

# TECHNOLOGY AND MAN

By P. E. HODGSON

THE LAST few decades have seen an unprecedented technological growth that has certainly opened up limitless possibilities for the development of the human race. At the same time, it is threatening our very survival. This sudden technological acceleration is already coming up against the limits set by the finite size of the earth; and, unless they are controlled, over-population and pollution will bring the whole process, so full of promise, to a catastrophic end. These problems are already urgent. They transcend in magnitude all the political and ideological struggles that tend to fill our minds.

The purpose of this article is to review very briefly some of the more important aspects of the situation, and to discuss some of the responses that can be made to it. The treatment is inevitably sketchy, due to the vastness of the material and the inadequacy of our knowledge. Its object is more to draw attention to urgent problems than to put forward any definitive solutions.

Technological growth is no novelty in human history. From the first cave dwellers who discovered how to use fire and fashion crude axes, to the inventors of the lasers and computers of today, ingenious men have found ways of increasing our mastery of nature. This has not been a story of continuous and cumulative development; when civilizations fall, their technological developments were often lost; yet despite such set-backs, man has gradually increased his ability to dominate his surroundings.

Over the years, this technological development has immeasurably improved the life of man, so that he is able to embark on adventures of body and mind that hitherto would have been impossible. Naturally, it also gives rise to problems. An axe can be used to cut down a tree or to split a skull. Man can misuse his new power and opportunities. He can use technology for the evil purposes of war or in numerous other ways: for example, to satisfy his personal pride and ambition.

These problems and many others posed by technological development through the ages have been studied in detail; and our traditional christian morality has been developed to deal with them.

It is the main theme of this article that the technological develop-

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ments of the last few decades are so different from what has gone before that an entirely new situation has been created. Some areas of christian morality must therefore be re-thought from the foundations if it is to retain its validity and relevance.

It is difficult to summarize these developments in a few sentences, partly because of their technical nature, and partly because they form a closely inter-linked system of mutually enhancing factors. Inevitably any attempt to do so involves a series of historical and sociological generalizations which deserve much more detailed discussion. Nevertheless, it might be useful to single out some of the most important features.

### *The integration of science and technology*

Until about a century ago, science and technology developed independently of each other. Technology was essentially the accumulated skills and rules of thumb of the workers and artisans, the makers of simple machinery, the metal workers, the shipbuilders, the leather workers and so on. It grew by steady accretion of experience, guesswork and lucky accident, and progress was fitful and chaotic. Science, on the other hand, was the attempt by very few men to understand the natural world. Initially, science was not clearly distinguished from philosophy. It was the province of university professors and amateurs with private means, who had little or no thought of practical applications. The fusion of these two strands has taken place since about the time of the industrial revolution in the last century. Now technology is controlled by scientific understanding of the underlying phenomena, and progress is immeasurably more rapid. In return, technological development provides extremely sophisticated equipment for scientific research, so that scientific understanding also increases rapidly; and this in turn lays the foundations of further technological progress, and so on. There is a continual interchange of ideas and equipment between the scientists and the technologists; so that the whole process is fused into one great enterprise of enormous power and future potential. The rate of development of science and technology naturally depends on the available resources of manpower and money, and these have increased enormously, particularly since the second world war. Governments and people in general realized the vast potentialities, and provided the means on an unprecedented scale. This has continued in the immediate post-war years, so that the rate of development has continued to increase.

*Unification of world communication*

Fast air transport and television have brought the nations of the world into communication with each other as never before. The news of any major political development or natural disaster is immediately flashed round the world; and anyone who wishes and has the means can be there in a few hours. We know about each others' problems and can be affected by each others' successes and failures as never before.

*The cumulative nature of modern progress*

In the past, the technological progress achieved with infinite pains by one civilisation could be lost when it was overwhelmed by another. There are past triumphs of man's skill, Ming china or a Stradivarius violin, for example, which we cannot reproduce even with all the technological means at our command. Now, through the development of world communication, the scientific and technological community is a supra-national one, so that any advance is speedily known and copied elsewhere. Commercial and political secrecy may occasionally delay this for a little while, but it is seldom difficult for anyone with sufficient means to repeat the work himself, as was dramatically shown by the soviet atomic and hydrogen bomb development. Thus, barring a world catastrophe, this scientific and technological development will continue to surge forward irresistibly and cumulatively. There is no possibility of turning back.

*World resources finite*

So rapid has been this development that it has already begun to run into difficulties, due to the finite size of the earth. An unlimited technological development requires unlimited natural resources and means of waste disposal. Until quite recently no-one gave a thought to this. They used whatever they could lay their hands on and threw away whatever they no longer needed, with no thought of the consequences. A series of nasty shocks has reminded us that this cannot go on without serious trouble. In many parts of the world, rivers are so polluted that they are little more than open sewers; nothing can live in them. Inland lakes have been killed by the polluted rivers flowing into them. Birds, animals, fish, trees and vegetation are being killed, and the atmosphere and oceans polluted. As our technology continues to develop this will get steadily worse.

*Rising standards of living for the fortunate few*

This scientific and technological development has made possible a vast increase in the standard of living of a relatively small proportion of the earth's population. We live better than princes in former times, with comfortable homes, excellent and varied food, sumptuous clothes, skilled medical care, ample leisure, light and congenial work, generous holidays, political freedom and opportunities to travel the world. And still we want more and more, and, by and large, we get it.

In awful contrast, the rest of mankind is sunk in grinding poverty, ravaged by disease, miserably housed, suffering from starvation and malnutrition, clothed in rags, without medical care, driven to unrelieved grinding toil, politically repressed and able to travel only if forcibly deported by their overlords.

*Increasing political tension*

In one vital respect the poor of the present time differ from those of the past: they know that others are more fortunately placed than they are, and they see no reason why they should not enjoy a similar life. Discarded glossy magazines show them how the rich live. Many hovels boast a television set, even if they lack many of the necessities of life. Thus, the combination of world communications and the disparity of living standards create a deep conviction of the injustice of the present situation.

Unfortunately, they are wrong when they suppose it is possible for them to enjoy the standard of living of the fortunate few. It is economically impossible; for the earth does not contain the resources to do it. Even if this were not so, and they were all brought up to our standard of living, the earth would be killed by the resulting pollution. Already an american uses more electric power than fifty-five africans; he pours more toxic waste into rivers and oceans than a thousand asians.<sup>1</sup>

Thus the rich are not simply those who are, for one reason or another, a little ahead in the general race for improved living standards, with the rest of the world soon following on. Their standards can be built up and maintained only for a relatively small number of people; and they depend on denying these standards to the rest of mankind. We are taking grossly more than our fair share

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<sup>1</sup> Quoted by H. Montefiore, in *Doom or Deliverance* (Manchester University Press, 1972).

of the world's resources. At the present time, in spite of aid programmes, the gap between the developed and the developing countries is increasing. The rich are getting richer; the poor, poorer. Knowledge of this situation is spreading and will certainly lead to ever-increasing demands that this intolerable situation should be remedied.

### *Rising population*

The application of science and technology to the fields of medicine has led to the virtual elimination of the major diseases, which, in previous centuries, had kept the population of the world in check. Infant mortality has been all but eliminated. Cholera, smallpox, malaria and the plague no longer decimate whole populations. As a result, the world population is increasing with unprecedented rapidity. This is shown by the following figures for the world population in millions at various times in the past:<sup>2</sup>

1650	545	1900	1608	1950	2515
1750	728	1920	1860	1960	2998
1850	1171	1940	2294	1970	3631

It is estimated that the figure will be 4000 in 1975; and if the present 2% annual increase continues, it will be 7000 in the year 2000, and 20,000 in 2050. At the present time, the average life expectancy is steadily increasing, and the population of the world is doubling every thirty years. Inevitably, this rapid increase is exacerbating the situation already described. It would have been serious even if the world population was steady; the growth of population brings the crisis time nearer.

Some attempts have been made, notably by Colin Clark, to maintain that the population problem can easily be tackled by the more efficient utilization and distribution of existing natural resources. Certainly this would help in the short term. It is, however, important to emphasize that this is completely useless as a long term solution; it would only postpone the day of reckoning. However much food is produced and however well it is distributed, the population will sooner or later, at its present rate of increase, attain such a level that existing resources will be no longer adequate for its needs.

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Such, in brief outline, is the situation brought about by the rapid development of science and technology in the last few decades. It

<sup>2</sup> Cf McCormack, A.: 'Population Explosion - Myth or Reality?', in the *Ampleforth Journal* (LXXVII, 1972), p 24.

will be clear how each aspect, serious enough in itself, is aggravated by the effects of all the others.

There is a good deal of discussion and disagreement about the details of the situation, partly because of the inadequacy of our knowledge, and partly because our inbuilt prejudices and limited experiences incline us for a variety of motives to take an optimistic or pessimistic view. In some respects, perhaps, things will turn out to be better than we expect; in others, worse. Wars apart, it is unlikely that there will be a sudden world-wide catastrophe. More likely there will be a series of local disasters, famines or massive pollutions, perhaps triggered off by natural disasters of the type we experience already, but becoming more frequent. Efforts to deal with these may well lead to increased political tension and hence greater likelihood of wars. The situation will also be alleviated by increasing application of conservation measures of the type discussed below, and by the development of new foodstuffs and other products to replace those becoming exhausted.

These uncertainties affect the time-scale of the problem: whether things will have become intolerable within thirty, fifty or a hundred years. But there is no doubt at all that it will happen sooner or later, within the lifetime of our children, unless action on a really massive scale is taken without delay.<sup>3</sup>

Faced with this somewhat disquieting situation, we can react in a variety of ways. We can brush it all aside, by saying that there have always been prophets of doom around, and their dire forebodings have never come true. In any case, things are unlikely to get serious, at least in Europe, for fifty years or so; and that should see us out. Or we can take it all seriously, and ask what is the use of living if we are heading for catastrophe? It would be better to quit now or, at any rate, not have any children who will make matters worse and be themselves condemned to death. Or we may feel like blaming science for all the ills that beset us, and urge that we turn back the clock and return to the primitive simplicities of rural life.

None of this is acceptable to the christian. Christ by his life, death and resurrection has shown us the way of life that overcomes death; so that the christian is filled with hope even in the face of death.

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<sup>3</sup> The literature on this subject is immense, and the following are mentioned only by way of introduction: Rachel Carson, *The Silent Spring* (London, 1963); D. H. Meadows, D. L. Meadows, J. Randers and W. Behrens: *The Limits to Growth* (London, 1972); Barbara Ward and René Dubois: *Only One Earth* (London, 1972); John Maddox: *The Domesday Syndrome* (London, 1972); Alvin Toffler: *Future Shock* (London, 1970).

He knows that man is on the threshold of his greatest advances that will make all his previous achievements seem puny by comparison.

This christian hope is not the selfish individual hope of one who retreats into his own private devotional world and cuts himself off from the struggles of mankind, imagining that he can thereby ensure his own salvation. It is an incarnational hope that willingly shoulders the cross of the world, and works unsparingly to alleviate its distress. The christian knows that it is only by more knowledge of God's world, by more science and technology, more care and compassion, more political and humane understanding, that we can hope to transform the outlook from one of intense anxiety to one of promise for the future.

The overall effect of current technological changes is to emphasize the unity of mankind, that we are all members one of another. We are thus forced to accept a much wider sense of community responsibility, and the individualistic ethics of the past are no longer adequate. Questions formerly regarded as private, or as the concern of small groups, are now seen to have widespread repercussions affecting society as a whole. Technological change is forcing on man an 'interdependence which becomes closer day by day and spreads by degrees over the whole world. As a result, the common good takes on an increasingly universal complexion and consequently involves rights and duties involving the whole human race'.<sup>4</sup>

There is no doubt that this re-orientation requires tremendous self-sacrifice, work and technical expertise, as well as a radical flexibility and willingness to re-think our beliefs and our way of life. If man considers only his personal short-term interests, the situation will steadily deteriorate into famine and war. Only a religion that firmly places the centre of life outside man, that teaches him that he can fulfil himself only by losing his life in the service of others, is able to provide the necessary motivation for the task. In this way we show ourselves true followers of him who told us to feed the hungry, give drink to the thirsty and clothe the naked.

This is familiar to christians in principle, though our practice is frequently deficient. But in addition a fundamental re-orientation is required: up till now we have lived in a period of man's expansion when the capacity of the earth set no appreciable limits; now we are moving into a situation when this is no longer the case. The expansion must gradually level off to a delicate and dynamic

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<sup>4</sup> *Gaudium et Spes*, 26.

equilibrium between the needs of man and the resources of the earth. Hitherto we have interpreted the divine injunction to increase and multiply and fill the earth, with an emphasis on the first part. Now we have to understand more deeply the meaning of the word 'fill'. To fill is to increase and multiply up to a certain point *and then stop*. It is no part of the divine will that the human race should increase without limit, until all the resources of the earth are used up and it is extinguished by famine and disease.

It is not easy to say exactly what constitutes 'filling the earth', but some guidance is given by the Council: 'The norm of human activity is this: that in accord with the divine plan and will it should harmonize with the genuine good of the human race and allow men as individuals and as members of society to pursue their total vocation and to fulfil it'.<sup>5</sup> By this criterion, some parts of the earth are already over-full; it is impossible for people to fulfil their vocation if they are obliged to live in conditions of utter destitution. Other people have far more than they need, and it is incumbent upon them to help their less fortunate fellow men. Most of the population of Europe and North America is already living at a higher standard than can easily be justified, and it is probable that this standard will fall either by voluntary renunciation or by action from other countries.

To understand in greater detail what sort of world we should be aiming at, and what measures are likely to be successful, it will be useful to look at the situation from another angle, by considering the conditions for a stable world.

### 1. *A stable population*

Unless the mean reproduction rate is less than or equal to two, the population of the world will increase indefinitely. This will inevitably lead to catastrophe sooner or later, irrespective of all other considerations. Allowing for infant deaths, celibacy and other factors, this implies a mean family size of about 2.2. In the past, the population has been stabilized by disease, famine and war. If we now exclude these 'means' of stabilization, and if we accept that the majority of men are, and always will be, incapable of voluntary celibacy on a sufficient scale, the population can be stabilized only by abortion, infanticide or contraception.

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<sup>5</sup> *Gaudium et Spes*, 35.



## 2. *Stable utilization of natural resources*

Man lives only by using the resources of the earth; and these are limited. Organic resources such as plants, wood, fish, animals are continually replenished, provided that species are not extinguished or their habitat destroyed through over-use. Even if the organic resources are not over-used, there is a limit to their production: that set by the size of the earth and the technology of harvesting. Undoubtedly the present production can be increased many times, though only at the cost of great capital expenditure.

The inorganic resources of the world are in a different category; they are steadily being used up and eventually they will be exhausted. Into this category come coal and oil. Originally organic, the present deposits were built up over vast geological eras, and there is no hope of ever replenishing them by the same process. Minerals are in a similar situation: by slow geological processes, certain metals have been concentrated into workable deposits. Technological use tends to dissipate them, so that even though the individual atoms are indestructible, they are eventually so spread around that they are no longer effectively available to man. As the richer deposits are worked out, poorer ones have to be used; thus their price steadily rises. Many quite common materials, like mercury and tin, will become significantly rarer in the foreseeable future; others, like aluminium and iron, are present in such vast quantities that they are virtually inexhaustible.

It is now possible to be a little more explicit about the action that must be taken to bring about a stable world.

### (a) *Stabilization of the population*

This is a very delicate and difficult problem. We all love children, and we know the advantages of families of many children who can grow up together. But we also know that unless the average family size is reduced to just over two, the human race is heading for disaster.<sup>6</sup> We have to try to balance the rights of the parents against the needs of mankind as a whole. The first essential step is to ensure that there are no unwanted conceptions. This alone would at once remove the greater part of the problem. But if this does not stabilize the population, we have to ask how the number of wanted children

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<sup>6</sup> Cf J. L. Russell, S. J.: 'Contraception and the Natural Law', in *The Heythrop Journal*, X (1969), p 121.

could be reduced. Parents might freely choose to forego children or to adopt children without parents of their own; but this is a special vocation rather than a general norm. It could well be argued that parents with such high ideals would better serve humanity by educating a large family of children who will grow up to lead the fight against the evils that beset mankind.

Since neither voluntary celibacy nor periodic abstinence is practicable for the majority of mankind, the only remaining way of controlling conceptions is by chemical or mechanical means, and these are forbidden by the encyclical *Humanae Vitae*. Since abortion is excluded as essentially equivalent to infanticide, the only possible way of controlling the explosive growth of population is eliminated. However, even within the Church, the encyclical is not uniformly accepted, and half the world's hierarchies are willing to admit exceptions to its absolute prohibition.<sup>7</sup> It is clear that this question will have to be tackled as a matter of particular urgency. It will become more and more pressing as time goes on, and no responsible christian can ignore it.

It is important to recognize that although contraception appears to offer the only practicable way of tackling the population problem, its widespread acceptance would not automatically remove all the difficulties. There are indeed inherent dangers in all known methods, though this is quite usual in the medical field, and they must be set against the advantages to be gained. More important, there are formidable difficulties of distribution and application, whatever method is chosen. Finally, it is above all important that it should not be used as a power-political weapon, or as a way of avoiding our duties towards those already born. It is certainly repugnant for rich societies to recommend contraception to poorer ones without at the same time doing all they can to raise their living standards, even at the expense of their own. There is no christian justification for restricting immigration from overpopulated countries into those with vast unpopulated areas and unused resources. As Lady Jackson has pointed out, 'white people occupied in the nineteenth century all the available temperate lands in the world, and it will be time to talk about the pill when we have put several millions of chinese and indians in Australia and South Africa. To preach birth-control

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<sup>7</sup> *Humanae Vitae and the Bishops* (John Horgan, Dublin 1972); see also *Ampleforth Journal*, LXXIII (1968), p 379ff.; LXXV (1970), p 204ff., LXXVII (1972), p 50 ff.; *New Blackfriars* 50 (1969), p 338ff.

without working towards a better distribution of the world's resources reveals an unconscious will to genocide'.<sup>8</sup>

(b) *Stabilization of the use of natural resources*

This requires strict legal controls over all industrial processes, to stop pollution, waste and planned obsolescence. We must accept the inevitable increases in cost. Pollution by car-exhausts, and by 'dumping' on land and sea also need to be controlled, and more efficient public transport encouraged. Regenerative organic processes that do not use up natural resources need to be favoured, compared with those that do. Ways should be found of removing the enormous waste of resources due to the arms race. At the same time as we aim at a more efficient use of natural resources, we should examine our consciences on whether we consume more than we really need. Mass-advertizing exerts powerful pressures to stimulate and encourage excessive consumption, and to make people buy more and more. Goods are sometimes deliberately made to last only a short time, so that we have continually to buy replacements. In a world of limited resources, where most people are desperately needy, these practices are simply immoral and steps should be taken to eliminate them.

(c) *Stabilization of the present situation*

These measures are designed to keep the situation stable, but as the present situation is already seriously unstable, massive measures need to be taken to restore some balance among countries. This requires a complete reorganization of the economic and political aspects of international trade.

These problems are being extensively studied in a series of conferences on trade and development organized by the United Nations, the most recent of them in Santiago, Chile. They are essentially confrontations between the rich and the poor nations, providing opportunities for the discussion of the provision of development capital and aid, the reform of the international monetary system and the existence of community agreements. So far, these conferences have seen eloquent speeches from the representatives of the developing nations, saying what they think ought to be done, and equally eloquent speeches from the representatives of the

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<sup>8</sup> Quoted in 'Synodal Diary', *The Month* (January, 1972), p 21.

developed nations, outlining schemes in general terms, but lacking any definite commitment to effective action. The possible expenditure of  $\frac{1}{2}$  or 1% of their gross national products is gravely discussed, when a much higher figure would be more appropriate.

These problems are of course far from simple, even given the necessary good will. It is very difficult to organize aid so that it really helps the poor to stand on their own feet, so that it neither enriches unscrupulous middlemen nor perpetuates an attitude of grateful apathy. Apart from cases of dire and immediate need, it is always best to concentrate on helping people to help themselves by education and the provision of better tools, machinery, seed and stock. To ensure that aid is rightly used requires substantial supervision, and runs the risk of criticism as interference in the internal affairs of another country or as economic imperialism. It is thus preferable that aid should be channelled through an international agency, such as the United Nations, which is less liable to this criticism. As much effort is required from the recipient countries as from the donors if aid is to succeed in its purpose.

Although considerable efforts are being made to organize aid to developing countries, the total is still very small compared with the need. The total value of the brain-drain of qualified scientists, doctors and engineers from the poorer to the richer countries is substantially greater than the value of the aid in the reverse direction, so that the poorer countries are actually subsidizing the richer. There is no doubt that a massive change in the policies of the developing countries is needed, and that they must be prepared to organize aid on a vast scale, together with major programmes of population resettlement. At present, the sums spent on aid are insignificant compared with those spent on defence and on the arms race.

#### (d) *Education and Scientific Research*

The resources of the earth will only be fully utilized if we know how best to make use of them; for this a massive and continuing programme of scientific research is essential. We still know all too little about the best plants to grow and the best animals to rear, and how to encourage their growth and control their diseases and predators. Many plants and animals flourish exceedingly well if moved to other countries, provided they are properly looked after. The advances that have been made in the last few decades are phenomenal, and undoubtedly there is still much to be done.

Even when we know what to do, the peasant farmers and herdsmen have to be taught the new ideas and techniques in a way that they can understand, and be encouraged to make good use of the new products. This requires a vast educational programme that will help everyone to use the new knowledge, without as far as possible upsetting their cultural patterns or overriding their human dignity.

Such grass-roots education has to be based on expanded higher education facilities, for this provides not only the scientists and engineers, but also the lecturers in teacher-training colleges, which produce the people to run the schools and rural education classes. The educational resources of the developed countries have a large part to play in this work, for they can teach the new skills to the most gifted citizens of the developing countries, so that they can later return home and spread widely the new knowledge.

The Church has a large part to play in this educational work. If the teaching is inspired by christian ideals, it is more likely that those who learn will use their knowledge not for their own personal benefit but for the good of mankind. It is this dynamic union of scientific knowledge and christian compassion that is our strongest hope for the future.

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There is no doubt that all these measures demand a complete re-orientation of the relations between individuals and between nations. At present most of us are concerned principally with our own well-being, and do not welcome the sacrifices necessary to secure the future of mankind. Even the certain knowledge that it is in our own self-interest, or at least that of our children, to make these sacrifices, is not enough to spur us to the necessary action.

This need for re-orientation extends to our attitude to animals, plants and to the earth itself. We need to re-discover a sense of continuity with our material roots.<sup>9</sup> At present we tend too often to regard the earth and its products as given to us to use, to dominate and to exploit in the service of our needs and desires.<sup>10</sup> This attitude owes not a little to our judeo-christian culture; indeed, a contributor to a recent symposium went so far as to say that the first chapter of Genesis is 'a faultless judeo-christian prescription for the population explosion, for the pollution of the water and the air and for

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<sup>9</sup> Cf Jacquetta Hawkes: *A Land* (London, 1951).

<sup>10</sup> Cf Gen. 1, 26.

ecological disaster'.<sup>11</sup> But if christianity cannot escape some of the share of the responsibility for the present, it also provides the main hope for the future, for it contains another strand of concern and reverence for the whole of creation, seeing man as God's caretaker and conscious of his organic unity with the whole biosphere and lithosphere.<sup>12</sup>

Christians have a great responsibility, for we are committed to believing that we must continually work for the good of others, that we must love our neighbour as ourselves for Christ's sake. The majority of the world's wealth is concentrated in countries that are at least nominally christian, so that christianity alone can be the mainspring of the necessary action. And yet all too often we find that christians are preoccupied with their own sectarian problems, while many humanists show exemplary devotion to the needs of mankind.

The growth of general prosperity and the progress towards the unity of mankind during the last few years has been phenomenal, when seen against the background of centuries of relative stagnation. The present time is one of unique opportunity, when man can either rise to an altogether new level of existence, or be plunged into irreparable disaster. In the life of mankind, as in that of the individual, God forces us to grow and mature by placing us in situations of increasing responsibility, of increasing potential for good and for evil. For the human race as a whole, this may be our last chance.

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<sup>11</sup> *Can we survive our future?*, a symposium, edited and introduced by G. R. Urban in collaboration with Michael Glenny (London, 1972).

<sup>12</sup> P. M. C. Davies, in *The Month*, July 1972 and previous issues.