to feed all the mouths that exist in this world. Experience, unfortunately, does not prove that all mouths are in fact fed. Millions in Asia and Africa go hungry and underfed. I would rather prevent life than bring into existence children who do not and cannot live as human beings and who are a shame and a scandal both to Providence and to man.

We have been so engrossed in recent times with the dangers of nuclear bombardment that we have ignored the more insidious but equally dangerous consequences of an uncontrolled population. If millions who are being born today are going to suffer privations and disease and may grow up into abnormal and twisted personalities, it is not a situation which can be faced with greater equanimity than the large destruction that might be caused if a war were to break out. At least, if we are all dead, we will have no problems. But if we continue to live or if we are allowed to live, then we will have a problem which, if attention is not paid to it immediately, might soon become insoluble.

You might well ask me what India herself has done toward the solution of this tremendous problem that faces her. We are one of the very few Governments in the world who have officially adopted a policy of birth control and family planning. It is not easy for any Government to do this. There are orthodox people in every religion who are opposed in principle, whatever the principle may be, to birth control. Religions in India are no exception to this. But our Government has placed the welfare of its people before religious sentiments, and even at the risk of offending these, has set up clinics in various parts of India to propagate extensive knowledge about birth control and distribute contraceptives free of any cost. We have about 1800 such clinics now and by the end of our next five year plan — in five years time — we hope to have about 8200. I agree that this is merely the fringe of the problem. But with our limited resources it is not possible to do more at present. One very satisfactory feature of the situation is that people, by and large, are cooperating with Government in this scheme. The poor people are beginning to realize what a burden and a curse a large family can be. They are even going in for sterilization. Government has authorized every hospital to perform this simple and painless operation but on condition that a person wishing to undergo it must have at least three children. This, you will agree, is much too drastic and irrevocable a remedy. But the very fact that people are resorting to it in large numbers shows the gravity of the situation.

To my mind, the real solution of this problem in India is a cheap oral contraceptive — a contraceptive as cheap and as easily available as aspirin or quinine. We can flood the market with such a contraceptive — and in twenty or thirty years we will have a social and economic revolution in India which will change the face of the country. The mechanical contraceptives we now have are expensive and uneducated people cannot be easily induced to use them.

What can this country do to help us? I want to make it clear that we do not want any money for this purpose. All that we want is science and technical knowledge being fully utilized in this country to discover the oral contraceptive I have referred to. Many private institutions here are working at it — but that is not enough. We have here magnificent national institutions of health which are working full time on research into many diseases and maladies — not only those which are prevalent here, but in any part of the world. Why ignore one of the most serious afflictions from which the world is suffering? I know that it is very often not considered respectable here to talk of birth control or family planning. It used to be the same about venereal diseases. Thousands of patients used to die because they dared not disclose the nature of their ailment. But that is a matter of the past. Medical science and medical conscience have advanced since then. A further great advance is necessary. It is for modern medicine to realize that this is one of the great issues of conscience today. And it is for scientists and doctors to preach the gospel of more knowledge and more research in this rather neglected department.

I am not unaware of the fact that there is one other remedy for increasing population and that is raising the standard of living. If we in India can overnight by magic raise our per capita income from \$60 a year to anything approaching \$2000 of your country, the population will be automatically controlled. In the last ten years we have been able to increase our per capita income by 20% — and if we succeed in doubling this effort in the next ten years, the results would still be pitiful. We have to fight poverty in India on both fronts — on the economic front by industrialization and on the population front by devising ways and means for reducing the birth rate. America has given us generous aid to carry on the fight on the first front. We want your great scientific, technical and medical knowledge and experience to wage an equally effective war on the second front. It is only when the conscience of the people has been roused that the war will be successfully waged.

*Speaker:* ALDOUS HUXLEY  
AUTHOR

I THINK it is one of the frightening facts of the modern world that we see these appalling subrational drives of aggression and militarism and nationalism being implemented by the most advanced technology produced by systematic reason. So that I would answer Doctor Dubos' question by saying that both these states — the sleep and the dream — are equally dangerous, and that somehow we have to temper the dream with this element which he himself was speaking about yesterday when he quoted the saying of Montaigne that *Science sans conscience n'est que rien de l'ame*. Science without conscience, without the barriers of compassion and the heart, is the ruination of the soul; that we have to work all the time as entire human beings, not as subrational creatures, and not merely as rational creatures,

but as creatures acting from the totality of the soul-body-spirit.

And now let me say how touched I am by what the Ambassador said about wishing that I had not abandoned poetry. Well, I'm afraid the reason I abandoned it was that I simply don't have what it takes. I would like nothing more than to be a poet, but unfortunately I do not have that special gift. I'm a moderately good versifier, but not much beyond that. And let me point out that even if I were a very great poet — even if I were Shakespeare — I would probably find it virtually impossible to write about the subject which we are talking about tonight. I really would defy Shakespeare to write a sonnet or a tragedy about the population problem.

This is really a very serious problem. Here we are faced by something which, as Ambassador Chagla pointed out, is, next to the hydrogen bomb, the most important issue of our time, and we as artists — the people whose business it is to reflect the world and pass on ideas to people at large — we simply cannot do anything about it, because this kind of subject matter is simply unsuitable both to the lyric and to the drama, and even to the novel. I very much doubt whether even Sir Charles Snow could make much of a novel about the population problem. And this is a most unfortunate thing inasmuch as we see that one of the most important issues of our time is actually beyond the scope of those people who should be telling the world how serious the matter is. . . .

Now, to get down to my subject . . . let me begin with a few figures. The Ambassador gave some of these figures. I will take the figure which deals with the time that it takes for a population to double. Demographers tell us that the population of the planet at the time of the birth of Christ was probably about 250 million — that is to say, less than half of the present population of China. When the *Mayflower* landed on these shores, the population was about 500 million. That is to say, it took 1600 years for 250 million to double their number on this planet.

Today we have approximately three thousand million inhabitants and as demographers have shown us, by the end of the present century — in about forty years, we shall probably have six thousand million. So that we see, whereas a relatively short time ago it took 1600 years for a very small population to double, it now takes less than half a century for a gigantic population to double. And this obviously shows us what underlines the fact that many people have touched on in the course of these discussions, that we are faced with an entirely unprecedented situation. . . .

I was struck this afternoon by what Dr. McDermott said about the inefficacy of public health measures in regard to the reduction of population. Quite indubitably it had an immense effect upon the increase of population in Europe and this country. It is, after all, only within the present century that the over-all rate of population increase in the world reached 1% per annum. And the European increase is undoubtedly due, to a very considerable extent, to the application of public health measures. It's extremely simple, and cheap, to apply some elementary public health measures, even to extremely backward people. Two years ago I was in Brazil and the Brazilian Government put a miniature transport at our disposal and flew us up into the jungles of Mato Grosso and set us down at an airstrip belonging to the Indian Protection Service (they have an admirable Indian Protection Service in Brazil), where we came across a literally Neolithic tribe — a tribe of savages who had not yet invented pottery or agriculture, who wore absolutely nothing (they are one of the few tribes of the world who go about stark naked), who live mainly by shooting fish with

bows and arrows, and I noticed that these people all had vaccination marks on their arms.

This, of course, leads us to one of the major ethical problems of our time. We've been told for many, many years that a good end does not justify bad means, but in this particular concept we find a paradoxical situation that may lead, among other things, to a very bad end. There's this tragic thing, that we do what is obviously intrinsically good — save people from malaria, save people from smallpox, and so on — but then we find we keep many more people alive and that their last state may be worse than the first. What is the answer to this problem? Obviously we can't stop health measures. We can't refuse to give these people protection against horrifying diseases.

The only answer, it seems to me, is that science should take one further step, exactly as Ambassador Chagla has suggested, and attempt to bring into balance the birth rate with the death rate. And here in this whole problem of ethics, I think it would be very important to bring up children with the idea that many of the ethical principles of civilized life do go right down into these worlds of non-human



nature. After all, the Golden Rule goes down into the world of inanimate nature. "Do as you would be done by." If you want nature to treat you well, you must treat nature well. If you treat nature in such a way that erosion sets in, nature will treat you extremely badly. And in the same way the whole idea of Greek morality — the idea of balance, the idea of moderation, the idea of nothing to excess — is really paralleled by the natural system of checks and balances which goes throughout the whole of animate life and nature. The system of checks and balances is enforced by nature in ways which we cannot accept. They're enforced by mutual devouring and by disease and famine, and our problem is to find humane equivalents for these checks and balances in order to produce this state of equilibrium, which is the natural condition under which animal species can live and under which alone they can live satisfactorily. . . .

Now let us come back to the consequences of the rather rapid population increase which is going on in this country. One of the consequences, as Professor Spengler of Harvard has pointed out, is undoubtedly that the rise in the standard of living will certainly not be as great, in consequence of the population increase, as it would have been had the increase been less substantial. A great deal of the resources made available by increased productivity will simply have to go as part of the replacement of obsolete houses and instrumentation, and also simply to satisfy the needs of the new population which has come into existence. Then, there is another very serious and difficult problem. It is the problem of education. The difficulties we've already seen in the last few years — the overcrowding of schools and insufficiency of teachers, the fact that in many elementary schools there had to be several shifts of the children; and what we're going to see in the 60's is the same thing happening on an even larger scale in the high schools and universities. . . .

Another peculiarity which this increased population will have in this country, and indeed in most countries, will be this: the great increase of population will be in the cities. There will be an enormous increase in urbanization and something like three-quarters of all the inhabitants will live in cities of more than one hundred thousand, and some im-

mense number (I forget what it is) will be living in one or another of the ten super cities which demographers have seen for the end of the present century. It's worth while enumerating what these super cities will be and what numbers there will be. There will be a super city in Florida at Miami-Palm Beach of about nine million; there will be a super city at Washington-Baltimore, also about nine million; there will be an eight million city around Philadelphia; there will be a 23 million super city of New York; about an eight million super city of Boston; there will be a baby super city around Cleveland of only about six million; about ten million around Chicago; twenty million around Los Angeles; and about eight million around San Francisco.

You may well ask what sort of effect will this immense increase in urbanization have on the quality of individual life? Only too frequently people talk about increases of population solely in terms of the available food supply. The United States will certainly have plenty of food for a good time to come. But after all, it has been said that man does not live by bread alone; he has to live by many other things. And the question arises — what quality of life will there be in the heavily congested urban areas? I, myself, feel it already. It seems to me extremely bad for children to be brought up in these immense urban areas where they are totally out of touch with nature. . . .

Then, of course, numerous sociologists and psychologists have spoken of the strange psychological effect of living in these great cities, which have no real community sense at all. Baker Brown Nails, for example, has written on it; Arthur Morgan has written on it; David Riesman in *The Lonely Crowd* has written on it; Erich Fromm has written on the same theme. I think some of these complaints may be exaggerated, but nevertheless it does seem quite likely that this bringing-up in totally non-natural conditions, with atomized individuals in only a functional and not in a personal relationship with one another, may produce very serious psychological effects. . . .

In recent years the F.A.O. has reported some evidence that in certain countries the amount of food and goods available to individuals today is actually less than it was forty years ago, and quite recently UNESCO published figures showing that in spite of the immense efforts which are being made all over the world to combat illiteracy, the absolute number of illiterates is greater than it ever was before. Here, again, we see a picture of running as fast as possible in order not quite to stand in the same place. . . .

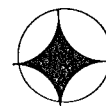
When we look at this situation and ask ourselves what is to be done, we see that, in fact, there are only two alternatives: one is that the underdeveloped country that wants to develop and raise its standard of living must be supplied with capital from the outside, from countries which have a surplus of capital; or, alternatively, they must do what the Ambassador of India is trying not to do (and thank God is trying not to do), make use of forced labor as capital, because you can use human beings as expendable counters in lieu of capital to a very considerable extent. And the great problem which confronts the world is whether the underdeveloped countries can achieve this improvement in their way of life without resorting to this substitute for capital, which is totalitarian control and the forced labor of the masses. . . .

Lord Orr is probably right in saying that there is about a 50-50 chance of getting over this terrible problem of raising the standard of living without resorting to forced labor. Of course, even under the most favorable circumstances it's not at all certain that there will be a success, and I think that what we shall see is this *Alice Through the Looking Glass*

picture of desperate running resulting only in standing in the same place. . . .

Needless to say, this state of affairs is likely to have very serious political consequences. With the frustration of the extremely high hopes with which all the newly independent nations have come into existence, there will grow up a sense of horrible disappointment. I think the consequences of this will be social unrest at home and intense envy and dislike of more fortunate nations abroad, and in certain circumstances a tendency toward aggressive action toward nations held to have greater resources than the ones feeling this pinch of frustration. And it's worth while pointing out that we are discovering now that it is perfectly possible for an underdeveloped country, provided it gets a certain amount of aid from abroad and provided it can impose forced labor upon its millions, to remain a country mainly peopled by men and women on a subsistence level and yet become a first-rate military power. It is possible to put the entire emphasis of industrial development into heavy industry and the creation of armaments. And this possibility, which I don't think was ever understood or realized until quite recently, poses an appalling fact, particularly in the context of the Cold War. And nobody has any idea of the consequences it may have.

Now, finally, what can be done? Speaking of the matter in ethical terms, you can ask the question: How can biological effects be reconciled with such a humanitarian ideal? Can we find humane and acceptable substitutes for nature's method



of balancing non-human population by means of hunger, disease and (among certain species of ants and among human beings, as these are the only creatures that make war) also by war. Can we find these more humane substitutes? This is the problem.

Now, quite obviously, two things can be done. One is to do everything possible to increase production, of both food and industrial resources. It is quite obvious that while the more prosperous parts of the world are spending about a hundred billion dollars a year on armament, the problem of the underdeveloped countries cannot be solved. I would like very much to see a Gallup Poll conducted among all the inhabitants of the earth, asking the question: Which do you prefer — to have enough to eat or to have nationalism and armies? And I think that if this question were honestly asked, I think the majority would say that they probably prefer to have enough to eat. But it would have to be stressed that they're not going to be able to have both. I don't think they *are* going to be able to have both. And as long as the nations, in the words of Lord Orr, remain insane, it's very unlikely that this 50-50 possibility of solving the overpopulation problem will be realized. Then, it is quite clear that whatever efforts are made to increase production, they will never, if the rate of increase continues indefinitely as it is, be sufficient to catch up with the enormous increment of human birth over deaths, and therefore it will become necessary, as the Ambassador pointed out, to introduce some system of birth control. . . .

But when you come to, first of all, the problem of increasing production, and then the problem of decreasing the birth rate, you find that you are up against the problem of educating enormous numbers of people. To increase the production of food you have to educate millions of peasants, change



their habits and introduce new forms of technology. And in order to change the reproductive habits of a great number of people, you have to have an educational campaign. It is perfectly obvious that this is an extremely difficult and arduous problem, but unless it is faced and faced with some degree of success, we shall see, as Lord Orr said, chaos in the world within 50 years. We shall probably not see it before then. But, as has been pointed out on several occasions in these discussions, it becomes increasingly necessary for us to become aware of the remoter future and to do something about that future.

And clearly, what is required, as the Ambassador points out, is, if possible, the production of an oral contraceptive or what is called in popular language "the pill." But unfortunately the production of the pill and the administration of it is a multiple problem. It is first of all a problem in chemistry, then it's a problem in medicine, then it's a problem of psychology, sociology and education — and even in theology. So that we have to attack this problem on many fronts at once. And incidentally, the pill isn't here! The only oral contraceptives that are here are very expensive, have to be taken every day, and have unpleasant side effects in many cases. So, that we are still quite a long way away from this ideal method of family planning.

Another thing that has to be remembered is that even if we get the pill and even, if by some miracle the birth rate were reduced overnight, say by 20%, there would still be in the next generation or so very formidable increases in population for the simple reason that the number of people in the reproductive age group is so very great at the present time. Even if their birth rate were 20% less than the birth rate at the present time, this great number would produce vast numbers of children. So nobody must imagine that this campaign of family planning is going to produce immediate results. It will not produce results, probably, in less than about a generation.

But unless it is adopted, the consequences (and I think most demographers would agree) will be completely disastrous. And here we have to remember that time is against us. We have to act with the greatest possible speed in this matter, otherwise the future fate of mankind may be completely disastrous and we shall then see what Lord Orr calls "chaos" and what I would call, in the context of this talk, a serious deterioration of the whole quality of human life due to this breakneck increase in quantity.

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**Dr. Dubos:** This is my last occasion to appear before you as chairman of this conference, and I should therefore take occasion of these few minutes to thank Dartmouth College for having organized a meeting which unquestionably has been stimulating to all the participants and we hope to all of you. But I should also try, not to summarize what has been said, but to tell you some of my personal reactions to it. But to do this as chairman of the conference would demand that I be able to be objective and detached, and I can assure you I am not an objective person. I always take sides. . . .

This afternoon, at the end of the panel, there came to me many representatives of the medical press and of the Boston and local press. And they were very much puzzled by the fact that out of our discussion this afternoon there did not arise any clear conclusion — something that could be stated as a set of beliefs on which all of us agreed. And I couldn't be more in agreement with them. There sure was nothing that we agreed on. And I tried to make clear to them that this was

the very purpose of our meeting; that we are not assembled here to solve problems. Our purpose is to *air* problems. Our purpose is to learn to state our problems and to state them as clearly and thoughtfully as we can, so that they can be better analyzed by the scientific community and so that the community at large — lay people — can struggle under our guidance to form its own opinions, often to be based on judgment of values.

Now this is a very difficult task for the press and the lay public. If I were to illustrate how difficult it is, even when each and every one of us tries to tell the truth as we see it, I need only take one example. And here I abandon any pretense of objectivity. You may have noticed that this afternoon Dr. Walsh McDermott casually made the statement that, "After all, it is not proven that medical technology has been as influential as people believe in bringing about the increase in population that we see all over the world." I now and then hinted at such things. Now you have seen the result: Dr. McDermott was qualified in the most dignified form of English language with the word "blarney."

Now, it happens that there were on that panel two members from the field of infectious disease, Dr. McDermott and I. We are the two specialists. Both of us, specialists, do not believe that medical technology is the main factor responsible for this increase in population, and the rest of the panel does not believe us. Or perhaps it is not the rest of the panel but is merely an expression in disguise — an expression of that very profound suspicion of the wisdom of scientists, which is prevalent all over the world, and even among the most distinguished thinkers in the world. . . .

I should like to continue in my French pattern, not as chairman of the committee, to quote one of the panelists this morning, who said that not so long ago it used to be thought that there is something peculiar, something unique to man, that makes man different from the rest of creation. And the way he said it, there is no doubt that in his mind, and he tried to convey to you his conviction, that now we are much wiser and much more learned and that we no longer believe that there's something unique to man.

Well, ladies and gentlemen, in my opinion if you start from the assumption that there's nothing peculiar to man, we have been wasting our time. Because what we have been talking about is not a kind of statistical morality that applies to living things at large. It's a kind of statistical morality, and a kind of individual morality, that has meaning only if we are referring to man as a very special living thing. I am not pretending for a minute that there is any scientific evidence that man is unlike the rest of living things. But certainly, in the most pragmatic sort of way, in an operational sort of way as a scientist, I know full well that each and every one of us has thought and has acted as if man *were* something peculiar, because if he were not, what Dr. Warren Weaver discussed about statistical morality, where he introduced a one-to-ten-million chance, would not apply at all.

There is, ladies and gentlemen, in my opinion, something peculiar to man and I think that if there has been any difficulty in our discussion during the past two days, it is that we have never been quite willing to say very forcefully that what we are speaking about is not just about living things but about man — whether man is something very special because of some act of Divine Creation, or whether man is something very special because we, being men, have so decided. So whatever happens tomorrow, I do hope that each and every one of us keeps clearly in mind that what we are talking about is not about life, not about living things, but about man who has created human civilization.

## Third Panel Discussion

### THE ISSUES INVOLVED IN INFLUENCING THE MIND

Chairman: RALPH W. GERARD

PROFESSOR OF PSYCHIATRY AND PHYSIOLOGY AND  
DIRECTOR OF LABORATORIES AT THE MENTAL HEALTH  
RESEARCH INSTITUTE, UNIVERSITY OF MICHIGAN

I would like to put before you my orientations of the problems of mind and its modification or control. A newborn baby is in effect a decerebrate animal. For a few years the nerve cells will develop, and for many years appropriate connections between them will become effective. This is achieved under the influence of environmental experience, and the behavior that becomes possible as a result of the development is appropriate or adapted to that environment. The development of the brain determines the kind of language a human will speak, determines the value hierarchies, determines to a considerable extent the personality. I have often suspected that in man, no less than in ducks, there is a considerable factor of imprinting, and that the first quacking object that happens to attract our attention determines whether we become Republicans or Democrats. The psychosocial input that brings about this brain development is supplied by family, by friends, by mentors in school and church and elsewhere, so that it is really true that society makes, as it is made by, social man.

A vehement statement was made by our distinguished Chairman last night to the effect that man is different from animals. I think he was wrong in what he said. Man is very little different — he's got a few ounces more brain, but individual man is not very different from individual primates. But collective men with their cumulative and universal culture are indeed a very different kettle of organisms. While we are on last night, I can't resist saying that it seemed to me that Dr. Dubos was inveigling us more with his Gallic eloquence than his Gallic logic in making the statement that he and Dr. McDermott, being the two experts on infectious disease, were therefore the two experts on population.

If society has to depend on the action of its members and has much influence on the formation of the brain and the mind, it certainly has the right to be concerned with what is written on its *tabula rasa*. Even if we do increase the efficiency from 15 to 20% there remains a limit to the capacities of the individual brain. I've always liked the story of Jordan, who before he became president of Stanford and the distinguished ichthyologist, decided that he was not paying enough attention to the students in his classes and that he would definitely get to know them. Asked some months later how this was working out, he shook his head sadly and said, "I gave it up. Every time I learned the name of a freshman, I forgot the name of a fish."

Society does have much to say about the kind of men it wants both in their breeding and in their nurturing, and I think the question of whether this is more or less easily done by a totalitarian society is equally salient as regards both aspects of the choice.

Well, who decides on what kind of men we want? Whether we want Alexanders, or Darwins, or Mozarts or Herculeuses? And I think this brings me to another point that I would like to say a word or two about. Science, in my judgment, is not ethically neutral and is not limited to giving us advice on the means to attain our ends. It has something to say about the ends themselves.

When collective man undertook to examine his world — first observe, then organize, then predict, and inevitably at-

tempt to control, first the physical, then the biotic and now the psycho-social realm — he gave himself over as much as he could to the rule of reason. The great engines of civilization are too complex to trust to guess and emotion; they require reason and foresight.

At least I think we could agree that science today can help exhibit clearly what the alternate consequences of alternate choices are, to the extent that we have the knowledge; and to the extent that we do not yet have it, we continue to attempt to gather it. If, for example, it could be clearly shown that one course of action committed the future of mankind to one alternative path, whereas another action left open for our posterity the choice of many faiths, would anyone fail to say that the latter decision was the wiser one? If it were possible to show, as indeed I think it is, that there is some golden mean of the amount of stimulation, or stress or environmental disturbance that must be given an organism, between zero which leads to stagnation and too much which leads to disruption, which is the most effective way of getting an active and full life? I think this could be accepted. It has been one of my themes for years that the whole course of biological and social evolution demonstrates that if we accept survival itself as a good, we must accept cooperation and altruism as comparable goods, because the history of living things shows that those species that went in for cooperation were biologically highly successful. I think we must accept the fact that we *are* our brothers' keepers. The question is: What are we keeping them for, or from? Not only starvation, but foolhardy acts and other things as well.

The problems today are overwhelmingly at the behavioral level. If we are going to have super cities, we must have some kind of super men to be able to get along with themselves in these cities. As I suggested yesterday, behavioral science is offering us solutions, and certainly many people are working intensively at finding them for the kinds of issues that have been before us through this entire Convocation: the relative value of an immediate good versus a later good, specialization versus generalization, of centralization versus decentralization. Much work is being done on these optimal tables of organizations for information flow in an individual brain or an individual organization like General Motors, if you will, and for decision flow in similar organized systems.

My time is running out, and so I shall not develop with you what I had hoped to present to the group, but I trust that in the discussion somebody will ask me about it, so I can talk about it. I would like to offer a concrete suggestion, from behavioral science considerations, how to prevent World War III and how to solve the problem of underground atom bomb testing. It is as simple as giving people who really want to convince others that they are telling the truth — heads of state and comparable figures, officially making a statement of policy — an opportunity to prove by lie-detection means that they are really telling the truth. Nobody will make anybody tell the truth. They can be given an opportunity to prove they are telling the truth when they so wish.

Speaker: WILDER G. PENFIELD, M.D.

DIRECTOR OF THE MONTREAL NEUROLOGICAL INSTITUTE  
AT MCGILL UNIVERSITY, 1934-60

TURN back with me some fifty million years and consider our common ancestor descending from the trees to stand erect and look about him at his world. Here was a creature able to observe the nature of things, because what has been called chance variation had endowed him with a larger brain,

prepared to deal with new projects. To his fellow anthropoids he must have seemed a most abnormal creature, a freak, that would surely come to some bad end and some members of this symposium seem to agree with this anthropoid opinion.

But man survived somehow, and through a vastly slow process of biological evolution he came to be the wise animal, species *homo sapiens*. He learned to speak and to write and to read. And after that, learning was cumulative. Teaching began in real earnest. Reason replaced instinct as a guide to behavior. Then it was — only a few thousand years ago — a new form of evolution began. Julian Huxley has described this as the growth of a body of ideas and of knowledge, shared by many members of human society. It depended not upon progressive change in the form of brain and body as Darwin's biological evolution does, but upon the accumulation of ideas handed down from generation to generation, social evolution; knowledge accelerates from year to year with startling speed while Darwinian evolution, since it is so slow, may be said to have stopped for us. Thus, in the ultimate sense it may be said that God created man, the heavens and the earth, but in an immediate sense man has created social evolution and only man can control it.

This body of new knowledge and ideas that man has created, this continuum of religions and ideologies, is flowing like a vast river of change, flowing through every city and hamlet in the world. In recent years natural science has swelled that flood with dangerous discoveries and many believe they hear the dreadful roar of waterfall ahead — the roar of doom. In spite of all these disquieting triumphs in the field of natural science, it's astonishing how little man has learned about himself, and how much there is to learn. How little we know about this brain which made social evolution possible, and of the mind. How little we know of the nature and spirit of man and God. We stand now before this inner frontier of ignorance. If we could pass it, we might well discover the meaning of life and understand man's destiny.

Dartmouth College has bidden us enter here — beyond this frontier — to discuss conscience, and this morning, particularly, to deal with the issues involved in influencing the mind. We all know that the minds of men can be influenced by teaching and preaching, by conversation and suggestion. Communist countries use propaganda to create a conscience in their citizens that will make them loyal to the state's own ideology. There's no advertising there, as we know it. That is a capitalistic phenomenon. Our advertising propaganda, with a little assistance from TV and with publishers' overtones, includes a bombardment of invitations to strong drink, the misuse of sex, the thrill of crime.

Now, these matters do not weigh directly upon the medical conscience. But alcoholism has become a disease of ever-increasing proportion. And the cause of disease is our concern. Excess is our concern either in work or play. It is bad for body and for peace of mind. But my job this morning is to turn to the physiology of the brain. Let me speak for a moment of the relationship of mind and body. There is no evidence of mental activity without brain action. And it seems a fair conclusion that each mental state and each voluntary act is accompanied by electrical potentials through brain circuits in a pattern that is specific for that state or action. But here scientific evidence stops. Conscience and thinking can be present only when currents of action are passing through the inner pathways of the brain, that is when the brain is working. And yet, one can direct and modify the action of the brain. I am, through the sound of my voice, directing the action of your brain. But my direction at best is only partial. You are considering, adding, rejecting, using your store of previous experience, your previous conclusions. You are from moment

to moment, pleased, amused, exasperated by what I say. You are working on a body of conclusions all through life. Conscience, as Dr. Chisholm described it yesterday in a boy of seven, is not the conscience of that boy at thirty.

How does the brain carry out this work which seems to be partly an automatic response to outside influence and partly from something initiated within? We cannot answer that question except in part. The brain is at work when electrical potentials are flashing along its nerve-fiber, nerve-cell circuit here and there, and back again. The connections within this master organ are so numerous, the choice of conductions so vast, how shall I describe it? Visualize, if you can, the far-flung system that includes all the telephones in the United States and Canada and the wires that connect them. Think of the electrical messages passing through this system. Condense the whole system, give it a central coordination, enclose it in one small skull and let it be carried about on two legs. That would be something like the human brain.

When currents and electric potentials travel along certain passages within the human brain, conscious thought is possible. But no one knows how it is that the brain's action is expressed in thought. No one knows how it is that thought initiates brain action. Portions of man's brain machine can be



forced into action and yet the individual is not fooled into the belief that he has made up his mind to anything or thought anything. Let me illustrate this. In many hundreds of cases, patients who are fully conscious have lain on my operating table while I explored the cerebral cortex, looking for the cause of their epileptic attack. As a guide in this search we have learned to touch the surface with an electrode, applying thus a gentle electrical current. The separate mechanisms of the brain's machinery can, sometimes, be set in motion that way; the hand can be made to move but the patient knows he did not make up his mind to do it; the current applied to other areas may cause him to see, or hear, or feel, but he knows that these are not impressions that come to him normally from his environment. Most surprising of all, an electrical stimulus applied to interpretive cortex in the temporal lobe may cause him to re-experience all that happened in some previous strip of time. The patient is suddenly aware of those things to which he paid attention then as though the stream of consciousness was flowing through his mind again. The time that is recalled may be recent, or it may go back to a much earlier period, even into childhood. The surgeon who holds the electrode cannot select one past experience instead of another, nor can he make the subject believe that he is really somewhere else in time or place. The patient knows he is on the operating table. He usually calls this second state of consciousness a dream, or he may say it's something like remembering but more real than that.

In certain undemocratic societies the procedure has been adopted called "brain-washing," during solitary confinement. There's nothing more scientific about this procedure than there was about the methods of imprisonment, torture and persuasion formerly used by despots and states and Church. Men's resistance to such things has varied since the time of the early Christians down to the present. Professor Donald Hebb in an admirable scientific study at McGill University examined the effects of nearly-complete isolation of an individual from all avenues of sensation. He found that the mind of the subject was soon filled with foolish fantasies, but

he found no method of controlling the thinking of the subject. The use of pillows — that whispered propaganda while subjects slept — was effective in the pages of Aldous Huxley's brilliantly imaginative book, *Brave New World*, but there's no evidence that I know of that a man who is unconscious from sleep or any other cause can be persuaded of anything, least of all of something he does not want to believe.

I shall not discuss hypnotism or subliminal suggestion by advertising. Neither procedure, I am told, has any long-lasting brain alteration.

In conclusion, it is fair to say that science provides no method of controlling the mind. Scientific work on the brain does not explain the mind — not yet. Neither the work of Pavlov on conditioned reflexes nor that of any other worker has proven the thesis of materialism. Surgeons can remove areas of brain, physicians can destroy or deaden it with drugs and produce unpredictable fantasies, but they cannot force it to do their bidding. . . .

"Modern Medicine" as used in the title of this symposium means, I suppose, scientific medicine in contrast to older traditional practice. But do not forget that medicine is an art as well as a science, and unlike some other arts it has in it a religion of its own. The art and the religion are very old, older in fact than Christianity. There is goodness and compassion in every man. Sometimes it is well hidden, I admit, but in my experience it is always there. Here is the ancient source from which medical religion was drawn — the innate kindliness in man, himself. Here is the hope for the future of man, and evidence, too, if you like, of what the intent behind Creation may have been. Science is another matter. It has grown and changed from year to year, and therapy has known its fads and fancies, but the art of medicine with its own peculiar ethics has in it an eternal quality derived from life itself. . . .

Dean Marsh Tenney said at the opening meeting of this symposium, "Science cannot be immoral and science cannot create morality." This is true, but philosophical and religious thought has been retarded by the general impression that



science had proven something in this sphere. Physician and scientist must make reasoned conclusions each for himself. Turning from science, to look at his own brief life, at his family, and at society as it is, like all other men, he would do well to turn back to man's ancient faith. Many a son sees misinterpretations in the religion of his father, but the Great Truths are there too. The brain of man today is no swifter than the brain of man when these truths were formulated.

Let us take, then, the best conclusions of the past and create a working religion, — a faith that will seem reasonable to all men, — one they will welcome. How? I do not know. The world has need of great religious leaders, men who like Gandhi will discard no good thing in the faith of Christian, Mohammedan or Hindu, men who will show us how to live by our beliefs. As Hippocrates turned from the practice of a profession to a code of ethics, so all men must turn from the rush of life to discover a reasonable faith. Only an interpretation of religion suited to these times can create in the hearts of men of every nation a better conscience. Make them see that they must love their fellow men everywhere or be destroyed. Only this, I say, can save this unbridled generation rushing on, confused, to self destruction.

Speaker: SANDOR RADO

PROFESSOR OF PSYCHIATRY AND DEAN,  
THE NEW YORK SCHOOL OF PSYCHIATRY

TODAY, a fit of rage may terminate civilization. Rage is the enemy of civilized man. The Cave Man lived by the strength of his rage, his automatic resort to violence. Since contemporary society depends for its survival on peaceful though competitive cooperation, society must, through its institutions, tame rage, check the resort to violence, and expand fellow feeling by educating the individual's enlightened self-interest to embrace the general welfare.

Self-domestication of the human species has been going on for millennia. In this evolutionary process — from place to place and from period to period — many elements of the moral code underwent changes. But the necessity to curb rage and violence remained. The organism had to develop, and did develop, machinery for making the moral code effective. From our medical point of view, we call the components of this organic machinery the mechanisms of conscience. Let me indicate briefly what we — in adaptational psychodynamics — have learned about conscience: how its executive mechanisms are seen to evolve in the child, how it works and how we may attempt to increase its effectiveness.

Adaptational psychodynamics is a young science; building upon Freud's fundamental discovery, its aim is to develop an introspectational branch of human biology. In this framework, conscience may be defined as an organization of self-restraining and facilitating mechanisms concerned with the regulation of human conduct. Its working, like other phases of central integration, evidences the organism's basic orientation towards repeating pleasurable experiences and avoiding painful ones. While remaining susceptible to social influences throughout the life span, conscience originates in the child's dependency relationship to his parents. At one point the child thinks, "If I do this, mother will say . . ." From here on, through repeated anticipation of parental criticism, the child acquires the capacity for self-criticism. Repeated parental threats, fear of punishment, fear of losing the parents' loving care are the motives that enforce obedience. Rage in the child leads to defiance. The disobedient child is punished, but he soon finds out that he can be punished only if detected. Prompted by defiant rage he now seeks to conceal his wrongdoings.

The child's continued reliance on his experience, the discovery that he can escape punishment by avoiding being caught, halts his moral development at this stage. Further moral advance is initiated by his growing conviction that the Authority — God, parent — knows, sees and hears everything. This conviction gives rise to the fear of inescapable punishment, or briefly, the fear of conscience. This is the only true mechanism of self-restraint. It obviously may reflect the influence of religious instruction though its roots lie deeper. I have seen psychiatric patients who were brought up by agnostic parents and who literally had never heard of God; nonetheless, they had a strong fear of conscience. The omnipotence that the child attributes to his parents stems from his primordial illusion that he is omnipotent himself. He develops this fateful generalization when he gains control of his hands and feet. Forced by experience to delegate his limitless power to his parents, he of course expects them to use it *for* him; alas, they also use it *against* him. Belief in omnipotence is reinforced rather than created by religious instruction.

While the fear of detection has its effect, it may be too weak to restrain defiant rage, but fear of inescapable punishment can do it. What happens is this: when defeated, defiant rage automatically turns around and is then vented on the

self. One may catch the child wildly beating his head with his fists. He later abandons his muscles and learns to belabor himself by means of self-critical thought. Retroflexed rage helps fear of conscience to repress defiant rage and to keep the temptation to reactivate it in check. The enemy — defiant rage — is thus conquered with the aid of its own deserter — retroflexed rage. The vehemence of self-reproach and, as we shall presently see, of self-punishment is no direct reflection on the quality of parental reproach and punishment; it is a measure of the individual's own retroflexed rage.

However, even the fear of inescapable punishment may be defeated by the combined power of prohibited desire and defiant rage: the child transgresses — with compunction. His *guilty* fear of inescapable punishment, far from being an added restraining force, is but a signal that his security is endangered. It brings into play the reparative procedure of expiatory behavior taught him by his parents: he is reprimanded, must make a confession, take his punishment, promise never to do it again, and ask for forgiveness.

This pattern becomes the starting point of momentous developments. Through repeated anticipation it too becomes absorbed and automatized. Thus, parental reproach gives rise to self-reproach; parental punishment to self-punishment; parental forgiveness to self-forgiveness. In the course of time, this expiatory procedure can become completely automatic: the child, and later the adult, executes the pattern without having the remotest inkling of what he is doing. Even in the adult's mind, hidden from his awareness, his automatized expiation remains addressed to his parents. Hoping for forgiveness he punishes himself, but all that he (and others) are actually aware of is that somehow he has unintentionally done himself an injury.

Automatized expiation, while serving as a channel for the discharge of overflowing tension, defeats the purpose of healthy conscience; it belongs to the pathology of conscience. Voluntary repentance too becomes a menace if the repentant exalts the suffering he has inflicted upon himself into license to commit fresh offenses towards others. Such types have been described by Dostoevski, the finest literary expert in the pathology of conscience.

Under the pressure of retroflexed rage, many individuals develop guilty fear — from imagined guilt. They are then bound to torture themselves unendingly — for the benefit of no one. The more preoccupied an individual is with quieting his needlessly troubled conscience the less he has to offer to himself or to the community.

With its rage turned against itself the organism is safe from the danger of destroying others. But now it faces the danger of destroying itself — on the installment plan. One sees the consequences in every branch of clinical medicine. To allow retroflexed rage to dominate conscience is dangerous.

This takes us back to the problem of rage. At some future time, we may be able to reduce the strength of rage by some biochemical control, if not through modification of the human organism. At present, we are trying to do it by a psychotherapeutic procedure known in the terminology of the science of adaptational psychodynamics as "rage abortion."

The other crucial point is that guilty fear and the purely emotional repair work of expiation have little value in adult life. The rational response to one's wrongdoing is to apologize, pay damages, and be satisfied with learning one's lesson for good. Conscience need not be dominated by mechanisms of the stern punishment system under which the child is rarely if ever rewarded. We arrive at very different results by using the appreciative reward system, under which the child is rarely if ever punished. Thanks to the same processes of repetitive anticipation, parental reward creates in the child the

automatic mechanisms of self-reward known as self-respect and moral pride. By shifting the emphasis from inhibition to facilitation, the reward system builds a healthy conscience: we give the child ideals, ingrain in him the value of integrity and courageous enterprise for their fulfillment. Under the reward system, we teach him to use his emotional resources for the intelligent pursuit of adaptive — i.e. realistic — goals. The guiding influence of intelligence and reasonable judgment on the emotions will make him more able to meet the responsibilities and seek out the opportunities he will be facing in life. It will help him to unfold in full whatever capacity he has for creative achievement. There is no substitute for self-reward: it is the emotional experience that makes man self-reliant. In the long run, if he succeeds in developing this pattern he is bound to win the recognition of his fellows.

The punishment system succeeds least with the self-willed child who needs help most. By provoking his enraged defiance, it tempts — if not prompts — him to do precisely the things which are prohibited. His only resource for conquering this temptation is to strengthen the inhibitory action of his guilty fear by automatically turning more of the torrent of his outward bound rage back against himself. But the next provocation gives added strength to his defiant rage, and with it to his temptation to transgress. The now necessary counter measure — reinforcement of his guilty fear by still more retroflexed rage — creates an ever mounting tension. The vicious circle is established. Observation shows the outcome: his capacity for productive performance will fall approximately at the same rate as his inner tension rises.

The reward system, instead of pinning the child's attention to things prohibited, lures him to constructive goals. Rather than increasing his fears, guilty fears, rages and retroflexed rages, it awakens and fosters his *desire* for reaching these goals. This way, it sets the stage for pleasurable activity and fulfillment. It teaches the child to experience moral pride and enjoy socially justified self-respect. He will thus be prepared for treating others with sincere consideration and respect. Though the reward system calls for lenience, it steers clear from indiscriminate "permissiveness." The latter attitude is anything but educational; it is usually resorted to by parents who are both frightened and misguided.

The here outlined propositions of adaptational psychodynamics derive from clinical observation. It would be desirable to test the validity of the whole conception on a larger scale by a special experiment in the upbringing and education of a group of children.

Rage is an open threat to the survival of the species. Retroflexed rage, by means of which traditionally organized — that is, punishment-centered — conscience operates, is an insidious threat to the health and life of the individual. In order to prevail against these threats, maximal research effort should be made towards reducing the strength of rage to manageable levels, and towards improving the traditional organization of conscience.

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**Sir Charles Snow:** I was fascinated by Dr. Rado's exposition. I thought, almost from the beginning, that the title of this convocation would have been easier for some of us if *moral nature* had been substituted for *conscience* in the actual assignment. I agree that conscience, for me certainly, has this inhibitive meaning, and I think for most persons who are interested in people in the literary sense. And as Dr. Rado was talking, I had one question to ask him, because to me it's obvious that what he would like to do, and we would all

like to see done, is going to be very much more difficult with some people than with others. This is not a thing where people start alike. And this seems to me to be one of my few quarrels with this kind of approach: it seems to be based upon romantic statistical optimism, so to speak.

I was thinking of the example he gave of the great expert on the pathology of conscience, Dostoevski, on which we should all agree. And then I was thinking of the two other experts on the pathology of conscience, Kafka and Kierkegaard. The three are not very similar but they have elements in them that are similar; they're all very marked examples of the inhibited functions. But I would have thought that there was a profound innate difference. Dostoevski, to his great good fortune, happened to be a man of very strong sexual temperament, which saved him from the worst inhibitive effects of his conscience and gave him the possibilities of self-reward. The other two, it seems to me, haven't got that great good fortune to have an abounding sexual temperament, which even Dostoevski had to fight his way towards. They, unfortunately, appear to have been made sexually impotent by the inhibitive effects of their conscience, and never got beyond the narrow streamlined reflection of what the inhibitive conscience really means. It seems to me you'll find that kind of contrast through a whole variety of the best of the population. You're going to find people will take — in Dr. Rado's language — to self-reward and be valuable to us in developing moral pride and all these things which we're exhibiting so triumphantly and suggesting for the future of the human race. But you're going to find people with whom it's much more difficult, and I would like to know if Dr. Rado has any feeling for the possibilities of the statistics? About how many people can you really do something with and how many you can't?

**Dr. Rado:** I'm afraid Sir Charles got me on our weak point of statistics. A practicing psychiatrist can talk only about his clinical observations and he calls them, euphemistically, "clinical impressions." Between "clinical impressions" on the one hand and statistics on the other hand there is a huge gap. Relying on my clinical impressions (live impressions), my feeling is that mistakes of traditional education, instead of bringing out the best that is available in these people, drives some of them into doing the wrong things. Because prohibitive education often defeats its purpose, because the inhibition tends to facilitate the opposite, it leads to transgression. That's the main point.

Now, how many people are capable of improvement? This amounts to asking what is the general level of intelligence . . . and to what extent can the level of intelligence be raised? I have talked a good deal in Europe with peasants, simple farmers, and was often amazed by their intellectual resources. It is true these resources are usually underdeveloped, but I am sure education would do a great deal more for these people. In consequence the general level of decency would also rise.

**Mr. Huxley:** May I bring out a point here as to what is happening in the problem of rage and frustration. I think we have a lot to learn from the way the Greeks treated the irrational side in man. Many other societies, of course, have found the same way of coping with rage and frustration, which is not merely to have psychotherapeutic methods of dealing with it but total physical and muscular methods. For example, I went to Brazil. There unfortunate Negroes in the slums of Baia and Rio work off the rage and frustration of a perfectly intolerable life in these night-long weekly dances. It

was very interesting to see; when one watched them, one could see exactly the same movements which were described in Greek Minoanism, the tossing of the head and so on, and one can see that this psycho-physical method — physical in relation to some kind of religious notion — is of the utmost importance.

It has always struck me that in modern psychiatry there is a terrible lack of dealing with the body as a whole. I mean, Freud tended to disregard the body, except as the two ends of the digestive tube — there was just the mouth and the anus — and nothing else! After all, there is something in between! And unless we cope with this and know what to do with it, I think we shall remain extremely impotent in the question of taming rage and frustration. And I think, as I say, there is a great deal to be learned from the Greek experience in this field.

**Dr. Rado:** I am advising people to keep a punching bag in the bath room and ladies a rag doll for the same purpose. What I want to say about Mr. Huxley's reference to Freud is this: I don't want any misunderstanding. This type of work I was reporting on is based altogether on Freud's fundamental discoveries but departs from his parables, from his metaphysics, and from his substitution of mythology for science.

**Dr. Chisholm:** Mr. Chairman, may I pick up a reference you made to the necessity for creative thought and imagination. I have the impression, and it's not more than an impression, that much of imagination which should be healthy and active has in fact been crippled by a too rigid internalized conscience control in childhood when the child got the impression from rigid parents, or relatively rigid parents, that to think in particular ways is good, to think in other ways is bad. And this becomes confused with the morality which in all our cultures is applied and must be applied to behavior. But many children confuse thinking with behavior, and can also apply the moral terms to thinking, which I believe should be confined to control of behavior, because if thinking can be bad, then imagination inevitably, I believe, is crippled, because there will be areas into which the child thinking is not allowed to adventure. This can carry on all through one's life. So that we find very large numbers of physically adult people who have closed areas in their minds which are not open or available for exploration; whole areas of human experience that are taboo from the point of view of their thinking. They're not allowed, by themselves, to think in these areas, because these were areas in which behavior was discouraged often by punishment when they were children.

I am very glad that Dr. Rado made a clear distinction between the reward system rather than a punishment system and the permissiveness which many psychologists are accused of upholding but which one finds very rarely upheld by any psychologist or psychiatrist — that is, an entirely permissive system.

I would believe that this question of the crippled imagination is one of the most important psychological questions that is facing the health professions now. And until we can loosen up our imaginations, we cannot use them for the full purpose and to the full extent of their potentiality. Imagination has some extremely important functions not fully used by most people yet. That is the exploration function.

**Dr. Weaver:** I had rather hoped that this would be introduced by one of my youngsters and betters, but since no one else has, I'm going to mention what is obviously a controversial topic, but one which I think we all ought to think

about. We have been discussing different ways in which the mind is affected and I think we should think for just a moment of the possibility of direct influence of mind on mind. I am in fact referring to that embarrassing, partially disreputable but nevertheless challenging body of phenomena known as "extrasensory perception."

I would like to mention the fact that I find this whole field intellectually a very painful one. And I find it painful essentially for the following reasons: I cannot reject the evidence and I cannot accept the conclusions. And I really don't know what anybody brought up in the scientific traditions does in those circumstances. A good many of my friends get around this difficulty by refusing to think about this topic at all. This is a kind of retreat and perhaps it is the only tolerable kind of retreat.

I cannot accept the conclusions of extrasensory perception because I simply cannot believe a body of phenomena that seems to fall so totally outside the classical framework of scientific procedure and scientific concept. I can't accept something that so totally overthrows all of the space-time order on which all of the rest of our science is based. I can't accept something that insults the whole notion of order of time, in which not only effect precedes cause, but knowledge of the event precedes the event. I cannot accept it. But on the other hand, I do not find it possible to reject the evidence. . . . I am absolutely convinced that there is something there; what there is there I do not know, and I must say that it worries me very deeply.

**Dr. Gerard:** May I suggest the answer to you? Accepting the statistics and accepting the incompatibility of the conclusion with practically all of our modern physical science, positives of science, my suggestion is that these few people for whom it has proven statistically valid have additional sensory modalities. Some few human eyes have been shown to have extraordinary perceptual capacity. There are other ways of looking at this than throwing out the baby or keeping the bath.

## Honorary Degree Assembly

*Speaker:* SIR CHARLES SNOW  
AUTHOR AND SCIENTIST

I THINK that in giving this address this afternoon, the most useful thing I can do, if only to clear my own mind, is to say what this symposium has and has not done. My feeling is that on the whole we've asked a number of the right questions, and questions of great importance and of considerable intellectual and moral difficulty. I don't think that we've found the right answers. I don't think it was feasible that we should find the right answers, and that is no great discredit to us.

If we seemed to suggest a lack of humility, which is inappropriate in these circumstances, so difficult and in some ways so grave, then that's a personal fault that we shall be responsible for. But on the whole, I would have thought that — to an extent at least — some of the questions have really been asked. And here I would like to say that among a great many of the participants, by far the greater number, there was complete unanimity on the major questions to be asked. I have to say that I thought the last speech of Dr. Dubos last night gave

a quite inaccurate impression of the general feeling among the participants in your symposium. We differ in a number of attitudes and Dr. Wilder Penfield showed you in his most moving speech this morning that he is a man of deep religious faith in the normal sense. Many of us have not that support and would, I suppose, call ourselves some kind of humanists.

But on the major questions, nearly all the participants, I think all here this afternoon, and all perhaps but one or two of our American colleagues, are in substantial unanimity on the major things which men have got to apply their minds and their moral natures to.

It seems to me that our proceedings fell into three divisions, though in fact it wasn't the chronological order, because this morning, having talked a good deal about conscience in modern medicine, it occurred to us to ask what conscience was. I think that was a very sensible thing to do and perhaps we should have done it earlier. We discussed that in different ways. Dr. Penfield talked, as one of the great brain surgeons of the world, of the relation — I think he would say — the absence of determinable relation between brain and mind. As is fitting in a country which is the psychoanalytical capital of the world par excellence, we had a most interesting discussion of the psychoanalysis of conscience. And I think we all thought that Dr. Rado gave a wise and humane treatment and drew a division between conscience which is an inhibitive and negative factor and conscience which acts as a self-rewarding system and makes people feel good when they do good, which is a very satisfactory state to be in, granted to few of us.

I felt an absence of any social discussion of conscience, of man's moral nature, and I suspect that is a gap rather common in my country and yours that we ought to be thinking about more intensively than we are. These are not so completely individual problems as we're sometimes inclined to think. There were remarks about this thrown out in the course of the discussion, but we never got nearer than just mentioning that collective man was involved, although I know that Dr. Gerard and others, and Dr. Weaver, feel very strongly upon this point. But having said something about the nature of conscience itself — I think that instead of "conscience" I would prefer the term "man's moral nature" — we then succeeded in distinguishing between two kinds of problems of conscience with which modern medicine is concerned.

The first is very old. It is the set of problems which beset any practicing physician in the course of his relations with his patients. It is very important not to forget the moral nature of the doctor-patient relationship. We didn't talk much about it because we were all pretty satisfied with what is generally established in this relationship. In many ways, indeed, it seems to me a thing which is very sacred and ought not be intruded upon unnecessarily. It is partly for that reason that we didn't give more than a dismissive word to euthanasia and Sir George Pickering remarked that doctors really are designed to heal people and not to kill them and that it would be unfortunate if homicidal doctors were really let loose. And he further said he thought that if euthanasia was in fact decided by society, it would have to be a decision society as a whole, and then society ought to provide not doctors but, as it were, licensed humane executioners to perform the act. . . .

The section on private morality did not worry us. We all feel a deep respect for the doctor-patient relationship, and if I appear to brush it to one side, it is simply because we had nothing original to say. But let us not forget that it is in fact the foundation of all real medicine.

But we came then to another and much more difficult kind of morality, which Mr. Warren Weaver at our first meeting

christened "statistical morality." And this seems to me indicative of the kind of trouble which, in the complexity of our world, men are bound to run into. I think I said myself that we are more "members one of another" than we ever could have been in St. Paul's time. Every action of ours has a possible effect, not only in our own circle, not only in our own country, but conceivably to people we don't know and never shall know. This is the nature of a highly articulated world. And so one can perform acts which are in themselves innocent acts, or even good acts, which nevertheless with sufficient foresight and sufficient intelligence one can see bring the risks or indeed the certainty of disease and death, perhaps, to people who are anonymous and have left no mark behind them.

The kinds of act of which we were thinking are those, of course, concerned with the production of radiation, the pollution of the air, even the making of automobiles. All these things are acts which society does — which are done by good men, by men who wish no harm to anyone. And yet, the necessary result of these actions is that harm is inevitably done on a statistical basis. This is a terribly difficult problem to cope with either meditatively or in reality. Mr. Aldous Huxley said very wisely: "You can't write works of art about problems of statistical morality." That is true, and yet, unless we think of it, unless we apply our minds to it, we shall be leaving the world worse off than we found it.

And this can happen positively or negatively, and statistical morality, I think, can operate in various ways. Think of the deterioration in the human gene pool, a subject dear to the heart of Dr. Muller. It is in fact true that owing to good actions performed by doctors and to their conquests of various diseases, owing to their ability to keep people alive who otherwise would not have been able to keep alive, and therefore would not have been able to propagate the species, the actual stock of genes is likely to be slightly worse — it's certain, in fact, to be slightly worse — than it was a hundred years ago. That is an example where absolute good actions are doing a finite statistical harm to the race. On the other hand, you have a neutral act like letting off an explosive, which is not a bad thing in itself, and won't do very much harm. It's only what it portends that worries me rather than what it does. And yet if enough of these are let off, then in fact the amount of radiation present in the world's atmosphere will gradually become such that a few children will inevitably die of leukemia, children whom we shall never know and whose countries we shall never know.

All these problems are difficult to grasp and yet intrinsic in the nature of our highly articulated scientific society. How are we going to find a way through them? No one, I think, at this symposium and no one that I've heard of in the world is very clear. But it is certain that as components of conscience we shall have to add foresight and intelligence, and we will try to invent phrases like "the developed conscience," "the developed imagination," with which large numbers of men must become possessed, if this world is going to be safe, or if indeed it is not going to be in serious risk of major catastrophe.

We had extremely impressive speeches on one of the ugliest major catastrophes that now threatens our species. We had these from Dr. Brock Chisholm and from the Indian Ambassador, who made, if I may say so without impertinence, the bravest speech I've ever heard from an Ambassador (a class of men not given to bravery) and by Mr. Huxley. And I believe, if for no other reason, those three speeches would completely justify the holding of this symposium. They were said with the deepest concern for all the moral sensibilities of man; they were utterly realistic, and they left one

with the feeling with which we should be left, for we are very near the brink of a rather unpleasant cliff.

What can doctors, scientists, responsible men do? Again we will agree, the important thing is first to tell the truth. And there are two components of telling the truth. It's very important that scientists, doctors, responsible men shouldn't exaggerate a possible danger for the best of reasons. It does harm if people overestimate the amount or the danger of radioactive fallout. The scientist must say that the upper limit is this, the lower limit is that. Between the two we have to guess. For if for whatever reason one departs from the strictest scientific honesty, even to warn people, then in the long run you're going to do much more harm than good. We stress that very heavily and I'm sure we're right to stress it very heavily. I've seen dangers of that kind in my own time, and it is a thing for which we should be constantly on our guard.

But of course there is another warning about telling the truth. There are several topics in this world (several of them were touched on with great nakedness at our symposium) which are bound to infringe on serious politics. That is quite inevitable, because politics are just the actions of men like ourselves. We were dealing with some of the scientific problems which are nearest to the lives of men like ourselves. It is quite impossible for these to be *not* associated with violent political emotion. Nevertheless, it is absolutely imperative that serious and responsible men shall not be frightened off. It is not enough for scientists to make statements of the greatest possible truth; they must have the courage to carry those statements through because they alone know enough to be able to impress their authority upon a world which is anxious to hear, if it can only find voices which can speak with enough clarity and, I think I must say, enough noise.

Well, I think that is a pretty fair representation of how far we got. But I shouldn't like to end on this note of impending doom, because, in fact, we have done not badly but rather well. Let us count our blessings for a moment. Turn back twenty years. As a matter of fact twenty years ago bombs were dropping rather uncomfortably near to us in London, but that is an interlude. Turn back twenty years in your history. We were without antibiotics. Think of the release from suffering, the gain in life's health and joy which have come through that invention. Many of our difficulties arise from just that success — from just that abundance. There are problems. They're very difficult problems, but they come because we have done very well. There's much evil in all of us and much stupidity. But there is a certain amount which is not evil in nearly all of us, and in most of us there is a certain amount which is not stupidity. And out of that mixture of good will and intelligence men have done most wonderful things in our time. Life is richer and healthier, not only in this great rich country but in much simpler countries, than it's ever been in human history.

But we must remember that the way before us is very rough. There is no doubt about that; the human race for various reasons has come through to a particularly pretty patch. This comes through partly because of its own marvels, its own skills, its own good will, its own ability to heal many of its sufferings. And so, let us think — after all, things might be much worse. And things might be much worse because of the efforts of some of these colleagues of mine here, who have through their researches, through their benevolent contributions to mankind, made our lives sweeter, longer and healthier than they otherwise could have been.

And so, in this most beautiful place, Mr. President, I ask our audience just for once to conquer the Western malaise and count the benefits we have.