FACING THE THREAT OF THE WORLD POPULATION EXPLOSION

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In South Africa, as in the rest of the civilized world, much attention is being given to existing nutritional problems of immediate importance to mankind—malnutrition among the underprivileged and the problem of providing them with the food they need or the nutrients lacking in their diet, and, at the other end of the scale, the so-called diseases of civilization caused by over-indulgence in too rich a diet.

Because of their preoccupation with these problems, nutritionists are inclined to give insufficient thought to the present alarming rate of population growth, popularly known as the 'population explosion'. This phenomenon, if it continues, will vitally affect man's prospects of producing adequate supplies of food for future generations, and it also affects, to a considerable extent, his prospects of meeting his present needs.

The world population estimates given in Table I will help to indicate the extent of the problem:

TABLE I. ESTIMATES OF WORLD POPULATION

Year	*Population*
1830	1,000 million
1930	2,000 million
1960	3,000 million
2000 (projection)	6,300 million

It took a century from the year 1830 for the world population to double itself; then came a speeding up of population growth, and in the short space of 30 years it increased by 50%. By 1960 the population explosion was in full swing and the world population is now expected to more than double itself in only 40 years. Will it double itself again in another 30 years, perhaps, and bring the world population to 12½ thousand million in the year 2030?

The trend is well illustrated in South Africa. In 1963 our population was estimated to be 17 million; it is estimated that it will reach 36 million by the turn of the century. The continual increase in the rate of population growth has, however, confounded population forecasters over the last decade or two, and some less sanguine forecasters think it not impossible that our population may even reach the fantastic figure of 70 million by the year 2000.

Even in his earliest phases of development man had already found ways and means of defending himself successfully against the depredations of beasts. It was only during this century, however, that he started to make significant advances against the depredations of microbes and parasites. We see today diseases which have decimated populations, scourges of mankind since the dawn of history, fast disappearing from the face of the earth. In our own country we have witnessed the virtual disappearance of malaria and nagana—vivid examples of the spectacular victories that have been won in the battle against the diseases of man and his domestic animals.

But the harvest we reap from this drive against disease is an alarming rise in the rate of population growth.

About 150 years ago Malthus declared that man would never escape from poverty and want, that he would progress in cycles through periods of plenty and population growth to periods of want, hunger and population decimation. Because Malthus was proved wrong, many refuse to see any danger ahead, and those who sound a warning are stigmatized as neo-Malthusians—gloomy prophets of doom. Our generation would be most improvident, however, if we did not attempt to look into the future and do what is needed to ensure that our descendants will live in a world at least no worse than the one we know ourselves.

There are 3 basic material needs which must be met if we are to maintain the industrialized way of life we know —power, the raw materials for clothing and construction and, most important of all, food. We already know that when our supplies of fossil fuels become depleted, we will be able to replace them with nuclear power; it is furthermore probable that as our mineral resources become depleted, we will develop the technology to enable us to utilize poorer and poorer reserves—in the end perhaps even the basal rock of the earth or the oceans themselves—for the extraction of the minerals and metals we require. But what about our food? Will man's ingenuity in food production be able to keep pace with the growth in population? Will he not ultimately be limited by the fact that soil, water and sun energy are available only in limited amounts?

We live today in a world of contrasts. In some parts of the West we find highly developed economies of waste—countries where food has to be stock-piled and sometimes even destroyed to protect agricultural economy; where large portions of food crops are left to rot in the fields because they do not come up to the high standards required by the consumer and the food industry; where the problem of municipal and industrial wastes and effluents is always increasing, and, significantly, where the dumps of discarded automobiles grow higher and higher.

Conversely we see, for instance in the East, countries with teeming populations whose economic development seems unable to keep pace with their growth, and whose poverty, instead of disappearing, seems likely to become even more desperate in the future. Estimates of the number of people in the world today who go hungry or are inadequately nourished vary from 300 million to as much as 1,000 million—a third of the world's population.

What can scientists do to alleviate the problem and avoid a future catastrophe? The immediate problem could largely be solved by a fairer distribution and better utilization of the world's food resources and by the application of existing knowledge to produce more food than we do today. But what of the future? What steps should we scientists take, what avenues should we explore to ensure that man does not meet with disaster—if not in this century, at any rate within 100 years? To maintain good health and a body capable of creative thought and productive activity a man requires minerals, vitamins, proteins, carbohydrates and fats. Minerals and vitamins

are required in very small amounts and already it is quite possible for the chemical industry to supply the total mineral and vitamin requirements of mankind. Proteins, needed for growth and maintenance, and fats and carbohydrates, needed for the provision of energy, are, however, required in vast quantities, and man will probably always have to rely on plants to synthesize protein, carbohydrate and fat from the nitrogen and carbon dioxide of the soil and air.

Although the universal application of the methods known today may be adequate for solving current food problems, scientists will nevertheless have to put a great deal of effort into finding new ways and means of increasing food production if we are to keep abreast with the ever-increasing growth in world population. Our nutritionists will have to gain more exact knowledge of man's requirements; our geneticists will have to breed plants which can more efficiently convert sun-energy into food; our agriculturists will have to find ways of making land more productive and even, perhaps, of using land which is at present completely barren. Entomologists, plant pathologists and chemists will have to find better ways of protecting our crops against insects and diseases.

Other branches of science will also have to make their contributions. Most important among them, perhaps, is food technology, which will have to devise still better means of preserving and distributing food and may even have to find ways of utilizing biological materials not yet recognized as sources of food. Already some food technologists are working in this direction. Some are experimenting with the extraction of protein direct from plants because they contend that it is wasteful and unnecessary to feed these proteins to animals for conversion into meat and milk. Others are trying to devise closed-circuit processes for the cultivation of yeasts and algae as food or feed. Yet others are thinking of using petroleum products as raw materials for the production of foodstuffs with the aid of microorganisms. This last possibility, that of using microorganisms to convert fossil or other carbonaceous material into food, may open up vast new resources for food production. Why should we not see such a revolution in food production as we have seen in other fields? Why should food production not shift from the farm to the factory? It is at least a reasonable possibility. Dr. Bovet[1] of Italy, in an attempt to relate the mass of the human species to that of the total biosphere, came to the conclusion that man at present consumes only 0·01% of the total amount of organic material present on the earth and theoretically available as food. The prospect of utilizing all the available organic resources of the world seems exceedingly remote at present, but it is not impossible that if mankind can rid the world of ignorance and muster all his economic and technological resources he may succeed in producing enough food to rid the world of hunger and allow him to go on multiplying at his present rate for a long time to come.

But is this the sort of life we would like for our great-grandchildren?—a teeming, beehive existence with our cities sprawling over a larger and larger part of the earth's surface, our skyscrapers growing higher and higher, and every bit of greenery, every form of non-human life, harnessed to provide nourishment for man? The only alternative is to find ways and means of controlling the rate of population growth and eventually even stopping all further population expansion. This counter-measure should be initiated before we have reached the limit of our scientific ingenuity and potential food resources and before the world has become uncomfortably crowded.

The historian, Arnold Toynbee,[2] has summed up the situation very succinctly. He recently stated: 'We have been godlike in our planned breeding of our domesticated plants and animals, but we have been rabbitlike in our unplanned breeding of ourselves. While we have triumphantly domesticated so many other species of living creatures, we have improvidently left our own species in a state of nature in this vital matter of reproduction. We have continued to breed up to the limit with a lack of control that we have never dreamed of allowing our domesticated animals and plants. Our self-imposed penalty has been to continue, with very few exceptions, to live in Nature's way—to live, that is, just, and only just, above the starvation-line—in spite of our unique human achievement of creating a man-made abundance of food.'

In our country, at present riding the crest of a wave of economic development and prosperity, and where the cry is ever for more and more skilled persons, it will be hard to convince the expanding population that man must learn to master his propensity for multiplication. But if we are to continue to be able to afford the luxury of wide open spaces, of food in great variety and abundance for all, and of large areas dedicated to the preservation of what we call 'nature', it will be necessary to limit the growth of our population, and we will have to learn how to do it. This is a subject which, in comparison with the efforts made in other directions, has been greatly neglected by scientists. Our sociologists will have to find ways in which mankind as a whole can be made aware of the dangers of his own excessive multiplication, and they will have to find means of engendering in man the will to restrict his numbers. The biologists will have to find methods of limiting population growth that will be economically feasible and acceptable to peoples of all races and creeds. Progress towards this goal will not come about as a matter of course. Man will have to work towards it and the results will come slowly.

The sooner the implications of uncontrolled breeding are studied and generally appreciated and the sooner steps are taken to put a brake on population expansion, the greater will be the likelihood that future generations will be able to enjoy the privilege of adequate food supplies. Surely it will be easier and less painful to mankind to take steps that will result in a gradual reduction in population growth than to wait for necessity or disaster to dictate a forced extinction or thinning-out of existing populations.

REFERENCES

1. Bovet, D. (1963): Paper presented at FAO World Food Congress, Washington DC, June.
2. Toynbee, A. J. (1963): Paper presented at FAO World Food Congress, Washington DC, June.