

THE CHALLENGE OF MAN'S FUTURE

WHEN WE LOOK at the world situation solely from the point of view of technological and energetic feasibility, we must conclude that the resources available to man permit him, in principle, to provide adequately for a very large population for a very long period of time.

There are, of course, physical limitations of some sort which will determine the maximum number of human beings who can live on the earth's surface. But at the present time we are far from the ultimate limit of the number of persons who could be provided for.

If we were willing to be crowded together closely enough, to eat foods which would bear little resemblance to the foods we eat today, and to be deprived of simple but satisfying luxuries such as fireplaces, gardens, and lawns, a world population of 50 billion persons would not be out of the question. And if we really put our minds to the problem we could construct floating islands where people might live and where algae farms could function, and perhaps 100 billion persons could be provided for. If we set strict limits to physical activities so that caloric requirements could be kept at very low levels, perhaps we could provide for 200 billion persons.

At this point the reader is probably saying to himself that he would have little desire to live in such a world, and he can rest assured that the author is thinking exactly the same thing. But a substantial fraction of humanity today is behaving as if it would like to create such a world. It is behaving as if it were engaged in a contest to test nature's willingness to support humanity and, if it had its way, it would not rest content until the earth were covered completely and to a considerable depth with a writhing mass of human beings, much as a dead cow is covered with a pulsating mass of maggots.

For population densities to reach levels much higher

than those which exist in present-day agrarian cultures, a great deal of technology is required. India, for example, could not possibly support her existing high population density without the benefit of the knowledge and materials she obtains from the industrialized society of the West. Without the existence of an industrialized society somewhere in the world, disease could not be effectively controlled and there would be no transportation adequate to the shipment of food from areas of surplus to areas of deficiency.

As is indicated in an earlier chapter, within a period of time which is very short compared with the total span of human history, supplies of fossil fuels will almost certainly be exhausted. This loss will make man completely dependent upon waterpower, atomic energy, and solar energy—including that made available by burning vegetation—for driving his machines. There are no fundamental physical laws which prevent such a transition, and it is quite possible that society will be able to make the change smoothly. But it is a transition that will happen only once during the lifetime of the human species. We are quickly approaching the point where, if machine civilization should, because of some catastrophe, stop functioning, it will probably never again come into existence.

It is not difficult to see why this should be so if we compare the resources and procedures of the past with those of the present.

Our ancestors had available large resources of high-grade ores and fuels that could be processed by the most primitive technology—crystals of copper and pieces of coal that lay on the surface of the earth, easily mined iron, and petroleum in generous pools reached by shallow drilling. Now we must dig huge caverns and follow

*This article has been adapted from the concluding chapter of the book, *The Challenge of Man's Future*, by Harrison Brown, to be published March 19, 1954, by The Viking Press*

Population figures and living standards are still on the rise. How long can it last? A considered analysis of what's ahead for all of us.

by HARRISON BROWN

seams ever further underground, drill oil wells thousands of feet deep, many of them under the bed of the ocean, and find ways of extracting elements from the leanest of ores—procedures that are possible only because of our highly complex modern techniques, and practical only to an intricately mechanized culture which could not have been developed without the high-grade resources that are so rapidly vanishing.

As our dependence shifts to such resources as low-grade ores, rock, seawater, and the sun, the conversion of energy into useful work will require ever more intricate technical activity, which would be impossible in the absence of a variety of complex machines and their products—all of which are the result of our intricate industrial civilization, and which would be impossible without it. Thus, if a machine civilization were to stop functioning as the result of some catastrophe, it is difficult to see how man would again be able to start along the path of industrialization with the resources that would then be available to him.

Should a great catastrophe strike mankind, the agrarian cultures which exist at the time will clearly stand the greatest chance of survival and will probably inherit the earth. Indeed, the less a given society has been influenced by machine civilization, the greater will be the probability of its survival. Although agrarian societies offer little security to the individual, they are nevertheless far more stable than industrial ones from a long-range point of view.

Is it possible to visualize a catastrophe of sufficient magnitude to obliterate industrial civilization? Here the answer must clearly be in the affirmative, for, in 1954, it takes no extraordinary imagination to foresee such a situation.

It must be emphasized, however, that industrial civilization can come to an end even in the absence of a major catastrophe. Continuance of a vigorous machine culture beyond another century or so is clearly depend-

ent upon the development and utilization of atomic or solar power. If these sources of newly applied energy are to be available in time, the basic research and development must be pursued actively during the coming decades. And even if the knowledge is available soon enough, it is quite possible that the political and economic situation in the world at the time the new transition becomes necessary will be of such a nature that the transition will be effectively hindered.

At the present time a part of the world is agrarian and another part is either already industrialized or in the process of industrialization. It appears most unlikely that these two greatly different ways of life can co-exist for long. A world containing two major patterns of existence is fundamentally unstable—either the agrarian regions of the world will industrialize or, in the long run, the industrial regions will revert to agrarian existence.

That the agrarian regions of the world will attempt to industrialize is unquestionable. We see about us today signs of revolution, of reorganization, and of reorientation of goals leading toward the creation of local counterparts of Western machine culture.

The search for greater personal security, longer life, and more material possessions will force the agrarian regions of the world to attempt to industrialize. But the probability of their succeeding in the absence of a major world catastrophe in the near future is small. There are clearly paths that could lead to a successful transition in the world as a whole. But the nature of man makes remote the possibility that the steps necessary for complete transition will be taken. The picture would change considerably if Western machine civilization were to collapse, thus giving the present agrarian cultures room into which they could expand.

Collapse of machine civilization would be accompanied by starvation, disease, and death on a scale difficult to comprehend. In the absence of adequate sanitation facil-

ities, the ability to inoculate against disease, facilities for food transportation and storage, factories for producing items which are essential to the maintenance of life, the death rate would reduce the population to a level far below that which could be supported by a stable agrarian society which practices intensive agricultural techniques. There would be such violent competition for food that savagery would be the heritage of the survivors. Human life would be confined once again to those areas which can be most easily cultivated, watered, and fertilized, and the principles enunciated by Malthus would once again become the major force operating upon human populations. Only very slowly would the number of persons climb to the level which could be supported by a world-wide agrarian culture—about 5 billion.

The agrarian society of the future

The characteristics of the agrarian society of the future would probably be very much like those of most parts of China today or like those of societies which existed in Europe as late as the early eighteenth century. The ratio of available food to total population would be low. There would be no large-scale industries, for metals would be practically non-existent and the only sources of energy would be wood and waterpower. Lack of adequate supplies of metals would prevent the widespread use of electricity. Although parts of society would benefit from accumulated knowledge concerning public health and human biology, death rates would be high. Antibiotics and vaccines would be non-existent. Birth rates would almost certainly lie close to the biological maximum.

Although machine civilization as it exists at the present time is unstable and may revert to an agrarian culture, it is important that we examine ways and means whereby stability in a world industrial society might be achieved. Can we imagine a sequence of events that might lead eventually to industrialization of all peoples of the world? And can we further imagine political, economic, and social structures that would permit the resultant society to maintain a long-range stability?

The most immediate danger

Perhaps the most immediate danger to confront machine civilization is war. It is clear that industrial civilization cannot afford the luxury of many more wars. It is conceivable that the next war could so shatter it that it would be unable to recover. On the other hand, it is also conceivable that it could survive two or three more. But in any case, the number which can be tolerated is finite, and each conflict will decrease further the probability that industrial civilization will continue to exist.

Wars in the past have been fought for varieties of causes, for resources such as water, agricultural land, and ore deposits, for outlets to markets, to discard yokes of enslavement and to sever colonial bonds, to further religious, economic, and political creeds, to obtain power

for power's sake. They have been fought over the pursuit of military security and over real or imagined threats to security. The causes of past wars have indeed been manifold, and the potential causes of future wars are equally numerous.

A fighting chance

No matter how we look at the picture, the threat of war is the greatest immediate danger confronting industrial civilization. The possibility of man's eliminating war as an instrument of national policy indeed appears remote, and to the extent that this is so it seems likely that industrial civilization is doomed to extinction. Nevertheless, the picture is not completely black, for we can conceive of ways and means not only of eliminating specific causes of war but of eliminating war itself. The fact that we are able to recognize these problems and conceive of solutions gives some hope that man's intelligence may save him in the future as it has saved him in the past. Remote though this possibility may be, it is the one to which those of us can cling who are unprepared to admit that man's destiny is, *a priori*, an ignominious one.

For the purpose of our discussion, let us assume that war and the possibility of war between existing industrialized nations disappear from the earth, though this seems most unlikely. Would the problems of survival of industrial civilization be solved? It is clear that they would not. Elimination of war, although it is an absolutely necessary condition for survival, is by no means a sufficient condition. In truth, the task of eliminating war, difficult though it may appear, pales into insignificance beside the further problems that will confront us.

Controlling rates of population growth

One of the most important, from both a short-range and a long-range point of view, is that of controlling rates of population growth and at the same time permitting human beings to take full advantage of the benefits of public health and modern medicine. Here there can be no escaping the fact that if starvation is to be eliminated, if the average child is to stand a reasonable chance of living out the normal life span with which he is endowed at birth, family sizes must be limited. The limitation in birth rates must arise from the utilization of contraceptive techniques or abortions or a combination of the two practices.

We know that by proper application of technology the earth could support a considerably larger population than now exists. But no matter where we place the limit of the number of persons that can be comfortably supported, at some point in history population growth must stop. And if population growth is to stop without our having excessively high death rates, we must reconcile ourselves to the fact that artificial means must be applied to limit birth rates.

CONTINUED ON PAGE 34

This conclusion is inescapable. We can avoid talking about it, moralists may try to convince us to the contrary, laws may be passed forbidding us to talk about it, fear of pressure groups may prevent political leaders from discussing the subject, but the conclusion cannot be denied on any rational basis. Either population-control measures must be both widely and wisely used, or we must reconcile ourselves to a world where starvation is everywhere, where life expectancy at birth is less than 30 years, where infants stand a better chance of dying than of living during the first year following birth, where women are little more than machines for breeding, pumping child after child into an inhospitable world, spending the greater part of their adult lives in a state of pregnancy.

The extent to which human beings avoid discussing conception control is truly incredible. Volume after volume has been written, and conference after conference has been held on the subject of increasing world food production, and arguments have raged over whether or not food production can be increased sufficiently rapidly to keep pace with population increase. Huge efforts have been made to improve public health in many of the underdeveloped areas. Yet if anyone, in an official or semi-official capacity, is so bold as to suggest that the approach is one-sided, paralysis sets in. The minority pressure groups start to work on the hapless individual, and soon he claims that his remarks were misinterpreted.

Conception control — unnatural?

Some of those who fight against conception control do so on the ground that it is "unnatural." Yet what could be more unnatural than appendectomies or injections of penicillin? And, for that matter, is not agriculture itself unnatural? Certainly a potato field growing in Western Europe is one of the most unnatural things in the world. The plant is not indigenous; forests were removed so that the plot could be cultivated; plants which prefer to grow there are uprooted so that the potato can thrive without competition; artificial fertilizers are applied to the ground; insecticides disturb the balance of insect life. Clearly, once man invented agriculture he moved into an unnatural world, and, as his knowledge has increased, his dependence upon unnatural surroundings has increased. Those who maintain that conception control should not be used because it is unnatural would be far more consistent if they urged simultaneously abolishment of all clothing, antiseptics, antibiotics, vaccinations, and hospitals, together with all artificial practices which enable man to extract food from the soil.

A second sector of the world which vigorously opposes contraception is the group which maintains that such practices are contrary to the precepts of religion. This concept indeed places man in an interesting light, representing him as one who, though he was created with the means of alleviating suffering by modifying the effects

of natural processes (as he proves every time he puts on an overcoat or takes a pill), yet believes that he is obeying the will of his Creator when he refuses to establish and maintain a balance between resources and population by the simplest and most humane of all possible ways.

The outlook is all the more interesting in view of the fact that it is the children who suffer the most in regions where the ratios of food to population are very low. When I walk through such regions, where birth rates are at a biological maximum, and I see dirt-encrusted, malnourished, disease-ridden children, I know that this is not the sort of world advocated by the One who said, "Suffer little children to come unto me, and forbid them not, for of such is the Kingdom of Heaven."

The Church knows this too, but offers only these choices to underprivileged groups: an almost impossible degree of continence, the difficult spacing of intercourse according to the principle of the highly unreliable "rhythm theory" (reluctantly accepted but not encouraged by some religionists), or the spawning of children who, *a priori*, cannot be supported and are doomed to die in filth and misery.

The guilty ones

Who, then, are the guilty ones in this grisly drama? Are they the parents, whose love for each other is perhaps the one tolerable aspect of an otherwise bleak and miserable existence? Or are they those who pass laws and issue edicts prohibiting the spread of contraceptive knowledge and, in so doing, help to perpetuate the misery and unhappiness which exists? Or, perhaps, are they the persons, whose name is legion, who are frightened by the creedists and in their fright refuse to take action.

The members of the third group, which actively opposes contraception, do so not because of any deep conviction that such practices are either sinful or "unnatural," but rather for the straightforward and unfortunate reason that they want their particular group, whether it be nation, race, or adherents to a creed, to become more populous. This motivation was partly responsible for many of the actions and attitudes in Italy during Mussolini's time and is responsible for existing official attitudes toward birth control in the Soviet Union. The leaders of the Catholic Church undoubtedly recognize that if adherents to the faith are able to maintain a substantial difference in birth rate between Catholics and non-Catholics, the proportion of Catholics in the population as a whole is likely to increase. Similar thoughts probably determine in part the attitude of numerous groups of people.

In recent years a new attitude toward birth control has appeared in several underdeveloped areas—the fear that industrialized nations are attempting to exterminate them by propagandizing contraceptive techniques. This, of course, is a blind, unreasoning fear—but no more

unreasoning than most other attitudes which prevail. This particular attitude will probably increase in importance in years to come, nurtured by existing race struggles and by the conflict between the Soviet Union and the West.

In view of the diversity of the attitudes which result in active opposition to family-limitation techniques, there is serious question that human populations in the world as a whole will ever be stabilized. Indeed, a convincing argument can be presented to the effect that the population of the world can never be stabilized over a long period of time by a willful decrease of the birth rate. At the moment, however, important though the problem of ultimate stabilization is, the most pressing problem confronting us is whether or not the growth potentials of the underdeveloped areas can be decreased to the point where such areas can undergo industrialization without undue population pressures being built up in the process.

It is possible to imagine a process whereby areas such as India might industrialize at a rate greater than the rate of population increase, but it is possible to imagine such a process only if the rate of population increase normally associated with industrialization is in some way greatly lessened. Let us make the drastic assumption, for the purpose of discussion, that organized opposition to dissemination of birth control information can be ignored, and let us attempt to visualize a program whereby birth rates might, under the circumstances, be lowered more rapidly than death rates within the framework of an industrialization process.

New techniques of birth control

As is pointed out in an earlier chapter, new techniques of birth control which are on the horizon offer considerable promise of being both inexpensive and applicable within the social structure of many of the underdeveloped areas. It is quite possible that within the next few years injections will be available which will produce sterility for a period of several months. Further, it is quite possible that drugs will be available which will prevent, without serious side effects, implantation of a fertilized egg upon the wall of the uterus. Let us assume that such drugs are available—as they almost certainly can be, given adequate research and development. We must then ask: It is possible to establish techniques that would secure both widespread use and widespread acceptance?

The degree of personal opposition to contraceptive techniques will vary greatly from culture to culture and from area to area. In Jamaica, for example, one would have to combat the belief that "a woman must give birth to all of the babies she has in her" if she is to remain healthy. In Puerto Rico one would be confronted with the desire for children as symbols of virility. In Asia one would be confronted with the desire for male children, for additional farm hands, and for the security which is believed to be brought by large families. Nevertheless, in spite of such individual opposition, there is

evidence that in most such areas there is a large proportion of women who do not want to become pregnant—or at least not so frequently.

Although effective contraceptives can probably be made quite inexpensively by Western standards, it is doubtful that the cost will ever be brought down to the point where they can be easily afforded by persons who are as poverty-stricken as those in the greater part of India today. This means that if birth control is to be really effective prior to the completion of the industrial transition it must be made a part of government policy, and, in particular, birth-control programs should be incorporated as integral parts of the public-health programs that are established.

Government birth-control programs

Major birth-control programs can rationally be given priority over many aspects of public-health programs, for lowered birth rates automatically result in improved public health. Less frequent exposure to childbearing results in lowered female mortality. Smaller family sizes result in better nutrition and lowered infant mortality. In addition, the lowered food requirement for an individual family results in generally lowered adult mortality. Thus, a major birth-control program can in itself be looked upon as a major public-health program.

In each area where comprehensive family-limitation programs are established, considerable social research will be necessary in order to ascertain the most satisfactory approaches for gaining general acceptance of the new ideas. Incentives must be devised and new educational approaches must be used. There must be social experimentation on a vast scale. There will be failures, of course, but, given sufficient imagination and effort, it is likely that there will also be successes.

There are persons who maintain that no amount of effort can succeed in lowering birth rates more rapidly than the rate of decrease that has been associated with industrialization processes in the past. Such views might well prove to be correct, but it seems more likely at the present time that such views are wrong. In any event, sound predictions of success or failure on the basis of existing knowledge are impossible. We shall never know whether or not success is possible until a vigorous effort is made and our ingenuity and imagination have been wholeheartedly applied to the problem. If we succeed there will be hope. If we fail, the prospects for successful transition of the underdeveloped areas to stable industrial societies will be so remote as to border on the impossible.

The second, and concluding, part of this extract from Harrison Brown's forthcoming book, "The Challenge of Man's Future," will appear next month.