

Religion—the control mechanism of a stable society

by Edward Goldsmith · January 1, 1974

A talk given by Edward Goldsmith before the Farmington Trust, 1974.

MY ORIGINAL INTENTION was to stick as closely as possible to the subject. However, having heard the last two remarkable addresses, I shall follow the line of reasoning that has already been traced.

Modern society is not representative of human experience

First of all, I feel that the only approach likely to enable us to understand these problems is the cross-cultural one. I do not believe that we can understand our problems exclusively in terms of the experience of our industrial society. Let us not forget that it is a very short one. It has only been in existence for about 150 years, whereas man, depending on how we define him, has been around for as much as one million, possibly two million, years. In fact, our whole experience of industry when compared with man's total experience is no more than two days in the life of a man of seventy.

If the industrial experience has been short, so has the agricultural one. Systematic agriculture probably only came into its own 10 or 12 thousand years ago. Before that, man was a hunter and a gatherer, and to a lesser extent a slash and burn or a shifting agriculturalist. Possibly 95% of all the people who have ever lived fell into this category.

It is a defect of practically all the disciplines into which academic knowledge is at present divided, that they are based on the experience of industrial society to the exclusion of all others, *i.e.* on a quite inadequate sample of the total human experience. This defect is not a minor one. It is sufficient to invalidate most of the work done by our scientists today. It prevents science from providing adaptive guidelines for public policy. The reason is clearly that what our scientists have taken to be general laws governing human behaviour at all times, are in fact but a set of principles which appear to have applied to a very limited sample of human behaviour.

This is true of today's sociology, which attempts to study modern societies without any reference to the traditional or primitive societies from which they have emerged, and of which they are, to a large extent, aberrant or pathological forms. It is true of economics, which assumes a whole set of conditions such as a market economy, which, as Polanyi¹ points out, have only been present in a fraction of known societies and for a very short period to boot. It is true of psychoanalysis—Malinowski pointed out that the Oedipus complex made no sense at all in a matrilineal society such as that of the Trobriand Islanders, in which a child is brought up by the mother's elder brother and not by her husband. It is true of government. Traditional societies being perfectly governed without the aid of any of the institutions which we associate with government and regard as indispensable to the maintenance of social order, public opinion reflecting traditional norms while the influence of the elders being sufficient to maintain the strictest adherence to the social norm, and it is true of religion, as I shall point out later.

Societies are subject to natural laws or constraints

Not only must we look at social questions cross-culturally, but we must look at them 'cross behaviourally', that is to say, in the light of all other forms of behaviour. In the same way that one must reject the notion that pre-industrial societies are not relevant to understanding the behaviour of industrial man, on the principle that he has now achieved so elevated a status that he is above the laws that have so far governed the behaviour of human societies, so one must reject the notion that man, primitive or industrial, is above the laws governing behaviour in general.

Man is an animal, and any analysis based on the illusion of his uniqueness can only lead to the most foolish conclusions. It may be argued that we are not in possession of the methodology for examining our social behaviour in this light. This only appears to be so, because we are so preoccupied with the empirical approach—more precisely the experimental method which consists in examining the components of the biosphere in isolation in the totally artificial conditions of a laboratory.

It is not in this way, however, that we can understand the biosphere. It is a complex system made up of closely inter-related sub-systems and the separate examination of the latter in isolation cannot reveal the nature of these inter-relationships. A system is in fact not simply the sum of its parts. That is why the experimental or reductionist method is proving to be such a disastrous failure. A more suitable method for understanding the behaviour of complex systems is provided by the new disciplines of General Systems or Cybernetics, the two being for all practical purposes indistinguishable. Both deal with the behaviour of 'systems' or units of behaviour, and what is surprising is the extraordinary similarity of systems, however different they may appear to the naked eye.

Consider a lobster and a man. What is in fact of interest is not so much their dissimilarity, but their extreme similarity in functional terms. They both eat, excrete, move, reproduce, etc, and in a similar way.

Cybernetics is basically the study of control. It reveals that there is basically only one way of controlling the behaviour of a natural system, whether it be a man, a lobster, a society, or an ecosystem. Even artificial systems can only be controlled in the same way.

Information is organised in a computer designed to control a machine tool very much as it is in a man, save, of course, that by comparison the process involved is pathetically rudimentary. General systems and cybernetics thereby provide a means of organising data into information that can be made use of. This is precisely what is lacking in the data rich, information poor, academic world of today.

Professor Howard, in his address, dwelt at great length on the increasing incidence of crime, delinquency, drug addiction, alcoholism in the U.S. These, I think, one must regard as but the symptoms of social disintegration. Another such symptom, as Durkheim pointed out more than 50 years ago, is suicide.

We can regard such behaviour as ‘random’ in the sense that it is no longer under control. As randomness increases so does order decrease, until eventually there is no longer a society, but simply a heterogeneous group of individuals who no longer constitute an autonomous unit of behaviour—or a system—but rather a mass society. Such as ours is today.

As this process of disintegration occurs, so the bonds holding people together are relaxed, as are the essential constraints which previously enabled individuals to act as the differentiated parts of a social system. This notion of constraints is extremely important. It is at the basis of organisation. Today it is not fashionable to discuss constraints. We live in a permissive world and have developed all sorts of very childish arguments for justifying this permissiveness. In reality it is but another word for chaos. To identify it with liberty is simply ludicrous.

Free or self-governing societies are characterised by self-discipline rather than permissiveness

To the Greeks, liberty meant the freedom to run themselves. They were free because their society was self-governing. The Persians were slaves because they were run by an autocrat. This did not mean that there was greater permissiveness in Greece than in Persia. The opposite in fact was true. The Greeks were highly disciplined.

Fustel de Coulanges in his famous study of the ancient city is shocked by the extent of their discipline, by the all pervading tyranny exerted by public opinion on the citizens of the city state, which was greater in his eyes than that imposed by any dictator.

A cross-cultural study of stable societies reveals that this discipline of self-discipline, characterises them all. It is a *sine qua non* of self-government. It is for this reason that self-government, which we regard as synonymous with democracy, cannot occur in a mass-society.

This must be so if we consider the nature of systems. A group of individuals learn to constitute a system by accepting constraints, *i.e.* by limiting their range of choice. It is in this way that order is built up, order involves by definition a limitation of choice. Consider the system that is the family unit. It can only exist if its members behave in a particular way towards each other. This means that they must limit their range of behavioural choices, in other words accept the imposition of constraints—that particular set of constraints that makes possible the survival of the family unit.

The laws of a stable society are hierarchically organised

Another important principle which few people are willing to face is that a society, like any other system, must be organised hierarchically. This must be so because the pattern of instructions ensuring the control of a system is so arranged that the instructions based on information reflecting the experience of the species over a long period are hierarchically superior to those representing its experience over a short period. Genetic information is not easily changed. It would be unadaptive for it to be so, otherwise it

would cease reflecting the experience of a species over a long period, and simply that of a single generation. In such circumstances the species would cease to be stable. There would no longer be any continuity. Each generation would have to improvise its own biological form, which is clearly impossible.

The same is true of cultural information, though less so. This type of information is more malleable, more adjustable to immediate environmental requirements. The reason is that it only controls the particularities of behaviour, the generalities being determined genetically. Nevertheless, the generalities of a cultural pattern must also be relatively immutable, except over a long period, if a society is to be stable. This is an essential point which few people have realised, and which serves to explain the essential nature of religion and the fact that there can be no stable society whose behaviour is not determined by its religious beliefs.

Religion embodies the most general laws of a stable society

The religious part of our culture, needless to say, is that part which we regard as indubitable or self evident—on which we are not willing to compromise—in which we must include the generalities of our behaviour pattern if a society is to be stable.

As you see, I am regarding a religion as an integral part of a culture, and a culture as the control mechanism that ensures the stability of a social system. That this principle is not obvious to everybody is due to the fact that we are accustomed to viewing aberrant or disintegrated societies, which require for their control elaborate institutions of all sorts. The basic principle of government in a traditional society is that it requires no institutions, save perhaps an informal Council of Elders. Australian aboriginal societies have been referred to as gerontocracies, or government by the old men. In my opinion it would be more appropriate to refer to them as necrocracies, or government by the dead. Such societies are governed by traditional information which we would regard as constituting their religion, though the word is unlikely to be used by them.

Indeed, interestingly enough, no traditional societies appear to have a word for 'religion'. It is only when religion breaks away from the rest of a society's cultural pattern and ceases to be the effective force governing it, that the word 'religion' appears necessary. In the classical world there was no word for it. 'Religion', as you may remember, simply meant 'matters of state'. It is often debated whether traditional societies do have a religion. Fustel de Coulanges, in his study of the ancient city, concluded that every aspect of life was religious. The various missionaries whose articles on the subject appear in 'African Ideas of God', feel, on the contrary, that traditional society in Africa at least, is not religious. The debate is a sterile one, unless we provide a precise definition of the term 'religion'. If one regards it purely in terms of our particular form of religion, then clearly one cannot expect to find it in traditional societies. If, on the other hand, you regard it as I do as constituting the generalities of a behaviour pattern, that on which we are not willing to compromise, then all stable societies must have it, i.e. must be religious, or they could not survive.

But let us look a little more closely at this notion of culture as a control mechanism. First of all it provides a model of a society's relationship with its environment. It provides a goal, whose achievement must ensure the society's stable relationship with its environment, and a means of achieving this goal, i.e. a 'hierarchical organisation of instructions or guidelines.'

It must be clear to all of us that these things are precisely what our youth is lacking today. They lack a comprehensive worldview, a means of interpreting the world around them (Science has failed disastrously to provide this), a goal, (golessness, is quite evidently one of the principal diseases our youth is suffering from), as for guidelines, without them they must drift aimlessly, like a leaf in the wind, and life must be sad, empty, frustrating.

The symptoms of social breakdown

A lot is to be learnt from an examination of the history of the breakdown of societies, Norman Cohn traced the disintegration of societies in Europe in the Middle Ages in his famous book 'The Pursuit of the Millennium'. Vittorio Lanternari has done the same for traditional societies in the Third World destroyed by Western influences, in his 'The Religion of the Oppressed'. In each case as a culture breaks down there is a period of alienation and demoralisation in which people appear principally concerned with the satisfaction of short-term needs. Such a period is characterised by permissiveness, the cult of individualism, the breakdown of hierarchy, the violation of the moribund society's most cherished taboos.

The period we are going through in Western society could not be more typical. Contrary to what we are taught today, people are never more miserable than in such conditions. That is why they have to resort to so many different forms of escapism: drug addiction, alcoholism, crime and why, too, they fall increasingly victims to schizophrenia and resort in ever greater numbers to the final form of escapism, suicide.

The next stage is a frantic search for new systems of belief in an effort to recreate an orderly society held together by a clearly formulated religio-culture. Movements attempting to achieve this have already begun to proliferate. In Africa today there are several thousand such movements, usually referred to as millenarist, or messianic. In Lagos there is actually now the world's first trade union of messiahs. Christianity started off very much in this way, as a messianic cult adopted by the alienated proletariat of the large cities during the disintegration of the Roman Empire. Since then it has gone through many forms.

One can expect an increasing number of such movements in our disintegrating Western society. I am fully convinced that it is only such a movement that can lead us out of the present morass. It is interesting to consider what should be its main features if it is to provide the basis of a new stable and satisfying post-industrial civilisation.

The basis of social stability is sacredness

I think perhaps the first feature of such a new religio-culture is that it should be all encompassing. We habitually distinguish between the sacred and the profane, if our religion were all encompassing, there would be no such distinction. Everything would be sacred, as is the case in traditional societies. If something is sacred it means that one cannot change it let alone destroy it simply to satisfy a passing whim, or even to provide us with an apparent material advantage.

The world of which we are part, which has taken 3,000 million years to create, must be treated with respect, and humility. This in fact is the only scientific attitude. The notion that one can modify it at will so as to bring it totally under our control, which is entertained by our scientists today, only reflects their shattering ignorance of basic scientific principles. There are two aspects to science: trying to understand the world we live in, and trying to modify it. If our scientists spent more time trying to understand things, they would soon realise how unjustified are the changes they are at present so intent on bringing about.

Primitive man regarded everything around him as sacred, which meant that he had to treat his environment with respect. We, on the other hand, have desanctified nature, worse still, we have sanctified man. Still worse, modern man has sanctified the human brain. Man, with the aid of science, technology and industry is regarded as omnipotent, omniscient and ubiquitous. He has taken over from God, and has decided to wage a methodical and systematic battle against his works. Indeed, the very principle that man can control his environment, which underlies the effective religion of modern man, is anti-evolutionary.

The belief which we cherish that it is possible by means of science and technology to create a paradise from which all human problems such as poverty, unemployment, diseases, malnutrition, ignorance, war will be eliminated is the ultimate heresy. It justifies the design and development of a totally new organisation of matter, the technosphere or world of human artefacts which is everywhere being purposefully substituted for the biosphere, or world of living things.

It is possibly the most naive belief ever entertained, since to achieve this dream must mean violating the basic laws of science: principally those of thermodynamics, biology and ecology. Its effect is to make the world ever less suitable for human habitation, since we are part of the biosphere, not the technosphere, We are made of protoplasm not wire and aluminium. The expansion of the technosphere must mean the corresponding contraction of the biosphere, these processes are the two sides of the same medal, essential parts of the same wider process. You can't have a tropical forest and a cement factory on the same spot; you have to choose. The technosphere derives its resources from the biosphere and must consign to it its waste products. The idea that resource management and pollution-control can prevent the destruction of the biosphere is indeed a very dangerous illusion.

This destruction of the biosphere occurs at all levels of organisation and gives rise to biological, social and ecological maladjustments. In my forthcoming book 'The Culturalist Manifesto' [see *The Way*], I try to demonstrate how the major problems

facing man today, such as poverty, unemployment, disease, homelessness, and war, are symptoms of these maladjustments. That is why technological solutions to these problems cannot work. In terms of our world view, we regard them as due to a lack of industrial development, whereas in reality it is industrial development that has caused them. We are convinced that by allocating funds for scientific research, technological development and industrial growth, these problems will be solved, whereas in reality by expanding the technosphere in this manner, we can only further disrupt biological, social and ecological systems, thereby further exacerbating these problems. We are thus caught up in a vicious circle, or positive feedback reaction from which we can only extract ourselves by completely changing our world view, by realising that these problems are not material or economic, but biological, social and ecological, and that they can only be solved by biological, social and ecological solutions.

Real poverty is biological and social, not material, deprivation

Poverty is not material deprivation. It cannot be eliminated by providing people with more electric toothbrushes and gold-plated Cadillacs. The Americans, by creating the most affluent society in the world, have not eliminated poverty. In Illich's words, they have simply *modernised it*. They have simply created a society in which a staggering amount of material goods is required to lead something approaching a 'normal' life, whereas in traditional societies a much more satisfying life is possible with a fraction of the material goods required by the Americans. Industrialisation in fact creates needs much faster than it can satisfy them. Also, as I have pointed out, these material goods are acquired at a cost: biological, social and ecological disruption. As electric toothbrushes become easier to acquire, so by the same token is it more difficult to obtain clean air, uncontaminated food and a satisfactory social environment. Industrialisation, if one looks at it carefully and objectively, is in reality a *device for providing us with the superfluous at the cost of the indispensable*. Poverty is, in fact, best regarded as biological and social deprivation. This is what the inhabitants of the ghettos of the large American Cities are suffering from and no amount of material goods can compensate for it.

The process is occurring much faster than anyone is willing to admit. Four or five years ago we were predicting that nuclear waste would eventually leak from the containers in which it must be stored for several hundred years. It has already happened. Over a hundred thousand gallons of high-level radio-active waste has seeped out into the Columbia River at Hanford. We were all concerned about the possibility that SST's would disturb the ozone layer which shields us from the sun's radiation, and without which life on earth is not possible. It is happening.

The Australian Academy of Sciences has just revealed that the ozone layer is shrinking and has been for the last eight years. We were concerned that industrial activities on the present scale would upset world weather. It has probably already happened. The present drought in West Africa and elsewhere may well be the result of climatic changes brought about in West Europe.

For the earth to be incapable of supporting human life would not take very long at the present rate of industrialisation. My guess is about 30-40 years. This may sound very little, but one forgets that growth is exponential, and during the next 30 years the world population, at the current rate will have doubled, and the impact of each man will have multiplied by something like six times. The impact of human activities by this time would be far greater than the earth's fragile life support systems could withstand.

Fortunately, all this will never occur. The biosphere will be saved by what I regard to be the inevitable collapse of the technosphere. I think that a massive economic crash is inevitable in the next four or five years. This must be accompanied by very serious social perturbations. Famine and epidemics are likely to seriously reduce population pressure, and out of all this there is likely to emerge new modes of thought and new societies based on very different premises.

The basic features of a stabilising religio-culture

As I have already mentioned, stable societies must be governed by their religions, which must englobe all aspects of their worldview.

They must regard themselves as being part of nature, not above it, nor in any way exempt from its laws; and nature, the work of evolution or God, must be regarded as holy. The terrible heresy, according to which it is supposed we can control nature for our own ends, must be totally abandoned. It is this illusion which will have caused the terrible global catastrophes we are about to witness.

In addition, the religion of such a society must lead its members towards maintaining social continuity, or stability. The notion of material progress as we conceive it must be totally abandoned.

Politics must be entirely governed by the society's religio-culture, as is the case in traditional societies. Institutionalised government has never worked. Look at our history, it is but a story of intrigues, massacres, wars, assassinations. Politicians have all been hopeless. All have failed to identify the real problems facing man.

Consider that the greatest problem we have faced since the agricultural revolution has been soil-erosion. The lands bordering the Mediterranean which were once very fertile, have been turned into wildernesses as the top soil has disappeared into the sea: Yet can anyone recall a political speech exhorting people to conserve the soil? How many votes would a politician in Britain obtain were soil conservation to be the principal plank of his party platform? Look at our politicians today. With the world collapsing about their ears, what do they discuss at Westminster? Equal pay for women, the interest rate on mortgages, whether we should build a third airport or channel tunnel. Let us face it, it is not in this way that a society can be controlled. When politics is governed by a society's traditions it is very different. The role of the Elders is simply to interpret the traditional law. Government has no institutions, democracy is not representative but *participatory*—all take an active role in governing the society in accordance with the principles handed down from generation to generation.

If politics has failed to replace tradition, so has science. Our scientists have swallowed the worldview of industrial man hook, line and sinker. The idea that it is as objective as it is made out to be is an illusion. The truth is that man was not designed phylogenetically to solve the sort of problems he is faced with today. For two million years, while he was a hunter-gatherer he undoubtedly developed a considerable talent for chasing small mammals and digging for roots. On the other hand he has been unsuccessful in most of his enterprises since he abandoned this way of life.

The maladjustment of modern society

As technology takes over from the biosphere, so does the world resemble less and less that to which we have been adapted, which makes it very difficult for us to understand it. In fact, one of the maladjustments caused by this process is 'cognitive maladjustment'. If you put an East African warthog into a shoe factory, you would not expect it to interpret correctly the components of this new and strange environment. It can only interpret it in terms of its previous experience. Similarly, when Captain Cook first arrived at Tahiti, the natives he encountered had never seen a horse, the only mammal of which they had had any experience was the pig, and they quite logically referred to the horse as a man-carrying-pig.

We are increasingly in this situation ourselves. Our natural instincts provide us with no guidelines for dealing with the strange new components of our environment. Horrible things like radio-isotopes, x-ray machines, food-additives, nuclear-power plants, pollution, resource-depletion, massive social mobility, of all these things we have had no cultural, let alone phylogenetic experience, and neither our politicians nor our scientists, nor anybody else, can respond to them adaptively.

It may be argued that we have accumulated an immense amount of data over the last fifty years, but data by itself cannot serve to guide public policy. It must first be organised into information. Unfortunately, our scientists carry out endless experiments whose results are described in detail in thousands of separate specialised journals. These are written for the specialist, and specialists defend their academic territory more ferociously than any territorially-based bird or mammal described by Robert Ardrey. The data is thereby locked up in a host of little pockets to which only the initiated have access. Efforts to organise data into information are looked upon as "unscientific" as it is often not the sort of work that can be carried out in laboratories. There is a perfectly good tool for organising this data, General Systems or Cybernetics, but, as we have seen, it is rarely used. The idea in fact that science can hope to provide a means of controlling our society is a terrible illusion.

Traditional cultures are adapted to biological and social needs

On the other hand, in a traditional society, science is kept under cultural control, as has always been the case in India, and as was the case in Europe until very recently. It was probably Descartes who laid the foundations for the separation of science from religion

by positing the '*res extensa*' as opposed to the '*res cogitans*', the former being for various reasons, outside the jurisdiction of traditional religion.

It is interesting to note how in a traditional society, technology, which with us has gone completely berserk, is also kept under control. It is only in this way that good technology is possible. Consider a fishing society living on a lake. Let us suppose that every year there is a net production of 1500 fish. A good technology would enable them to catch precisely this number, and this is the one which a traditional society would undoubtedly exploit, the one consistent with its religion and ritual life. A modern technology introduced by an unthinking external power would undoubtedly enable them to catch many more than 1500 fish but with the inevitable depletion of fish stocks.

Technology, in a traditional society is an integral part of its behaviour and cannot be looked at separately. There is a famous story of a tribe in Australia among whose members the possession of a stone axe was of particular significance. Only the elders possessed the right to do so, and there were elaborate rituals for lending axes to other people, all of which were very important for the maintenance of the tribe's social structure. Missionaries, seeking to ingratiate themselves with the Aborigines, dished out axes to everybody, steel ones at that, and the result was the break down of the society and the transformation of its members into depressed slum-dwellers living on the periphery of the modern world.

One of the most important aspects of our behaviour which must be culturally controlled is education. We have totally lost sight of its very purpose and consider that it consists in cramming ever increasing quantities of largely irrelevant information into the heads of our unfortunate children. We forget that *education is basically but another word for socialisation*. This is certainly true in traditional societies, where it consists of transmitting the traditional information from one generation to the next, so as to ensure the society's continuity or stability.

This information is that which is required *to enable the child to fulfil its functions as a member of its family and community*. If this is so, then the information will differ from one society to the next. That required to enable a young child to fulfil its functions as a member of a bushman band will be very different from that which he would require were he a member of a centralised African kingdom, such as Benin. In fact, a bushman with a first class honours at Oxford University is, as far as I am concerned, uneducated.

Restabilising society

The sooner we understand this principle, the sooner will this terrible social disruption we are causing throughout the Third World start coming to an end. Meanwhile, we in Britain should start considering now what is the information that must be communicated to future generations which would enable them to develop a stable, continuous and satisfying society.

I do not think that this work will be in vain. As industrial society grinds to a halt, people will lose confidence in conventional wisdom and current solutions. In fact, this has

already begun. They will be looking for different answers, very different ones. One can predict a religious reaction to this eminently irreligious age; a new interest in traditional forms after a period in which people have only been concerned with the novel, the original, and the outrageous; a longing for a communal living to replace the cult of individualism; a frantic search for spiritual values by those who have only experienced the squalor and misery which our materialist philosophy has inevitably brought about.

My question to you, Gentlemen, is what is to be the role of the Farmington Trust in an exciting and essential enterprise of this sort?

Two quotes from the discussion following this address)

“The African in my view was religious in that if there was complete disaster he said ‘Shauri Ya Mungu’. In other words, God’s doing. If everything was marvellous it was still God’s doing. All his problems in fact were put upon the shoulders of God. I think your deepest believing Christian is doing the same thing. Is it not possible for the modern generation to find something on which to put their problems?”

“Science cannot deal with the real essence of religion any more than it can with the nature of art or the political nature of man, but we can systematically study the religion in man—our civilisation has been built on a religious foundation—there is some reality in this.”

The Cosmic Covenant

by Edward Goldsmith · February 2, 1998 ·

This is transcript of a talk by Edward Goldsmith on 2 February 1998 at the Religion & Environment Education Programme (REEP) Conference for Bishops & Theologians, chaired by the Bishop of London.

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See also additional material.

“freedom – the right of a particular form of life to lead the life that it was designed to lead by its evolution or creation – and also in the case of the human species by its cultural upbringing.”

THE ENVIRONMENTAL PROBLEMS we face today, such as the destruction of the world’s forests, the drainage of its wetlands, the pollution of its groundwaters, rivers, estuaries, seas; the erosion, compaction and desertification of its agricultural lands, the chemicalisation of just about everything, and of course global climate change – the problem that dwarfs them all – are not unrelated.

They form a veritable syndrome, and, what is important, they are the inevitable consequences of the policies that we apply, all of which are designed to contribute to the overriding policy of promoting massive, uncontrollable, economic development that we identify with progress. Unfortunately, we believe quasi-religiously in economic development. It underlies the world-view of modernism – of the secular religion of today – which is unfortunately the source of all our problems.

Underlying the world-view of this secular religion is the fundamental assumption that the world is badly designed. God did a bad job, and it is incumbent on man, armed, as he is with all his science, technology, industry, and free trade, to transform it in accordance with his vastly superior design.

To a truly religious person this dogma should clearly be seen as the ultimate blasphemy; yet few people see it that way. Nearly everyone today seems to accept the preposterous view that modern man is actually ‘improving’ the world – making it a better place to live in – against, I might add, all the evidence to the contrary that is accumulating by the minute.

Of course, people still pay lip-service to a transcendental religion – in our part of the world to some form of Christianity. But it is indeed only lip-service that they pay to it. The real religion with which they have been imbued since their most tender childhood is the secular religion of progress. In any case, modern Christianity, like most modern mainstream religions, has changed very considerably over the years.

From serving above all to link people together, to the whole creation, and to the creator, as etymologically the term originally implied, it has become little more than a biopolar relationship between an asocial, anecological man and a God who seems to share the

same characteristics. Something must be done about this if life is to regain its meaning and also if we are to survive very much longer on this beleaguered planet.

The two main speakers this morning have showed us that originally, ancient Judaism as well as early Christianity did serve to bind man to the whole creation and to the creator himself. But the original theology has been perverted and must be reconstituted, which means returning to our roots so that religion can once more fulfil its original role and spearhead the shift towards a less destructive way of life.

To say as the Metropolitan John of Pergamon, among others, has done, that the destruction of the environment is a sin, is not by itself sufficient. People can only understand and believe that it is a sin, indeed the ultimate sin, if this notion is totally consistent with the theology that sees the preservation of the creation as man's overriding duty, as we have been shown today was the case in the early Judeo-Christian tradition. Also, we must realize that if to destroy the environment is a sin then development can no longer be the acceptable goal of governmental policy.

Of course it is every type of development that I refer to. In the last 30 years since I have been involved in the environmental movement, I have heard over and over again that the sort of destructive development we have had so far is not real development. The development process has been mismanaged we are told. We must do it properly. What we need is a new sort of development, the "*rural development*" of McNamara when he was President of the World Bank, the "*eco-development*" of Maurice Strong when he ran the United Nations Environmental Development Programme, the "*intermediate development*" of Dr Schumacher, or the "*integrated development*" which at one time was all the rage. Of course today it is "*sustainable development*" that is supposed to provide a panacea to all our problems.

However, nothing has changed. If anything, development has become even more socially and ecologically destructive and morally repulsive, especially with the development of the global economy, that in effect, globalizes this immoral and destructive process.

The second point I want to make is that this process is now completely out of control. I do not see anything in place that can conceivably stop the continued destruction of the world's forests until there are no accessible forests left, or rather until it has become uneconomic to cut down any more. There is no law anywhere to prevent corporations from clearcutting forests or draining wetlands, or generating greenhouse gases that must inevitably destabilize the world's climate.

What is more, even if any such laws to be enacted there is no possible mechanism for implementing them, especially as it is in the immediate interests of governments to collude with the corporations responsible for the destruction, as it will temporarily at least increase their tax income while providing many of their members with often massive kickbacks.

Worse still, with the signing of the GATT Uruguay Rounds Agreement, any such laws would almost certainly be classifiable as 'non-tariff barriers' and judged illegal by secret panels of the World Trade Organization (WTO). What is more, if the multilateral

agreement on investments (MAI) is signed, such laws would be even more obviously illegal. This shameful agreement would in effect make it illegal for any government to pass a law that reduces the profits of a corporation. In anticipation of the signing of this agreement, the Ethyl Corporation of America is actually suing the Canadian government for \$250 million because it refuses to let them sell in Canada a toxic additive to petrol that would apparently reduce their profits by that amount.

The third point I want to make is that if current destructive trends persist for long enough – and they do not have to persist for very long – 40, 50, 60, at the most 100 years, our even more degraded world will have ceased to be capable of supporting complex forms of life and we will almost certainly become extinct as a species. Fortunately it is unlikely that they will continue that long. Something will bring them to an end.

But – let us be realistic – that something, whatever it is, will almost certainly not be an intelligent and responsible decision taken by a government anywhere in the world. It would not be politically expedient for them to take such decisions, for their precious political careers would come to an abrupt end if they made even the most tentative suggestions that the requisite decisions should be made. In effect, we have delegated the solutions to our problems to disasters of different sorts – economic disasters, social disasters, and of course ecological and climatic disasters, if the others do not occur first.

Having said this, it is quite clear that today there are no cosmetic solutions to our problems. It is too late to fiddle around with things. We are past that stage. If all today's social and ecological trends lead to catastrophe, quite obviously the only responsible course of action is to reverse these trends and reverse them very quickly indeed.

If today's policy is to create a global economy totally controlled by vast, uncontrollable, and socially and ecologically irresponsible transnational corporations catering for the world market, we must instead create a network of loosely connected local economies, largely in the hands of small and medium sized companies that are integral parts of local communities and societies, and for whose welfare they feel deeply responsible.

It is only in this way that we can reduce the impact of our economic activities on an environment that cannot sustain the present impact – an impact that we are still busily trying to increase by globalizing the economy and making it ever more dependent on the use of highly destructive new technologies such as genetic engineering.

It is only in this way too that we can conceivably provide people with jobs or other means of assuring their livelihood, for even today, it is the small and medium sized companies that provide the bulk of available jobs – the transnationals – in spite of all their hyper – providing but an insignificant proportion of those that are today available. What is more, it is also only in this way that we can create the economic infrastructure for renewed families and communities which the global economy cannot conceivably do.

We need to move in this direction for yet another reason. This morning we all agreed that it was only within the context of a cosmic or ecological religion – which early Judaism and early Christianity once were – that people can be made to realize that the destruction of God's creation is a sin – the ultimate sin. Unfortunately, an atomized

mass society such as ours, made up of alienated people for whom the object of life is little more than immediate self-gratification, and that is organized into totally artificial surrogate social groupings, such as governmental institutions and commercial corporations, cannot conceivably be imbued with this sort of religion.

Let us not forget that the main feature of a cosmic religion is its accentuation of man's obligations to society, the natural world and the all-encompassing cosmos itself. There is no point preaching such a religion to people who have been taught that obligations of any kind are but unacceptable constraints on their individual 'freedom'. Nor are such people likely to accept these ideas if they have been taught from their earliest childhood that the God they worship has little concern for the fate of society, the natural world, and the cosmos.

Unfortunately it is by imbuing people with these irresponsible ideas that we maximize the immediate interests of the large transnational corporations that control the global economy we have institutionalized in the last few years. Fortunately this global economy cannot last for long. It is organized in such a way, and is at the same time so highly automated, that it could probably function with less than 20 percent of the world's work force – thereby marginalized 80 percent of humanity – something which is impossible to do without creating unparalleled human misery and all sorts of social conflicts.

In addition, it is inherently unstable as the South American economic crisis of the early eighties, the Mexican economic crises five years ago [1993], and now the economic crises in the Far East, Russia, Mexico, Brazil, India, and Pakistan, make clear. It seems but a question of time before the world economy undergoes a similar fate and we are faced with global economic collapse. Whether this occurs or not, a vast proportion of humanity will, in any case, be forced to fend for itself outside the formal economy, which means developing an elaborate informal economy which will dwarf in size and importance the formal economy itself, that we have now globalized.

This will give rise to terrible chaos and human misery but it must also spell a slow and piecemeal return to a society that is organized once more into family and community groupings in which economic activity is on a very much smaller scale and caters for, at most, local and regional markets.

We must realize that it is in such societies that we have spent possibly as much as 95 percent of our tenancy of this planet – it is only in this sort of society that people are likely to feel a sense of obligation towards the world around them – the only sort of society that can possibly be imbued with the sort of cosmic religion that Father Murray, Margaret Baker, and Professor Nasr talked about this morning. One might go so far as to say such a society is a natural one for humans to live in, as one might add a cosmic or ecological religion is the natural one for humans to be imbued with.

Indeed, it has been shown by a succession of our classical anthropologists (Ralph Linfon, Melford Spiro, George Peter Murdock, etc.) that the family and community have provided the basis of human society throughout the traditional world. There is no real exception to this rule. The key idea that man's welfare is assured not by maximizing gross national product but on the contrary by preserving the critical order of society, the natural world and the all-encompassing cosmos, is equally natural to our species.

Mircea Eliade, and other great students of religion have shown how most of the rituals performed by traditional peoples served above all to maintain the cosmic order. In many societies in fact a word existed for the path that had to be taken in order to do so – the *Tao* of the ancient Chinese, the *R'ta* of the Vedic Indians, the *Asha* of the Avestas, the *Maat* of the ancient Egyptians, and as Father Murray and Margaret Barker make clear in their writing, the *Sedeq* of the ancient Hebrews. By following this path one maintained the harmony between heaven and earth – the original meaning of *shalom* – cosmic order in fact.

This was also the path of justice and it was by following it that one observed, at the same time, the moral law, the divine law, and the cosmic law. There was seen to be no distinction between the law governing society (the *nomos* of the Greeks) that which governed the natural world itself, (usually referred to by the Greeks as *dike*) and that which governed the all-embracing world of the gods (usually referred to as *Themis*).

What a contrast with modern man's view of law! It is worth noting that today our law serves above all to protect private property, and one could destroy the living world and make our very species extinct without violating a single one of the laws that we enacted. What an indictment of the world-view, that our law so faithfully reflects!

As we return to a natural society, the bulk of people will realize that the modern world they have left behind was little more than a terrible aberration. It may have provided us with a mass of ingenious gadgetry and undoubtedly with all sorts of comforts which were unknown in the traditional world, but it has also made a very large number of people very miserable, for it has deprived them of the most important things in life.

The great Indian thinker, Krishna Chaitania, who died two years ago, defined that much abused term 'freedom' as the right of a particular form of life to lead the life that it was designed to lead by its evolution or creation – and also in the case of the human species by its cultural upbringing. It is this freedom that we have been increasingly deprived of in modern times, and no amount of ingenious gadgetry can compensate for this.

We have always lived as members of families and communities, bound together with the natural world and the cosmos by a cosmic tradition and religion. For me, this must be man's natural state, and it must be that which best satisfies his real needs and at the same time of course those of society, of the natural world, and of the cosmos. If we are to have a future we must abandon the illusion of scientific, technical and industrial progress which can only lead to global catastrophe, and, though we cannot recreate the past, it is a world that displays its principal features that we must seek to create.

Man is naturally a religious being. It is not religion as Karl Marx insisted, but materialism that is the opiate of the people. What is more, religion is even today a powerful force and could be very much more so if it were seen by the public at large as providing the very basis of the world view with which we must all be imbued if we are to survive on this beleaguered planet. Hence the critical importance of reviving the largely forgotten cosmic roots of the Judaeo-Christian tradition and indeed of the other mainstream religious traditions of today.

Towards a Biospheric Ethic

by Edward Goldsmith · January 26, 2003 · [Leave a Comment](#) · [Share](#) · [Print](#)
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Modern moral philosophers have tended to study ethics in a void, ignoring the insights of the natural and human sciences. Although several of our most noted and thoughtful biologists and sociologists have sought to correct this, they have based their ethical principles on a grossly distorted view of nature and human society.

The result has been a ‘technospheric’ ethic that seeks to equate progress and the moral good with economic expansion and the dominance of man over nature. A new ‘biospheric’ ethic is required: one that places ethical values in their appropriate context: that of mediating human behaviour in its relationship with society, the ecosystem, the biosphere and the Cosmos itself.

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ONE OF THE FIRST questions to answer in a serious discussion of ethics is whether there exists an acceptable criterion for determining whether or not an action is ethically right or wrong. Dobzhansky thinks that there cannot be, because it would limit “*the essential human faculty for the exercise of freedom*”. [1] Waddington, on the other hand, thinks that there can be.

“I wish to maintain that it is possible to discuss, and perhaps to discover a criterion which is not of an ethical nature, but is, if you wish, of a supra-ethical character; a criterion, that is to say, which would make it possible to decide whether a certain ethical system of values is in some definite and important sense preferable to another.” [2]

The criterion which he suggests is “*wisdom*”. Indeed the wise man rather than the educated man, let alone the scientific expert, is above all, he who can best distinguish what is right from what is wrong.

What are ethics?

I think one can consider all natural systems, including humans, to be endowed with a set of instructions whose implementation, in the light of the model of their relationship with their total spatio-temporal environment, has enabled them to achieve their goal of helping to maintain overall Gaian stability or homeostasis, and thereby their own stability or homeostasis.

These instructions are organized hierarchically, the more general – and hence those that determine the basic features of a system’s behaviour and which reflect the longest experience – being differentiated into more particular instructions which determine the system’s less basic features, those that it has acquired in the more recent past.

One of the most important, and indeed indispensable, features of the general instructions is that they should be non-plastic, and hence immutable in the short-term at least. This is the only way in which continuity, and thus stability, can be maintained.

That is why genetic information is non-plastic. If it were not, then there would be nothing to prevent zebras from engendering baby wildebeeste and vice versa.

This is also why cultural information, that which mediates the behaviour of social groups, must be non-plastic. If it were not, then such social groups could display neither continuity nor stability. nor could their behaviour be homeotelic and thereby serve to maintain the order of the Cosmos. Such non-plastic instructions, at the cultural level, I regard as moral values.

The acceptance of authority

Waddington points out very explicitly that instructions are useless unless they are accepted and acted upon. For this to be possible, they must be regarded as authoritative. He considers that “*the sociogenetic continuum*” cannot be maintained “*without the existence of the role of an authority acceptor*”. For him,

“ethicizing is for man an integral part of the role of the taught or the authority acceptor – without the existence of which his cultural socio-genetic evolutionary system could not operate.” [3]

Piaget saw ethics in the same way:

“It seems to us an undeniable fact that in the course of the child’s mental development, unilateral respect or the respect felt by the small for the great, plays an essential part; it is what makes the child accept all the commands transmitted to him by his parents and is thus the great factor of continuity between different generations.” [4]

As the child grows up, this eventually generates co-operation and mutual respect. It could be argued that the acceptance of knowledge transmitted in this way is epistemologically unacceptable. But as Waddington noted:

“... a great deal of social transmission takes place at a time when the recipient is much too young to apply any verification procedures, which must be regarded as relatively sophisticated mechanisms for adjustment and rectification rather than as basic elements in the fundamental mechanism of transmitted information which is accepted, rather than on information which has been tested and verified.” [5]

One can go further than this. Propositions are clearly not accepted in the real world – no more by scientists than by children – because they have been verified, or because they are falsifiable (Popper’s proposed criterion), but because they fit in with a particular paradigm or worldview, which, in the case of children may be embryonic and hence in its formative stage. Indeed, ‘empirical’ verification, as Popper showed decades ago, is not a realistic concept.

The process by which we build up information has, in any case been validated by the evolutionary process itself – of which it is the product. As Waddington wrote:

“like all other products of evolution, information has been moulded by the necessity to fit in with – or rather, to put it more actively, to cope – with the rest of the natural world. The intellect is an instrument forged for the specific purpose of coming to terms with things.” [6]

This is an essential point that is rarely made and whose acceptance is alone sufficient to validate knowledge acquired subjectively by intuition by members of societies that have learned “*to cope with the rest of the natural world*”.

What, we might ask, makes the “*authority acceptor*” accept the instructions and adopt them as the ethical principles underlying his code of conduct? The answer is that they must be sanctioned, authenticated, validated, indeed sanctified, by something more important than himself which he regarded as embodying wisdom, authority and sanctity. Matthew Arnold referred to this as “*something, not ourselves, that makes for righteousness*”. [7]

It makes sense to suppose that that “*something not ourselves*” should be the natural world of which we are an integral part -and whose laws we must clearly observe if we are to survive. Significantly, it seems probable that we are cognitively adjusted’ by our geneto-cultural inheritance to regarding nature as the ultimate authority. As Worster writes: “*Few ideas have been recycled as often as the belief that the ‘is’ of nature must become the ‘ought’ of man*”. [8]

Even in the nineteenth century – a period which saw the development of technospheric euphoria and the revolt against nature which helped to rationalize this euphoria – sociologists still looked to nature as the ultimate sanction for our ethical system. As Greta Jones writes,

“The search for a social theory was, for the vast majority of nineteenth century sociologists, a search for a ‘natural’ underpinning to social order and, in addition, for atrophy of the individual’s obligation to respect that order.” [9]

Even those who explicitly rejected the notion that our ethics cannot be derived from nature could not, in spite of themselves, avoid doing just that. Thus Lester Ward, who saw nature as evil and preached state-controlled economic development as a means of creating a paradise on earth, stated that his programme (“*collective telesis*”) could alone “*place society once more in the free current of natural law*”. [10]

Even Edward O. Wilson, the father of twentieth century sociobiology, who strenuously denies that our ethics can be derived from nature, cannot avoid telling us, in an unguarded moment, that our ethical values are the product of the evolutionary process:

“The biologist, who is concerned with questions of physiology and evolutionary history, realizes that self-knowledge is constrained and shaped by the emotional control centres in the hypothalamus and limbic system of the brain. . . What, we are then compelled to ask, made the hypothalamus and limbic system? They evolved by natural selection. That simple biological statement must be pursued to explain ethics and ethical philosophers, if not epistemology and epistemologists, at all depths.” [11]

Evolution: the source of ethics

If nature is that “*something not ourselves*” that makes for righteousness, this means that ethical behaviour must be that behaviour which enables a living thing to fit into the natural world, to behave as part of it and, hence, to observe its laws or constraints. In

particular. it means that the evolutionary process that brought about the natural world. that all encompassing life process, must provide the best guide to ethical behaviour.

This was the view of both C. H. Waddington and Julian Huxley. “*We must accept*”, Waddington wrote, “*the direction of evolution as ‘good’ simply because it is ‘good’ according to any realist definition of that concept*”. [12] This must be sound common sense. Indeed,

“... if any individual approaches a nutritionist and says that he prefers to grow in an abnormal and unhealthy I manner, the nutritionist can do no more than tell him that if he I does so he will be out of step with nature. The criteria of biological wisdom in the case of ethics, or healthy growth in the case of eating. which can be derived in this way, are immanent in nature as we find it, not superimposed on it from outside. . . The criterion we are applying here is one of general accordance with the nature of the world as we observe it.” [13]

Julian Huxley felt the same way. In his Romanes Lecture of 1944, he stated that there was an overall direction in evolution. This direction he took to be “*good*” and suggested that it provided a yardstick against which to measure ethical values about which we may be in doubt.

This point was made even more strongly by Ralph Gerard, one of the leading holistic biologists at the University of Chicago in the early 1940s, who contended that “*a pronounced pattern of observed direction in nature provides man with all the guidance he needs for ‘shouldness’*. *If nature is found to be a world of interdependence, then man is obliged to consider that characteristic a moral dictum*”. [14] The evolutionary trend towards closer integration was, he argued, “*like a straight path through a dense wood, requiring of the pathfinder that he remain on the track and follow it through*”. [15]

Unfortunately however, all these scholars were imbued with what might be referred to as “*the world-view of modernism*”, whose principal role is to rationalize, and hence legitimize, economic development – that enterprise to which our society is entirely committed and which leads to the development of the ‘technosphere’ or the surrogate world of human artefacts.

Not surprisingly they sought above all to persuade themselves, and everybody else, that the Promethean enterprise to which they were committed was a fundamentally moral one. Sadly, neither C. H. Waddington nor J. S. Huxley, for all their insights, were exceptions to the rule.

But before we consider their position, let us first consider that of Herbert Spencer and the social Darwinists who preceded them.

Social Darwinists

Herbert Spencer and his colleagues preached an ethic of individualism, competition and aggression, an ethic which they justified as being in accordance with ‘natural law’. As Spencer wrote, “*Progress is not an accident but a necessity. Instead of civilisation*

being artificial, it is a part of nature, all a piece with the development of an embryo or the unfolding of a flower". [16]

The social Darwinists painted a very distorted view of nature, however. They saw it as random, chaotic, atomised, competitive and aggressive, ignoring its more fundamental co-operative aspects. For William Graham Sumner, the main prophet of social Darwinism in the USA, "*competition*", in the words of Richard Hofstadter, "*was the law of nature which could no more be done away with than gravitation*". [17]

The stress on competition was an essential tenet of social Darwinism, for in terms of Darwinism itself, then the established theory of evolution, and later of neo-Darwinism, competition provided the very motor of evolution. For the same reason, it was essential to the course of progress. The poor, the starving and the diseased, who were identified with the unfit, could thus be cast by the wayside without moral scruple. As Spencer wrote, "*The whole effort of nature was to clear the world of the (unfit) and make room for the better*". [18] This is still the ethic of our modern market society.

It is to be noted that it was also the ethic of Adolf Hitler, who wrote:

"the law of selection justifies this incessant struggle by allowing the survival of the fittest. Christianity is a rebellion against natural laws, a protest against nature. Taken to its logical extreme, Christianity would mean the systematic cult of human failure." [19]

The ethic of progress – in effect, the ethic of perpetual technospheric expansion – is in reality no more than an ethic of biospheric destruction. It is not an evolutionary ethic. On the contrary, it is an anti-evolutionary ethic.

The reaction against Nature

Like Spencer, T. H. Huxley in the 1890s, Gaylord Simpson and Jacques Monod in the 1950s, and Edward O. Wilson, Richard Dawkins and the other sociobiologists of today, also view the world as selfish, individualistic and aggressive. Thus T. H. Huxley, Darwin's most celebrated disciple, wrote that

"from the point of view of the moralist, the animal world is on about the same level as a gladiator's show. The creatures are fairly well treated, and set to fight – whereby the strongest, the swiftest and the cunningest live to fight another day. The spectator has no need to turn his thumbs down, as no quarter is given". [20]

But unlike Spencer, Huxley believed that "*the ethical progress of society depends not on imitating the cosmic process, still less in running away from it, but in combating it*". [21] Indeed,

"social progress means a checking of the cosmic process at every step, and the substitution for it of another, which may be called the ethical process; the end of which is not the survival of those who may happen to be the fittest, in respect of the whole of the conditions which obtain, but of those who are ethically the best". [21]

This ethical process he identifies with material progress. The same anti-naturalistic view was expressed by Sigmund Freud, who saw the development of civilization as a

systematic battle against man's natural instincts. It was also that of Lester Ward. As Donald Worster notes,

“Ward saw the way to progress and moral redemption in a systematic war with nature, which above all meant ‘changing the competitive egoism that all men have inherited from their animal ancestors’.” [22]

This is also very much the position of the sociobiologists who are particularly in vogue today. For them (like all modern neoDarwinists) man is by nature an individualist and an egoist, his overriding preoccupation being the survival of his own genes. But this does not mean that we have to behave egotistically. Indeed, as Dawkins tells us:

“We have the power to defy the selfish genes of our birth and, if necessary, the selfish memes of our indoctrination. We can even discuss ways of deliberately cultivating and nurturing pure, disinterested altruism – something that has no place in nature, something that has never existed before in the whole history of the world. We are built as gene machines and cultured as meme machines, but we have the power to turn against our creators. We, alone on earth, can rebel against the tyranny of the selfish replicators.” [23]

Elsewhere Dawkins tells us:

“If you wish, as I do, to build a society in which individuals co-operate generously and unselfishly towards a common good, you can expect little help from biological nature. Let us try to teach generosity and altruism, because we are born selfish. Let us understand what our own selfish genes are up to, because we may then at least have the chance to upset their designs, something which no other species has ever aspired to.” [24]

Gaylord Simpson and Jacques Monod put forward a broadly similar argument. For them, the most relevant aspect of nature is its randomness and purposelessness. “*Man*”, Gaylord Simpson tells us, “*is the result of a purposeless and materialistic process that did not have him in mind. He was not planned*”. [25] For Simpson, this has dramatic ethical implications:

“The discovery that the universe, apart from man or before his coming, lacked any purpose or plan, has the inevitable corollary that the workings of the Universe cannot provide any automatic universal, eternal, or absolute ethical criteria of right and wrong. This discovery has completely undermined all older attempts to find an intuitive ethic or to accept such an ethic as revelation. It equally undermines attempts to find a naturalistic ethic which will flow with absolute validity from the workings of nature or of evolution as a new revelation.” [26]

Jacques Monod said much the same thing. “*Since man has no role within the biosphere and is a stranger to it*” he wrote, “*the biosphere cannot impose any values on man*”. [27] What then is to provide us with an ethical inspiration? Presumably the technosphere or world of human artefacts – the product of economic development or progress.

The evolutionists

This brings us back to Julian Huxley and C. H. Waddington who, as we saw earlier, went a long way towards developing a biospheric ethic. If they did not, it is because they accepted the ‘gladiatorial’ view of nature that was prevalent at the time. They probably could not have done otherwise for this view was, and still is, at least among mainstream scientists, extremely firmly entrenched. Among other things, it underlies the Darwinist (and indeed the neo-Darwinist) theory of evolution, whose main features no scientist could then question without losing credibility among his peers.

Unlike T. H. Huxley, however, Julian Huxley and C. H. Waddington nevertheless believed, as we have seen, that it was only from nature that our ethical system could be derived. Furthermore, unlike the social Darwinists, they did not see this as implying that it had to be an individualistic and competitive ethic. On the contrary, they were firm believers in co-operation and harmony.

Their position was thus a strangely inconsistent one, and their efforts to eliminate this inconsistency somewhat unconvincing. It involved arguing that both nature and human nature were themselves subject to evolutionary change, which they identified with progress and which they saw as tending in the direction of increasing harmony and co-operation.

The argument is best expressed by Julian Huxley himself. He formally rejected his grandfather T. H. Huxley’s thesis that there was “*a fundamental contradiction between the ethical process and the cosmic process*”. [28] If the older Huxley believed this, “*it was that he saw the former as absolute and universal and the latter as occurring at a purely biological level*”. [29] As Julian Huxley wrote,

“Today that contradiction, can, I believe be resolved – on the one hand, by extending the concept of evolution both backward into the inorganic and forward into the human domain, and, on the other by considering ethics not as a body of fixed principles, but as the product of evolution, and itself evolving.” [30]

Progress, an integral part of evolution, had made man less individualistic and less competitive and more cooperative and altruistic, and it was this co-operative and altruistic ethic that itself mediated “*human evolution*” or progress.

Thus although both Julian Huxley and Waddington regarded themselves as proponents of the biospheric or naturalistic ethic, by insisting that progress was part of evolution and that the technosphere or world of human artefacts was part of nature, they sought to justify the very process of economic development that is leading inexorably to the destruction, indeed to the very annihilation, of nature.

Such a position had previously been expressed very explicitly by Drummond the American theologian, who insisted that “*the path of progress and the path of altruism are one*”, evolution being “*nothing but the Involution of Love, the revelation of Infinite Spirit, the Eternal Life returning to itself*”. [31] This is also the position of the Nobel Laureate Ilya Prigogine, which he uses to justify the latest phase of technological progress – genetic engineering – which he sees as providing a means of achieving a new earthly paradise.

Thus, regardless of their differences, all the scholars I have referred to formulated an ethic that serves above all to rationalize and hence validate that Promethean enterprise which we popularly refer to as ‘progress’ and which gives rise to the ‘technosphere’ or surrogate world of human artefacts. One could refer to such an ethic as a ‘technospheric’ ethic and contrast it to what we might call a ‘biospheric’ ethic, an ethic whose role, in sharp contrast, is to rationalise and hence validate the preservation of the natural world on which we must ultimately depend for our survival.

Before we go further, it is worth considering the main features of the ‘technospheric’ ethic in some detail.

Morality begins with Man

A cardinal tenet of the ‘technospheric’ ethic – one accepted by all the scholars we have discussed so far – is that morality begins with modern man and that one cannot talk of primitive man, or of other forms of life, as being ‘moral’. Thus T. H. Huxley tells us that:

“society differs from nature in having a definite moral object; whence it comes about that the course shaped by the ethical man – the member of society of citizen – necessarily runs counter to that which the non-ethical man -the primitive savage or man as a mere member of the animal kingdom -tends to adopt. The later fights out the struggle for existence to the bitter end like any other animal; the former devotes his best energies to the object of setting limits to the struggle.” [32]

Although Julian Huxley, as already noted, saw progress as part of evolution, he insisted that it was an ethical process, which previous evolution was not:

“The existence of man on earth introduced morality into the Cosmos in the same sort of way as it later introduced the so-called Laws of Nature. . . Moral law does not exist until man appears, with his capacity for perceiving badness and goodness and for generalizing about right and wrong.” [33]

The laws or customs of vernacular societies were observed not only because they had the moral force of having been promulgated by the ancestors. . . but also because they were seen as maintaining the order of the Cosmos.

Waddington took the same position:

“It is only when we pass on from the sub-human world to deal with the evolution of man that ethics must, in its own right, enter the picture”. [34]

In a similar vein, Simpson, who as we have seen saw progress as very distinct from evolution, writes:

“There is no ethics but human ethics and a search that ignores the necessity that ethics be human, relative to man, is bound to fail.” [35]

Purpose

Most of these scholars (Simpson and Monod, in particular) agree that evolution is a random, blind and purposeless process but insist that this is only true until man, or

more precisely modern man, appears. Lester Ward also made explicit this belief that it is only with the appearance of man that there can be purpose:

“If there is no cosmic purpose, there is at least human purpose, which has already given man a special place in nature and may yet, if he wills it, give organization and direction to his social life. Purposeful activity must henceforth be recognised as a proper function not only of the individual but of a whole society.” [36]

Ward made a distinction between man-made phenomena that are the result of human purpose, which he called “*telic*” (from the Greek word *telos* = ‘goal’) and natural or ‘genetic’ phenomena, the result of blind natural forces.

Significantly Sir Peter Medawar also considered that there was no purpose without consciousness and that because only man was conscious, only his behaviour was truly purposive.

Knowledge

All those who share the technospheric ethic are agreed that knowledge begins with man, or modern man. In non-human forms of life, and presumably among primitive people, there is only ‘experience’, whilst with modern man there is ‘education’. This makes all the difference, for according to Ward, “*the knowledge of experience is, so to speak, a genetic product, that of education is a teleological product*”. [37]

Monod and Simpson attach so much importance to knowledge that they actually preach an “*ethic of knowledge*” (Monod’s “*ethique de la connaissance*”). Monod sees this as being the only ethic possible for modern man. This ethical knowledge would differ from that of ‘animistic’ man, by which he means primitive man, because the latter believes in teleology – a belief which, for Monod, is a hideous failing, since he sees it as the opposite of objectivity, which alone embodies what he refers to as “*authentic*” knowledge.

Monod’s “*ethic of knowledge*” is clearly an essential part of the ethic of the technosphere, since it is only through the type of “*authentic*” knowledge which he promotes as ethical that the technosphere can be built up. Julian Huxley is explicit on this score:

“Knowledge is not merely an end in itself, but the only satisfactory means for controlling our future evolution.” [38]

If knowledge is good, and its acquisition essential for assuring the march of progress, then it must follow that

“social morality is seen to include the duty of providing an immense extension of research, and its integrated planning to provide the basis for desirable change.” [39]

Reason and choice

A third feature of the technospheric ethic is that it is only with consciousness, purpose, knowledge, and all the other supposedly unique endowments of modern man, that reason and choice emerge, without which there can be no morality.

Monod tells us that his ethic of knowledge would differ from all other previous ethics in that it would have been adopted by an act of conscious choice. Simpson tells us that choice is morally good. *“Blind faith”* on the other hand, *“is morally wrong”*. [40]

As knowledge builds up, our rational choices will change or rather ‘evolve’. This means that our ethics must be flexible: they cannot be absolute or, for that matter, universal. Change, Simpson insists, is *“the essence”* of evolution and for that reason alone *“there can be no absolute standard of ethics”*. [41]

Waddington also considered that the evolutionary ethic, as he saw it,

“cannot be expected to be absolute but must be subject to evolution itself and must be the result of responsible and rational choice in the full light of such knowledge of man and of life as we have.” [42]

As already pointed out, this was also essentially the view of Julian Huxley.

Individualism

The technospheric ethic is fundamentally an individualistic one. Simpson argues that even if we wished to derive ethics from nature, they would still be individualistic, for evolution tends towards individualisation (as opposed to higher integration as ecologists once maintained). This individualisation, Simpson regards as *“good”*. Man must be aware of *“the goodness of maintenance of this individualisation”*, and he must promote

“the integrity and dignity of the individual . . . Socialisation may be good or bad. When ethically good, it is based on, and in turn gives maximum total possibility for, ethically good individualization.” [43]

Man has no duty to the state (which Simpson does not distinguish from ‘society’). Those who suggest that he does are but the proponents of the *“organic State”*, a notion used *“to support authoritarian and totalitarian ideologies”*. [44]

Individualism, on the other hand, Simpson associates with democracy. Democratic society, for all those who espouse the technospheric ethic, is the product of the *“social contract”*, that is, of purposive, conscious, rational choice based on scientific knowledge. Therefore it is *“good”*. As William Graham Sumner wrote:

“Contract . . . is rational even rationalistic. It is also realistic, cold and matter of fact. A contract-relation is based on a sufficient reason, not on custom or prescription. It is not permanent. It endures only so long as the reason for it endures. In a state based on contract, sentiment is out of place in any public or common affairs. It is relegated to the sphere of private and personal relations.” [45]

The individual’s duty to the state thereby ends when the contract is rescinded.

Julian Huxley and Waddington also accepted the ethic of individualisation, but it was tempered with their knowledge that, in Huxley’s words, *“the individual is . . . meaningless in isolation”*, and, in Waddington’s, that *“a fully developed human being is inconceivable in isolation from society”*. [46] Nevertheless, according to Huxley,

“fuller individualisation is an evolutionary end; the developed human individual is the highest product of evolution; the experiences which alone have high intrinsic value, such as those of love and beauty and knowledge and mystical union, are accessible only to human individuals . . . yet a certain right organization of society is necessary as a means before those ends can be achieved.” [47]

This society, needless to say, Huxley sees as a man-made political unit. It is the United Nations that impresses him, since it may lead to the single world society.

For the sociobiologists only an individualistic ethic is even conceivable. The individual's overriding goal, for them, and indeed for those who have accepted the latest variants of neoDarwinism, is the proliferation of his own genes. The notion that this goal may, in the natural world, be subordinated to the more sensible goal of serving the interests of the community or the species or the ecosystem is considered unscientific, and those who suggest it, as does Professor Wynne Edwards, are mercilessly derided.

The occurrence of altruistic behaviour, by which they mean all behaviour that tends towards satisfying the needs of any unit larger than the individual, is acknowledged, but is explained simply in terms of short term cost-benefit analyses, based on the principle that, on certain occasions, altruism provides the means of satisfying the individual's overriding goal of maximum gene-proliferation.

There is a terrifying consistency to such arguments, since, for 'conscious' and 'rational' modern man, supposedly bereft of a subconscious, of emotions, of feelings, of faith, and allowed no attachments save of a rational and contractual nature, no identity in a random, goal less world, or alternatively one immersed in an anonymous megasociety committed to perpetual growth, there can be no alternative to the individualistic ethic.

Man as the only source of values

Since the modern ethic is the product of conscious choice, based on 'objective' and hence 'scientific' knowledge, it is sanctioned or authenticated by no external authority but that of modern man himself, endowed as he supposedly is with all his unique intellectual and moral gifts, and armed with the unique potentialities offered by scientific knowledge.

Simpson tells us that “*Man can cherish values if he wishes to*”, [48] but they are his own, self-imposed values. No absolute ethics can be found “*outside of man's own nature*”. [49] Monod is of the same mind. He writes,

“The ethic of knowledge would not be imposed on man. It is he on the contrary who would impose it on himself.” [50]

The evolutionists (Julian Huxley and C. H. Waddington) would of course only partly agree with this, but their differences would be minor ones. For them, progress or “*human evolution*”, the latest phase of evolution, is principally the product of the development of mind, consciousness and reason and is a largely manmade process too.

Modern man thus authenticates his own moral choices although these are further authenticated, it is claimed, by being 'natural' and because they reflect the fundamental direction of the evolutionary process.

All (except for Ward) agree that man must be subject to no constraints. He is free to do what he likes. Being equipped, what is more, with the limitless powers conferred on him by his intelligence, his consciousness, his mind, his reason and his scientific knowledge, man is now seen as being in the unique position of being able to influence – some go so far as to say determine – his own evolution. As Simpson writes,

“Man for the first time in the history of life has increasing power to choose his course and to influence his own future evolution.” [51]

Julian Huxley came to the same conclusion from a very different position.

“In the light of evolutionary biology, man can now see himself as the sole agent of further evolutionary advance on this planet, and one of the few possible instruments of progress in the universe at large. He finds himself in the unexpected position of business manager for the cosmic process of evolution.” [52]

Ilya Prigogine and his disciple Erich Jantsch go even further. For them, the key determinants of progress are “*consciousness*” and “*mind*”, which needless to say only man is endowed with. It is because man possesses consciousness, Jantsch tells us that “*mankind is not redeemed by God but redeems himself*”. The evolution of consciousness he then identifies with the evolution of the universe itself, which in turn he identifies with “*self-organization*”.

Such self-organization is marked by increasing “*fluctuations*” or discontinuities which are “*good*” because they give rise to “*dissipative structures*” which, roughly speaking, are the organized systems that make up the biosphere, but which, needless to say, are not distinguished from those that make up the technosphere (see *The Ecologist*, Vol. 11 No. 5).

To subject man’s conscious activities, in particular his super-star technologies such as genetic engineering, which Prigogine particularly favours, to any biological, social or ecological constraints would, it is argued, be distinctly immoral, since it would be interfering with the development of the very “*dissipative structures*” on which not only our material welfare but the very evolution of the biosphere is held ultimately to depend.

This may sound like a caricature of Prigogine’s thesis but it is not. Indeed, Prigogine, Jantsch and their main followers in France, Belgium and elsewhere have built up an extraordinary cosmology for rationalising progress and the super-star technologies that are to achieve its latest stages. These are legitimised by making them out to be natural processes that play a key role in the “*self-organisation*” of the universe, and of course, by seeing them as the product of the consciousness, reason, choice and knowledge of a deified modern man.

Progress

Above all, the technospheric ethic is an ethic of progress. As Julian Huxley writes,

“Social organization should be planned, not to prevent change, nor merely to permit it, but to encourage it.” [54]

Progress is seen as a purposive process, inspired by conscious and rational considerations, based on what is taken to be objective knowledge. Certainly progress is viewed as the exclusive work of modern man. Whether progress is to be allowed free rein to satisfy the interests of commerce, as Spencer, Sumner and more recently Prigogine, Jantsch and others believed, or tightly controlled, as Ward maintained, so as to protect the individual from the worst abuses of the market, is neither here nor there.

What is important is that all benefits are implicitly assumed to derive from the technosphere rather than the biosphere, and that ethical behaviour is thereby taken to be that which leads to the maximum technospheric development or economic growth.

A biospheric ethic

The technospheric features which have been put forward as fundamental to a valid ethical system can be shown to be unacceptable. To begin with, we must reject utterly the notion that only modern man is capable of moral behaviour. This is just part of the myth that progress has somehow put modern man above nature. This is a pure dogma based on no serious considerations of any kind. Indeed, if by moral behaviour, we mean merciful, kind and altruistic behaviour, then there is absolutely no evidence that non-human animals do not behave morally.

Conrad Lorenz describes in great detail how all sorts of non-human animals are capable of behaving in this way, although he too seems to accept the scientific dogma that only humans are moral, regarding such behaviour in non-human animals as “*analogous to true morality*”. [55] Nevertheless he writes:

“Nobody with a real appreciation of the phenomena under discussion can fail to have an ever recurring sense of admiration for those physiological mechanisms which are in force in animals, (producing) selfless behaviour, aimed towards the good of the community and which work in the same way as a moral law in human beings.” [56]

We must reject too the preposterous view that only modern man is capable of purposive behaviour, which is one of the justifications for the dogma that he alone is moral. This is yet another device for rationalising the dogma of progress, which is seen as transforming a random, chaotic world into an orderly and purposeful one. Indeed, the more we learn about the biosphere,

“the more orderly and purposeful it appears to be and the more difficult the dogma of randomness is to sustain.” [57]

We must also reject the notion that only modern man’s behaviour is based on conscious choice rather than on belief or faith. Again, this is simply another means of rationalising the dogma of progress. There is no reason of any sort for suggesting that non-human forms of life are incapable of conscious choice.

In any case such choices are, in both human and non-human animals, largely illusory. Motivation research, largely undertaken by the advertising industry, has revealed that the reasons advanced by people for explaining a behavioural act are largely rationalisations designed to make the act appear to be based on conscious and rational considerations.

Moreover, to maintain that behaviour is only truly ethical if it is based on conscious choices is irreconcilable with the view of ethics as providing the general non-plastic instructions that will assure the continuity or stability of a society's behaviour pattern. For, if these instructions are to be non-plastic, they must be believed in, indeed, regarded as self-evident, not just derived from ad hoc conscious choices. If they were, then they would give rise to a highly unstable social behaviour pattern, and hence a society with no continuity or stability.

As we have seen, Waddington sees such basic instructions as accepted without question, as an act of faith rather than by the conscious or rational choice of an "*authority acceptor*". This he saw as essential for maintaining what he calls the "*socio-genetic continuum*". Clearly too Matthew Arnold's "*something not ourselves that makes for righteousness*" must be a faith of some sort – faith in the sanctity of something we regard as holy and from which we can alone derive our ethical system.

We must reject too the associated idea of an 'ethic of objective knowledge'. Objective knowledge is seen by science as being above all knowledge that has been insulated from subjective values, but as we know today there can be no such thing.

Even if there were, as Popper has pointed out, we are not designed by our evolution to entertain such knowledge. It has no role to play in the strategy of nature. Even if it had, how could we possibly be imbued with the ethic of value-free or ethic-free knowledge – the ethic, in fact, of not having an ethic?

We must reject too the notion that ethical behaviour must favour 'individualization'. The natural world, as already noted, is highly organised. It is a vast co-operative enterprise, capable as Jim Lovelock has shown, of maintaining its homeostasis in the face of environmental challenges. An atomised or individualised biosphere is a sick biosphere, one that has disintegrated, as ours is doing under the impact of economic development or progress.

The same is true of an atomised or individualised society. The alienated members of such a society have lost the power to govern themselves and must be run by a government and a vast associated bureaucracy, for which, when living in a healthy and structured society, they have no possible need. The ethic of individualization is thereby the ethic of ecological and social disintegration.

We must reject too the notion that ethics must be purely our own and not derived from anything larger than ourselves – such as our society or nature itself – and hence that man is free to determine his own evolution and need submit to no social or ecological constraints. This view may be consistent with Simpson and Monod's view of man as a stranger in a random world in which he has no role of any kind to fulfil.

It may be consistent too with the neo-Darwinian, and hence the socio-biologist's, view of man as the supreme egoist, whose only role is to assure the proliferation of his own genes. But this paradigm is now under ever more serious attack across a wide front, and is increasingly difficult to reconcile with our knowledge of life processes within the biosphere. [58]

Finally, we must reject the ethic of scientific, technological and industrial progress, an ethic which all the values we have considered serve above all to rationalise and hence to legitimise. Progress, or the economic development with which it is equated, involves the systematic substitution of the technosphere or man-made world for the biosphere or natural world or living world from which it derives its resources and to which it consigns its ever more voluminous and ever more toxic waste products. As the technosphere expands so must the biosphere disintegrate and contract.

Economic growth, in fact, is a measure of biospheric disintegration and contraction. The two processes are but different sides of the same coin. This means that the ethic of progress – in effect, the ethic of perpetual technospheric expansion – is in reality no more than an ethic of biospheric destruction. It is not an “*evolutionary ethic*”, as Waddington and Huxley saw it. On the contrary, it is an anti-evolutionary ethic. It serves to sanctify the reversal of the evolutionary process.

Gaian morality

A biospheric ethic, an ethic compatible with the ecological view of the world we live in, would be very different from that proposed by the scholars whose writings we have considered. It would above all be one which enables man to assist in the achievement of Gaia’s overall goal of maintaining the biosphere’s stability or homeostasis in the face of change whereas immoral behaviour would be that which reduced Gaian homeostasis and hence that which disrupted the basic structure of the Cosmos.

This was undoubtedly what ethical behaviour was taken to be by the vernacular societies of the past. The laws or customs of such societies were observed not only because they had the moral force of having been promulgated by the ancestors in the “*Dawn Period*”, as Radcliffe Brown refers to it, [59] but also because the behaviour that conformed to them was seen as maintaining the order of the Cosmos. So long as that order was maintained, then man prospered: if it were perturbed, if, in fact, the ‘balance of nature’ were upset, then disaster inevitably followed.

Vernacular man’s fundamental role in life was thus to maintain the order of the Cosmos, which he saw himself as doing by performing the prescribed rituals, taking part in the prescribed ceremonies and in general by observing the traditional law of his society. This law he took to be a moral law and one which applied not only to man and the society to which he belonged but also to nature and, indeed, to the Cosmos itself.

Father Placide Tempels in his celebrated book *Bantu Philosophy* notes:

“Moral behaviour for the Bantu is behaviour that serves to maintain the order of the Cosmos and hence that maximises human welfare. Immoral behaviour is that which educes its order, thereby threatening human welfare.” [60]

This statement could apply equally well to vernacular societies in all parts of the world. In many of these societies, the pattern of behaviour that is judged to be ethical was referred to by a word that both denotes the order of the Cosmos and, at the same time, the ‘path’ or ‘Way’ that must be followed in order to maintain it.

Among the Ancient Greeks the word used was *Dike* which also meant 'righteousness' or 'justice'. The Chinese *Tao* is a very similar concept which refers to the daily and yearly 'revolution of the heavens'. According to de Groot, Tao

"represents all that is correct, normal or right in the universe; it does indeed never deviate from its course. It consequently includes all correct and righteous dealings of men and spirits, which alone promote universal happiness and life." [61]

All other acts, as they oppose the Tao, are "*incorrect, abnormal, unnatural*", and they must "*bring misfortune on the bad*".

The Buddhist notion of *Dhanna*, the Persian *Asha* and the Vedic *Ri'ta* are very similar concepts: all refer to the Way that man must follow if he is to maintain the order of the Cosmos, the only Way that is truly moral since to maintain it is to assure the welfare of the world of living things, while to divert from it can only cause disasters like floods, droughts, epidemics and wars.

Although many tribal peoples do not appear to have formulated the notion of the Way in so explicit a manner, their notion of morality remains the same. Moral behaviour is still that which conforms to the traditional law and which, at the same time, serves to maintain the order of the Cosmos; immoral behaviour on the other hand, is that which is taboo. Roger Caillois writes:

"An act is taboo if it disrupts the universal order which is at once that of nature and society. . . As a result the Earth might no longer yield a harvest, the cattle might be struck with infertility, the stars might no longer follow their appointed course, death and disease could stalk the land." [62]

Conclusion

Clearly in terms of this criterion, there can be no more truly immoral enterprise than that to which our modern society is so totally committed; namely, economic development or progress which involves the systematic substitution of the technosphere for the biosphere.

Such 'progress' must inevitably lead to the destruction, indeed the annihilation, of the world of living things. Indeed, the flood, droughts, epidemics and other massive discontinuities whose seriousness is increasing every year, are but the symptoms of this destruction; they are the price to be paid for the immorality of the economic policies to which we are committed.

The only way of reducing the severity of these discontinuities is to abandon these policies and seek instead to reconstitute, to the extent that this is still possible, the natural world that we have so irresponsibly destroyed. Indeed if we want to survive on this planet for more than a few decades, we have no alternative but to return to the Way – and hence adopt once more the biospheric ethic that it so faithfully reflects.

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Note: Edinburgh University has since then closed this centre, but it survives independently – website: www.che.ac.uk.

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Is science a religion?

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WE LIVE IN AN AGE OF FAITH, not in God but in Science. If most of us are still capable of facing the mounting problems of the world today with relative equanimity, this is because we believe that Science will provide us with the means of solving them: half a millennium ago we would have expected God to do so.

Scientists are functionally the priests of our industrial society. It is only they who are capable of mobilising, for our purposes, the limitless powers of Science, of acting thereby as the intermediaries in our relationship with this new and formidable deity.

It is not surprising that their writings are imbued with an aura of sanctity previously reserved for the holy texts of the established religions. If a proposition is classified as 'scientific', then it must be true, indeed incontestable. If, on the other hand, something is branded as 'unscientific' then it must be the work of a charlatan. This has provided the Scientific Establishment with the power to prevent any undesired deviation from scientific orthodoxy. In the same way, the Catholic Establishment of the Middle Ages would excommunicate a heretic whose teachings constituted a challenge to their authority.

Indeed, one finds among the annals of the Scientific World some which are strangely reminiscent of mediaeval witch-hunts. Consider, for instance the response of the Scientific Establishment to the publication of *Limits to Growth*. It was branded as unscientific by both *Nature* and *Science*, the world's two most prestigious scientific journals.

In Britain the inquisition was led by Lord Zuckerman, once Chief Scientist to the British Government. It is easy to see how he exploited the terms 'scientific' and 'unscientific' to discredit this very important work in the following outbursts in a speech delivered in Stockholm during the 1972 United Nations Conference on the Human Environment:

“Our newspapers urged on by a plethora of pseudoscientific books, articles and speeches are filled with items which warn us that irreversible damage is being done to our physical environment . . . I have referred to a book *Limits to Growth* which has been hailed . . . mainly by the scientifically uninitiated as a scientific statement about man's environmental problems . . . for my part I have no hesitation in saying that I am among those professional students of environmental problems who dismiss the book as unscientific nonsense” [1]

What Is 'Science'?

In view of this, it is clearly important that one should know just what 'Science' is, and precisely how one determines what constitutes a 'scientific' proposition.

'Science' does not appear to have ever been adequately defined. In general, it seems to involve the accumulation of knowledge. But what is knowledge? Here we encounter a major snag: to answer this question we must leave what is generally regarded as the realm of 'exact science', and enter that of Epistemology or the Theory of Knowledge.

For scientists to regard Epistemology as being outside the scope of Science is to renounce the responsibility for examining the assumptions on which their work is based, for determining in fact, to what extent it is justified.

This task is delegated to people who, working outside the field of Science, know very little about it, and who like most specialists today, tend to regard their field of study as largely autonomous, as something that can be studied in isolation from everything else. As a result one finds little in current epistemological writings which can serve to provide a theoretical basis for Modern Science – a lamentable situation. As Einstein wrote "*Epistemology without contact with science becomes an empty scheme. Science without epistemology – in so far as it is thinkable at all – is primitive and muddled.*"

What is Knowledge?

Knowledge is clearly some sort of information. To qualify as knowledge, however, this information must display certain characteristics. According to Ayer, who appears, to be one of the principal spokesmen for the modern school of Empiricism, it must be true, we must know it to be true, and for the right reasons. This implies, above all, that knowledge is conscious information of some sort. This is presumably the only type of information which can be studied empirically. Also, it is by basing one's behaviour exclusively on such information that one is regarded as acting 'rationally'.

If epistemologists knew a little about such subjects as Cybernetics, Ethology and Psychology, they would realise that conscious information plays by no means a determining role in the behaviour of even the most sophisticated members of the species '*Homo sapiens*'.

To understand the use of conscious information without reference to that of unconscious information is simply not possible. In fact to understand the use of information in the brain is difficult without examining it as part of a general theory of information, which must mean examining the way, it is built up and made use of by systems at all levels of organisation. Such a study would reveal that information in the brain is built up and used in very much the same way as it is in a gene-pool or a fertilized egg and that there is only one way of organising and using information among natural systems.

Control

The reason for this is that information is only built up for one purpose, and that is to constitute a model of the relationship of the system, of which it is part, with its particular environment. Information is, in fact, of no value by itself as a basis for behaviour. To identify a technological device as being a nuclear power station, for instance is of no value if one has not previously built up a model of the relationship between a nuclear power station, the biosphere of which we are part and the rest of the technosphere of which it is part. Only in this way can one understand what are its

implications and hence how we should react towards these diabolical contrivances. It is a serious illusion to suppose that the mere fact of attaching a label to something provides information about it.

If information is only built up for a single purpose, this is also true of the model of which it is part. A model is only built up for the purpose of serving as a basis for the control of a system's behaviour towards its environment.

This whole notion of control is largely ignored by epistemologists as well as many scientists who have implicitly adopted the empiricist position. There is a good reason for this. If a system is controlled, it must mean that it is goal-directed or purposive, for what else can control mean but to keep something on its correct course? And how can it be kept on its correct course if it doesn't have one? The goal, needless to say cannot be pinpointed in space-time. It is simply that course along which discontinuities and their corrections are reduced to a minimum. By taking such a course a system is capable of maintaining its basic structure in the face of environmental challenges, i.e., of remaining stable.

It is also by taking such a course that free energy is reduced to a minimum over a long period. In this way the system remains in four-dimensional equilibrium with its environment. This principle of directiveness is irreconcilable with empiricist philosophy, since it cannot be induced on the basis of observation, i.e., according to what empiricists regard as the only legitimate way of building up knowledge.

Also, it justifies a methodology for building up knowledge which is in competition with induction. I refer to deduction from the general principle cited. Thus one could postulate that to maintain its stability in specific environmental conditions a system must be able to achieve a given set of sub-goals. A specific behavioural act could therefore be explained in terms of its contribution to the achievement of a sub-goal, and judged in accordance with its ability to do so. This is in fact the cybernetic as opposed to the reductionist approach.

To reject the directivity principle, however, is to reject the very principle of organising information, and hence, among other things, the possibility of Science. The reason for this is very simple. Information is built up out of data, the raw materials of information. Data, as we shall see are interpreted in the light of a system's model of its relationship with its environment, and then constitutes information. This means putting 'mental order', I suppose one might call it, into what might previously have appeared to be random data. This is only adaptive if this order corresponds to something, i.e., if it reflects an ordered situation. Since behaviour is, by its very nature, dynamic, i.e., involves change, this change must be orderly which means that it must be heading in a given direction.

The mechanism of control

Cybernetics has probably contributed more than any other discipline to the unification of Science by demonstrating that control, at all levels of organisation, is achieved in the same way that, in fact, the basic cybernetic model is of universal application.

Data are obtained, transduced and interpreted. A hypothesis or model is postulated and projected back onto the data, followed by a modified hypothesis and a further projection. Each time the hypothesis is made to fit better with the general model of the system – either by modifying the former or the latter. This can be repeated over and over again, and in this way there will be a continual monitoring of a series of even better hypotheses formulated after successive accretions of information.

This process gives rise to a damped system, i.e., one in which errors are progressively reduced. If interpretation is taken as tending towards a position of four-dimensional equilibrium, i.e., along an equilibrium course – which we can represent by a straight line – it will in fact take the form of a series of oscillations of ever-diminishing size – tending towards the reduction of errors – i.e., the development of an ever better representation of the system.

On the other hand, if this mechanism does not function properly, i.e., if the system gets out of control, then the oscillations will increase in size. This of course cannot continue indefinitely, the discontinuities would become increasingly insupportable and the system would eventually collapse – just as is happening to our society today.

At this point it might be worth noting that for two million years or so, human social systems displayed considerable stability. Unstable social systems appear to have been largely confined to recent times, i.e. to the period following the Neolithic revolution. [2] Even during this period, traditional societies which have succeeded in remaining outside the orbit of mainstream civilisations have continued to display considerable stability. Such stability can only be achieved in one way, and that is by the operation of a control mechanism of the type described above.

This mechanism is provided by its culture, of which an essential component is a specific world-view or model of the society's relationship with its environment, a corresponding goal-structure and a means of achieving it. [3]

Science appears to be an attempt to replace the cultural information which makes up traditional worldviews which is very different in the case of each traditional society with a single organisation of information which should theoretically serve each of them equally well. It is an attempt, in fact, to substitute objective for subjective information as a basis for control.

Such a substitution has many implications, which I shall look into in this. article. First of all, however, let us consider what can conceivably justify it.

Epistemologically, the answer is fairly obvious. Traditional information does not qualify as knowledge. It is only true vis-à-vis a largely subconscious and very subjective model and not vis-à-vis a conscious objective one.

It involves reference to such things as Gods and spirits whose presence is empirically unverifiable, while it establishes a strange set of cause and effect relationships between men's ritual activities, the behaviour of these Gods and spirits and day to day biological-social and ecological events, which can be shown to be 'irrational'.

Objective truth must be the overriding criterion for judging the validity of information. We all assume that this must be so. . . but why? On what is this assumption based? I shall show in this article that this is epistemologically unjustified, in fact that it is a pure act of faith.

If cultural information is organised subjectively rather than objectively, it provides a society with a very restricted view of its environment, that which it has so far required for its own specific adaptive purposes. If information be organised objectively, it is assumed that it provides a faithful reproduction of the outside world, which should provide the basis for a much wider range of adaptations, enabling a society in possession of this objective information to adapt to all possible eventualities.

For this to be so, a number of obvious conditions must clearly be satisfied:

- The first is that objective information can be organised to constitute an effective model of Man's relationship with his environment.
- The second is that this model can effectively be made use of to control this relationship.
- The third is that this would enable Man and his society to adapt to important and improbable changes, i.e., that there are no other limits to their potential for adaptation. I shall show in this article that all these assumptions are false.

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Science has not provided so far a means of controlling society

We are living in an age in which public policy has, for the first time, been largely influenced by Science. In spite of this, society is increasingly out of control, hence unstable, and the discontinuities we are subjected to are on an ever increasing scale, so much so that we are well on the way to social and ecological collapse. On strictly empirical grounds one cannot avoid the conclusion that Science has been a failure.

Objective truth

Objective truth does not appear to be the relevant criterion for judging the value of information used by natural systems. Genetic information is not objective. It is specific to a particular individual as a member of a particular species. Cultural information is not objective either. In fact one can go further and say that as the biosphere has evolved out of the primaeval dust, as complexity and variety have built up, so has the corresponding subjective information determining this evolutionary development. To substitute a single organisation of objective information for the multitudinous organisations of subjective information, which are at present used to control the behaviour of natural systems, would be to reverse evolutionary trends and hence to foster informational entropy.

It could be objected that objective information also displays order or negentropy. This is true only in the sense that the technosphere displays order. Order is but another word for organisation. Things are organised for a particular purpose to satisfy a particular goal. Random organisation is a contradiction in terms. Now the goal of the technosphere is very different from that of the biosphere. The former is designed to provide Man, one of the myriad forms of life which inhabit this planet, with the maximum comfort and

convenience, whereas the latter being concerned with the maintenance of its overall stability is concerned with catering for the requirements of all, not just one of the forms of life which constitute it. They all have an essential function to fulfil within it.

Both organisations of matter are in fact in competition with each other since the former can only maintain itself by extracting resources from the latter and consigning to it its waste products. From the point of view of the biosphere the technosphere constitutes waste or randomness or in fact entropy. Similarly from the point of view of that organisation of subjective information associated with the biosphere, objective information constitutes entropy. It has played no role in building up the biosphere on the other hand without it there would be no technosphere.

Why should this be so?

In the biosphere, a system could adapt either by modifying its environment to satisfy its own requirements or by itself undergoing change to satisfy these requirements of a changed environment. In practice both strategies are resorted to. We have seen that the justification for Science must be to permit rapid and radical adaptation which a traditional culture would not do. When rapid and radical change is required however the former strategy is the only possible one. It is quicker and easier to adapt man to living in a cold climate, for instance, by building him houses with central heating, double glazing, etc. than by bringing about those physical changes in him which would enable him to support the cold weather. Thus in practice objective information simply permits environmental change. If this environmental change were not regarded as desirable there would be no reason for replacing traditional subjective information with scientific objective information. Objective information can thereby serve but as a basis for reducing the order of the biosphere of which we are part.

Practical people will not accept so strongly worded a condemnation of the technosphere. They will insist that by clever management it is possible to reconcile the two, to achieve some sort of a compromise between the rival goals of the biosphere and the technosphere. Besides it will be maintained, human ingenuity, combined with omnipotent Science must be able to compensate for the reduced stability of the biosphere, by devising means of correcting the resultant discontinuities.

The failure of Science could be rectified if our knowledge were improved, if Science were reorganised, if, for instance, it could be unified to provide us with a single model of the biosphere in its interrelationship with the technosphere.

This too was my feeling twenty years ago. In fact, I spent many years working out a general model of behaviour which led to my book (unpublished) *The Theory of a Unified Science*. Since then, however, my views have changed. This is why.

The Empiricist thesis

Firstly it would mean abandoning the empiricist thesis which underlies science. According to Empiricist epistemology, knowledge can only be obtained by observation. This thesis is manifestly false. The child's mind at birth is far from being the 'tabula rasa' which this would imply; for instance, a child is, and must be, in possession of a rudimentary model of its relationship with its environment. This has been shown to be

true experimentally. Fantz, [4] for instance showed that chicks are born with a tendency to peck at certain objects rather than others – but we do not need such experience to prove this point.

If a species is to be stable which means if it is to display continuity, i.e., remain stable, then its behaviour must be based on information which itself displays continuity. Each generation must inherit information which reflects the experience of its ancestors going back into the mists of time. That is why genetic information is so stable. If it were more plastic and could permit adaptations to changes based on the experience of one or two generations only it might give rise to adaptations to what could turn out to be freak conditions unlikely ever to recur – such as the situation created by our industrial society. Its behaviour would display no continuity. It would be unstable – and hence could not survive.

Building up information means improving the model so that it may serve as a basis for ever more adaptive behaviour. This improvement, contrary to what Empiricists may think, does not simply consist in accumulating more data but also in organising it within the model.

The establishment of a new relationship between two of the variables of a model, for instance, permitting an improved explanation of certain observable data must provide information without involving the simultaneous detection of data – thinking – in other words.

The notion that all information is only built up by observation is thus simply not true. However one can go further than this. What is the status of that information which is built up by observation?

The first feature is its subjectivity. Detection is a directive process. It does not consist of randomly accumulating data, but rather of isolating from all possible data that minute fraction of it which appears relevant to a system's behaviour pattern. Thus, as Judson Herrick points out:

“The skin is sensitive to mechanical vibrations up to 1,552 per second, but beyond that point feels only a steady push. The ear is aware of sound travelling by wave lengths of 13mm up to 12,280mm, but does not hear sounds below or above these limits. The skin is aware of heat-waves only from .0008 to .1mm long. The eyes take cognizance of light waves from 0008mm to .0004mm, but miss electric waves, ultra-violet waves, x-rays, gamma-rays and cosmic rays, running from wavelengths of .0004 to .000,000,000,008mm”. [5]

This first genetically determined selection is complemented by a further ontogenetically and largely culturally determined one. Thus at any given moment we can detect but a minute fraction of those data which we are genetically equipped to detect – those which may appear relevant to our behaviour in those particular circumstances in which we find ourselves at a given moment.

This leads one to the essential consideration that detection can only occur on the basis of a pre-existing model, more precisely two models – a genetic one and one which might be called a cerebral or cultural one, in terms of which is calculated the relevance of

different data to a system's behaviour pattern – yet another reason for rejecting the Empiricist thesis.

Data in fact are detected and interpreted in order to confirm or invalidate the model postulated. One might however ask on what basis is the model postulated? The answer is that which appears most probable in the light of the model one has built up during the course of one's experience.

A brain, like any other organisation of information made use of by natural systems, acts among other things, as a probability calculator. [6]

Contrary to what most people think, scientists proceed in precisely the same way – they select data on the basis of a preconceived model – partly objective, probably partly subjective too, in terms of which the data are subsequently interpreted.

Indeed, scientific theories, rather than being reached 'inductively', in accordance with empiricist theories, must be regarded as postulated, as the most probable explanation of certain data on the basis of their specific model of the world about them, in other words, deduced from this model.

In this way, Le Verrier postulated, by purely mathematical means, the then unknown planet Neptune as an explanation of certain otherwise inexplicable disturbances of other planets. Later, ". . . when the German astronomer Galle directed his telescope, to the spot in the night sky that had been figured out by Le Verrier, he saw there a tiny speck that changed its position slightly from night to night, and the planet Neptune was discovered (1846)". [7]

Dirac postulated the positron as the most elegant way of explaining certain atomic phenomena inexplicable in terms of existing variables.

Epicurus and his disciple Lucretius postulated the atom, and Bohr postulated the modern version of this ancient hypothesis. Watson and Crick proceeded in the same manner when developing the genetic code, as is revealed in their book, *The Double Helix*.

These discoveries are well-known. There is a tendency, however, to regard them as scientific curiosities – and as exceptions to the general rule that science develops inductively by the meticulous examination of impartially accumulated data, in accordance with the Empiricist thesis. I think that on the contrary, they are merely striking examples of what is, the only possible method of science.

Every scientific proposition is in fact a hypothesis. The objective value of this hypothesis depends on that of the model on which it is based. If it were based on a fully integrated general model of the biosphere then it would have considerable value. But such a model is not available. More often than not, for reasons we shall look into later, it is based not only on incomplete information but on incomplete subjective information. A scientist's interpretation of a situation tends to be that which, above all, satisfies his personal psychological requirements. The distinction often made between 'scientific facts' and 'mere hypotheses' is totally unjustified epistemologically. If knowledge is acquired by

observation (and observation, as I have shown is but an interpretation of data, i.e., a hypothesis) knowledge must consist of hypotheses.

Consider one of Lord Zuckerman's 'scientific facts', taken from the same speech at Stockholm. He points to the "*increasing physical and intellectual violence to which we are all subjected*" and attributes this to the frustration of not being able to increase our standard of living fast enough. He points to the disparity of living standards between and within countries and argues that if this were reduced, violence would cease to be a problem.

This is clearly one of a large number of possible interpretations of the available data, not that which is best reconcilable with available knowledge, but that which, best suits his desire to prove that the Limits to Growth argument is wrong and that economic growth is necessary.

What is more, this hypothesis will be influenced by all sorts of subjective factors such as what one expects to see, what other people persuade us we should be seeing, etc. Perception and, by the same token, the interpretations it gives rise to are purely subjective and bear no relationship whatsoever with the objective measuring rod which Empiricists make them out to be. [8]

On the contrary, rather than provide objective information on the thing perceived, perception tends to provide instead, objective information on the personality of the perceiver – as is pointed out by Witken who wrote a book to prove this point.

Perception also is functionally the same thing as computer simulation. Simulation is selective since it only deals with data which can be interpreted in such a way that they give rise to a change in the value of one or more of the variables used in the model. The implications of this change are calculated in terms of all the other changes this must bring about, to the value of the other variables in terms of which it is interpreted.

There is a big difference between the two processes however – for perception is simulation on a purely subjective model and cannot thereby provide a basis for building up objective information or knowledge, while computer simulation is supposed to be objective. This is of course the ultimate reason for rejecting Empiricism. The implications however are obvious. What is required is a means of by-passing perception, of replacing it with an objective means of building up information. But is this possible?

A first step is to replace gradually the subjective vocabulary which we have inherited as part of our cultural heritage and in terms of which we persist in describing the world about us. I refer to such words as 'mind,' 'consciousness,' and practically all the other terms used by Empiricist philosophers, not to mention sociologists.

This has been happening for some time. Indeed, with the development of knowledge, man's view of the world becomes couched in ever less subjective terms, i.e., terms which are ever less those of our own personal experience. As Konrad Lorenz says, "*Every step of knowledge in physics means 'taking off a pair of glasses'.*" [9]

Von Bertalanffy writes:

“It is an essential characteristic of science that it progressively de-anthropomorphizes, that it progressively eliminates those traits which are due to specifically human experiences. Physics necessarily starts with the sensory experience of – the eye, the ear, the thermal sense, etc., and thus builds up fields like optics, acoustics, the theory of heat, which correspond to the realms of sensory experience.

Soon, however, these fields fuse into such that do not have any more relation to the ‘visualizable’ or ‘intuitable’: optics and electricity fuse into electro-magnetic theory; mechanics and the theory of heat into statistical thermodynamics, etc.” [10]

Thus as science advances, the variables used are further and further divorced from those of our experience. As one would expect, it is in modern physics, the most advanced of all disciplines, that this tendency is most accentuated. Thus the physicist’s concept of ‘time’ as dependent on velocity and as inseparable from space, the pi-meson with its lifespan of two millionth of a second; the electron that weighs only a billionth of a billionth of a gram; and anti-particles that may run counter to time and that may originate in the future and become extinct in the past – all of these are obviously totally outside the world of our experience.

Compartmentalisation

Another great barrier to the unification of Science is the practice of dividing up knowledge into separate disciplines each dealing with a set of things that appear to have something in common. This is a direct consequence of the adoption of Empiricism.

The biosphere is a single integrated system made up of closely integrated and hierarchically organised sub-systems and sub-subsystems. It is dynamic, not static, and is therefore the product of a single integrated process. Quite clearly it cannot be understood in terms of these separate disciplines.

Indeed changes occurring within a specific field must inevitably cause changes in other fields about which a specialist would have very little knowledge. In addition changes in other fields would also cause changes in his field which he would have no means of understanding. As a result specialists are not only incapable of interpreting and predicting changes occurring outside their particular field of study but also, and this is possibly even worse, within it.

This means that the charges condoned and even proposed by specialists and in particular that brand deferred to as experts, are based on what may occasionally be objective information, but are necessarily only part of the relevant objective information and this, as already shown cannot serve as the basis of action. These arguments may be true but they must of necessity present only part of the truth. Modern Science is not exact at present but an accumulation of half-truths – and it is on the basis of these half-truths that scientists trying to control the world, and as a result bringing about its annihilation.

How can we get round, this? As we will see to design a unified Science using a general behaviour model is relatively simple. I could provide you with the basis of it right now. But it would never be accepted let alone made use of. One reason is that it would require multi-disciplinary cooperation.

Unfortunately, specialists in the different disciplines have developed different terminologies and methodologies and contact between them is at best, impossible save on a superficial basis. This situation is getting worse rather than better. Prestige is inspired by becoming more technological and more esoteric. What we are in fact witnessing is the operation of a basic technological tendency towards originality. Non-specialists must be kept out of one's territory, and ambitious men go so far as to carve a niche in their own academic territory on the slightest pretext. Look at cybernetics. Here at last was a tool which could be used for unifying the sciences. It was not to be. Not only has it become increasingly uneconomical, but its domain has already been sliced up by ambitious academics. Von Bertalanffy called his theory General Systems, Forrester Systems Dynamics, and I am sure there will be lots more. In this way, instead of merging the various disciplines it has actually given rise to at least three new-ones.

Why we can predict the failure of multi-disciplinary research, with total confidence, however, is that the different disciplines having evolved in vacuo, are not compatible with each other.

Modern Economics is incompatible with both Anthropology and Ecology. Modern Medicine is irreconcilable with Evolutionary Theory. Modern Dentistry with its dependence on X-Rays with Radiobiology etc.

For effective multi-disciplinary work to occur, specialists would have to admit that many of the principles on which their disciplines are based are in fact false. Can we expect them to do so? Can we really expect people who have established a reputation in a particular field after years of hard work to admit that their work is based on faulty assumptions and has thereby been in vain? Of course not. They can be counted upon to rationalise any extraneous information which appears to menace their professional status in such a way that it will cease to do so.

This is precisely how the experts have reacted to *Limits to Growth* and our own *Blueprint for Survival*. The mental acrobatics they are willing to resort to in order to rationalise their own world-view in the face of massive evidence which renders it objectively untenable is truly astonishing, and in a way rather pathetic. The effect of this natural psychological tendency however is to render multidisciplinary research largely impracticable.

Atomisation

The empiricist thesis also leads to atomisation, i.e., to the breaking down of things into their constituent parts for the purpose of studying them in controlled laboratory conditions.

I am not suggesting that this is not useful, only that it is not sufficient. This provides information on the constituent sub-systems, but it provides no information on the role, played by the system in the larger systems of which it is a part. Often this is not even conceivable since we are dealing with systems of a large and diffuse nature such as human societies and eco-systems which simply cannot be examined in controlled laboratory conditions. By looking at the parts however one can get very little idea of the whole.

What is particularly significant is that many scientists ignore the very existence of such systems. Indeed, the very concept of an ecosystem is probably less than 30 years old.

If a set of systems are part of a larger one it means that they are subjected to a particular set of constraints which will enable them to act for certain purposes at least as a unit. Order is in fact defined as the influence of the whole over the parts. The fact that we have not recognised that we are part of a larger unit called an eco-system means that we are totally unaware of a whole set of constraints which we must observe if we are not to destroy the larger system of which we are but the differentiated parts.

Even more astonishing of course is the fact that the importance of the social system is not generally understood by the scientific community. It is generally considered that any group of heterogeneous people can constitute a society so long as they occupy the same area. The notion that a society is a behavioural unit in its own right, a natural system in the sense that a biological organism is a natural system, is accepted by but a small minority of thinking people with a knowledge of the functioning of the tribal societies in which man has been organised during 99 percent of his tenancy of this planet. Yet this is unquestionably so, and the fact that it has not been accepted means that we have ignored yet another set of extraordinarily important constraints to which our behaviour is normally subjected.

To understand the behaviour of man without reference to the larger system of which he is part, is like trying to understand the behaviour of a cell without reference to the organ or tissue and the biological organism to which it belongs. It is, in fact, quite obviously impossible.

Thus, the ills that industrialised society is suffering from such as crime, delinquency, alcoholism, drugs, etc., cannot conceivably be understood by our scientists – unless it be first postulated that society is a natural system which provides its members with the requisite social environment. Only then can these ills be correctly interpreted as the pathological manifestation of social disintegration, and from the point of view of the victims, as the symptoms of social deprivation. Instead these ills will continue to be interpreted as the signs of material deprivation: – a convenient diagnosis in a society geared to the production of material goods, but one which, by causing further industrialisation must lead to further social disintegration and correspondingly aggravate the ills which this must give rise to.

Continuity

In addition, one cannot understand the working of a system by examining it, without reference to its past. For a system is not autonomous. It has inherited a model of its relationship with its environment which provides it with a goal-structure and a set of instructions on how to achieve these goals.

As I have already stated, this model reflects the system's experience over a very long period. In this sense a system exists in time as well as in space. That, which is visible to us, and which is actually there, is but a part of it, a very small one at that, and to understand its functioning it should be best regarded as only a link in a spatio-temporal continuum. This is in fact the case of a traditional human society. A tribe is made up of

the living, the dead and the yet to be born. Only in this way can it display continuity or stability. When a society disintegrates, it does so in time as well as in space.

Living in the cultural void created by industrialisation we are not only alienated from our fellow men, but also from our ancestors and increasingly from our children. In fact, we are temporal as well as spatial, isolates. What is more, the information which a system has inherited from its past can give rise to a very large number of possible systems of which it constitutes but one possibility. Each cell for instance starts off with the full complement of hereditary information which would enable it to form part of any specialised issue within the organism of which it is part. Slowly it learns to fulfil a particular function, and thereby comes to make use of a specialised part – constituting but a minute fraction of available information. The same occurs at other levels of organisation.

A population, for instance, makes use of but a minute fraction of the information contained in the gene-pool. No system can be understood however, unless one takes into consideration all the alternative systems which the information its development was based on, could have given rise to.

The unification of science must involve building a model of the behaviour of that all-encompassing system which is the biosphere, and as we have seen, atomisation, a methodology indisassociably linked with empiricism cannot enable one to understand the behaviour of such a system.

Measurement

It can be argued that any ‘deficiency’ in perception can be made up for- by measurement. Measurement in fact has become a veritable fixation among scientists today, so much so that it is seriously held that propositions which cannot be measured, cannot thereby fall within the scope of science. Unfortunately, a number of important variables cannot be measured. How does one measure the information in the cultural pattern of a traditional society? How does one measure the bonds which hold together the different members of a family and which are extended to hold together the human community?

If only a fraction of the factors which would have to be taken into account in a general model of behaviour, are measurable, and can thereby be made use of for the formulation of scientific propositions this is tantamount to admitting that scientific behaviour must, by necessity, be based on partial information only – and cannot thereby serve as a basis for adaptive responses.

This is particularly true of the *Limits to Growth* model of Man’s present predicament. One of the main criticisms levelled at this stage was that the values given to the variables were not based on sufficient evidence.

The basic argument of *Limits to Growth* however is not affected by the discovery that the world’s resources of copper, bauxite or manganese are higher than Meadows thought, nor for that matter that the environment can absorb more of the waste products of industrial processes than he and his colleagues had estimated. The model simply reveals that our society is heading in the wrong direction. The further it

continues in this direction the greater will be our commitment to the use of resources which will be in increasingly short supply, and the greater the amount of waste which it will have to consign to an environment with an increasingly limited capacity to absorb it. The lesson to be drawn from this study is that we must cease moving in this direction, in fact that we must move in a totally opposite one.

Interpretation of measurements

There is no point in measuring things unless one knows what their value should be. Yet one cannot know the ideal value of any variable in a model representing a given system, unless one knows what are the values of the other variables and what are the relationships between them. An individual measurement is simply of no value.

What is important is to determine the principles underlying the functioning of a natural system, to establish what are the -relevant variables and how they are related. What the actual values should be is the function of so many petty technical factors, that it is not in measurements which conflict with cherished subjective beliefs, tend to be interpreted or rationalised in such a way that they cease to do so. Defenders of industrialisation still maintain for instance that the cancer rate is not increasing in industrial society. What has increased, they maintain, is our ability to diagnose it-This myth is only being exploded as we are beginning to know more about the health of tribal societies.

In the same way Zuckerman refuses to admit that lead poisoning is becoming an increasing menace. He writes: *“The risk of being poisoned today is probably as small as at any time since lead started to be mined. But we have now developed the ability to detect the presence of this element. And of others, like mercury in very small concentrations.”* [14] Measurements, in fact, are but precise means of detection. As such, they provide data, not information. This is obtained by interpreting them in the light of a largely subjective model.

Logistics

In addition the measurement of the parts of a system in isolation from each other is a vain task, for purely logistical reasons. The number of interrelationships between them simply defies calculation. Let us consider the problem of pollution. Is it in fact possible to examine in laboratory conditions the precise effect of introducing a new chemical substance into our environment? The answer is no. Man has already put over half a million pollutants into the environment and there are several thousand new ones every year.

The World Health Organisation, according to Laird, receives 2,000 to 3,000 new ones each year for examination. WHO does not have any research facilities of its own so that these products must be farmed out to be examined by independent laboratories. For both financial and administrative reasons less than ten per cent of them are examined in this way. What makes the problem particularly intractable is the synergy which often obtains between different combinations of pollutants.

Scientists are constantly discovering new synergic effects. . For instance, it was found that the combination of Benespyrene with carbon dioxide can produce lung cancer in

experimental animals. Also animals infected with flu virus can contract lung cancer if at the same time they have been exposed to artificial smog.

DDT is regarded as presenting little hazard to marine life by virtue of the fact that it is only very slightly soluble in water. However, it appears to be something like ten thousand, times more soluble in oil, which means that the combination of DDT and oil can prove lethal to many forms of sea life. [15]

Very disturbing is the synergy between asbestos and cigarette smoke. It has been estimated that asbestos workers who smoke have a 92 times greater risk of dying of lung cancer than men who neither work with asbestos nor smoke. [16]

In addition, it is logistically impractical to examine the long-term effect of sub-lethal doses of the different pollutants. Yet these are often as important if not more so than the more spectacular effects of large and sudden doses. For instance, a few parts per million of DDT in water can upset the temperature regulating mechanism of young salmon. [17]

Sub-lethal amounts of DDT can be lethal when associated with falling temperature and starvation. This apparently explains why in a river in New Brunswick in 1969 there was considerable mortality among salmon during the cold weather that followed an earlier fish kill attributed to high levels of DDT. [18]

Sub-lethal dosage of different pollutants can also have subtle effects on all sorts of behavioural mechanisms, on the ability of fish for instance to find their way about, or to detect the presence of other fish. Vorster considers *“that the subtle effects of CHS on avian reproduction have a greater overall impact on bird populations than an acute dose on more indirect mortality, even though a bird kill may seem more-spectacular.”* [19]

Another problem is that of sampling. There is no guarantee that the levels measured during a given period are in fact representative. Thus analyses of Rhine water have so far identified some 200 different pollutants and these are regarded as constituting perhaps no more than one-tenth of those present. Dr. Sontheimer, a chemist involved in this work, has said they have no way of foreseeing *“what will be floating in the river tomorrow . . . A cleaning process that works one day, works badly the next day.”* [20] Moreover, even were it possible to devise the correct monitoring equipment and purification plant the cost would be prohibitive. Sontheimer considers that it would cost at least 10 times more to extract poisons already diluted in the Rhine than it would to keep them out.

The argument against measurement is very much that against atomisation. To understand how the world works one must look at the whole, not the parts, and proceed by deduction rather than induction.

Our understanding of pollution, for instance, will not be built by examining and measuring levels of individual pollution, but by examining the principle involved in the light of a general behavioural model of unified Science.

Centralisation of information

A further insurmountable problem is that arising from the centralisation of information. Indeed, the replacement of subjective information by objective information involves centralisation and this has many implications.

Consider the island of New Guinea where there are at present 700 different tribal groups, each with its own religio-culture. If the country were modernised these would inevitably be destroyed as the population was herded into large industrial complexes in which the children would soon be subjected to the standard western-type education.

These religio-cultures have developed over the course of thousands of years, not at random, but for a specific purpose – that of enabling the tribal groups in question to achieve a stable relationship with their environment. This they achieve remarkably well, as can be attested by all those who have examined the behaviour of tribal societies. However it is considered by us that their behaviour would be more adaptive were it based on a single organisation of information – the one which reflected objectively the world they, as well as countless other social groups throughout the world, happen to live in.

We forget, however that a society is a natural system, and it can be shown that its religio-culture is an integral part of it, that part which ensures its control. If one removes an integral part of a social control system in this way why not do the same with other systems? Why not for instance centralise genetic information? Why not start a world genetic data bank, which animals wishing to reproduce themselves in a modern and scientific way, whether they be fiddler crabs, dung beetles, or human beings, need but contact so as to obtain, by the aid of some giant computer, all the genetic information that they may require for this purpose?

However ridiculous this suggestion may sound, in behavioural terms the same principle is involved. In both cases it means counteracting the processes leading to the evolutionary development of normal control mechanisms. Such action is anti-evolutionary and can only lead to an increase in randomness.

Let us push the argument still further. If we deprive the inhabitants of New Guinea of their social control mechanisms, in the interests of centralisation, why don't we do the same for the other mechanisms involved in their life processes? Why do we not set up, for their benefit, a single computerised liver for instance, or a complete digestive system which would deal with all the digestive processes of the island's population thereby freeing it of digestive worries and letting it concentrate on more progressive activities such as watching TV or going to football matches?

Once more the example may appear absurd. But in cybernetic terms it is not absurd at all. Natural systems must be self-regulating if they are to be stable. A control mechanism is an integral part of a system. Remove it and the latter disintegrates, just as would an organism if one were to remove its liver or its digestive system. That is why traditional societies have not survived the destruction of their religio-cultures.

Differentiation

The original instructions initiating a behavioural process are differentiated during their implementation so as to adapt them to environmental requirements.

In this way the process cannot be explained solely on the basis of these instructions. Nor does the model on the basis of which the instructions are justified, suffice to justify the totality of instructions given at each level of organisation as behaviour proceeds. This principle is well illustrated by the behaviour of an army.

It is not even remotely conceivable for a General to issue a complete and detailed Plan of Action, which will be observed to the letter at every echelon down to that of the section. The General cannot tell the exact nature of each problem that will be encountered by his men during the implementation of his instructions. He cannot know the position of each boulder, each tree, each bush which the individual soldiers will encounter -the physical strength of each individual opponent, the ruses he will resort to. In other words the imposition of a complete Blueprint from above is totally unadaptive. These instructions must be subjected to changes accommodating environmental influences, in precisely the same way as the cultural information on which is based a traditional cultural pattern is subject to evolutionary change.

In the case of an objective pattern of information, the mechanism for ensuring its differentiation is absent.

Consider that most of the disciplines, into which knowledge is at present divided, are based on a very insufficient sample of the total human experience. Modern economics, for instance, is based on the Western experience during the industrial age. [21] It is assumed indiscriminately to apply to traditional societies, and efforts to apply it in this way have led to social disruption on a considerable scale.

Modern agriculture has been devised largely on the basis of the experience of European countries enjoying a temperate climate. Its indiscriminate application to tropical areas has led to wholesale soil destruction and desertification.

Ideas of government are just as socio-centric and their exportation to Africa and Asia has led to the erosion of traditional cultures and to the setting up in their place of unstable political regimes which are nothing more than parodies of their already largely unsuccessful European counterparts.

All this is largely the result of the failure to adapt centralised objective knowledge to local requirements – to differentiate it, in fact, as subjective information is differentiated during the behavioural process among self-regulating natural systems.

The non-plasticity of generalities

The reason why the mechanism for adapting apparently objective generalities to environmental requirements is absent is that we cannot avoid regarding them subjectively as a priori truths, and thereby to rationalise any experiments which would invalidate the principle of their applicability. Why should this be so?

The reason is simple, the model used by the control mechanism of a natural system regardless of its level of complexity constitutes a hierarchical organisation of information. Information is organised in it, in accordance with its degree of generality. The more general the information the more important it is, since it colours all the other information in terms of which it is differentiated. Also, the more general it is, the longer the experience of the species or of the social group (in the case of cultural information), which it reflects. The more, therefore, it can be predicted that the circumstances to which it mediates adaptive behaviour are likely to be present, the less modifiable is this information.

Traditional man could predict with confidence that the circumstances that have been present for thousands of years are likely to continue being present. Their whole cultural pattern depends therefore on the continued presence of these circumstances, and little or no provision is made for their possible absence. Thus, the cultural pattern of a fishing society living on the edge of a lake would assume that the lake does not go dry and that its fish population is not depleted.

An Eskimo society living in the Arctic wastes will assume the particular climatic conditions in which it lives. Neither the fishing society, nor the Eskimo society can cater culturally for drastic changes in their basic relationship with their environment. If such changes occur, then the cultural patterns in question will collapse. But in terms of their very long experience there is no reason for them to suppose that it will.

The same is true of genetic information: Let us not forget that the generalities of our behaviour pattern are formulated in terms of our genetic information. This reflects the experience of a far longer period than does the cultural information. Its main feature is that it is largely non-plastic, i.e., it is not subject to change except over a very long period. If, for instance, it were modifiable on the basis of the experience of a single generation, then the species would cease to display any continuity; it would cease, in fact, to be stable.

When scientific information is built up, this essential fact is not taken into account. The generalities of a scientific model are supposed to be as modifiable as are its particularities, which are supposed to enable those who avail themselves of this information for the purpose of controlling our destinies, to adapt to the most radical environmental changes which a traditional culture could not hope to do. Needless to say, it doesn't work out that way.

A normal organisation of information will contain the optimum, not the maximum amount of information. A system will not develop the capacity to detect signals and interpret them if it does not have the capacity to adapt to the situations involved, or can only do so at the cost of disrupting its basic structure; which is precisely what its entire behaviour pattern is designed to avoid.

To change the generalities of a pattern of information and hence to seek to adapt to very radical changes, must lead to precisely this result. It is clear that the human brain is not designed to contain an objective pattern of information. It cannot handle its generalities. This explains why scientists are incapable of applying scientific method to

the analysis of social questions on which their views are uncritically those of their particular sub-culture.

The objective particularities of their 'scientific' world-view are grafted on to the subjective generalities of that provided by their specific sub-culture. (This is particularly clear in the case of Lord Zuckerman's refusal to accept that pollution levels have gone up with industrialisation, and his other argument for still further industrialisation.)

Let us not forget that all behavioural processes, including 'learning' proceed from the general to the particular and once the generalities have been determined during infancy they are very difficult to modify, however impressive may be the scientific arguments produced for this purpose. Thus when a conflict arises, it is the subjective generalities which inevitably prevail and the subjective interpretation of any situation which they provide simply tends to be rationalised in the most convincing 'scientific' jargon.

That is why wisdom does not seem to grow with access to scientific knowledge, only ingenuity,, and ingenuity in the service of the wrong ideals, entertained on the basis of faulty assumptions, is a liability rather than an asset.

There is no mechanism for making use of objective knowledge for the purpose of control

Since the- human brain is incapable of containing an organisation of objective information, as is a cultural pattern, objective information if it is to be used must be imposed on the system from the outside. It cannot be part of .the system's normal control mechanism. But how is it to be imposed? No means is in fact available. Science does not provide a mechanism for ensuring that scientific knowledge is actually made use of. Regardless of the amount of objective knowledge available, both individuals and governments will tend to behave on the basis of the subjective information which is part of their phylogenetically and ontogenetically developed control mechanisms. The objective information they will simply rationalise to make it appear compatible with it.

If we have been persuaded that they can, it is that we have wrongly interpreted these particularities in such a way as to make them appear amenable to technological solutions which are the only ones our society can provide, i.e., the solutions which are prescribed by the subjective cultural pattern with which we have been imbued.

If we were to use available objective knowledge we would be forced in fact to reverse practically all existing trends. If we consider the problems that face Man today it can be shown that all our remedies are counter productive. Poverty for instance cannot be combated by providing people with more material goods.

First. of all we are reaching a point where it is increasingly difficult to keep up with the manufacture of these goods. Secondly their provision in the most lavish way has no effect whatsoever in reducing poverty. In America for instance there are 21 million people who are classified as 'poor'. The reason is firstly that the production of material goods changes the environment we live in, in such a way that more material goods are then required. Industrialisation creates needs faster than it can satisfy them.

Besides it is becoming increasingly clear that the misery we associate with poverty is the result of biological and social, rather than material, deprivation, while the production of material goods is the main cause of biological and social deprivation. In the same way, it can be shown that such basic problems as unemployment, [22] ignorance, [23] homelessness, [24] malnutrition [25] and disease [26] are on the increase throughout the world in spite of unprecedented investments in technology and industry and that they are not being resolved by technological and industrial progress.

On this basis the whole process should be reversed. If we do not reverse it, it is simply that we are incapable of making use of objective knowledge for the purpose of social control which continues and always will be assured on the basis of subjective information.

Cognitive maladjustment

If perception cannot serve as the basis for objective knowledge in normal conditions, in a period of rapid environmental change it eventually becomes even incapable of providing useful objective information. The principle involved I shall refer to as cognitive maladjustment.

It is generally held today that man is infinitely adaptable. This is only because the concept has never been adequately defined. If we define it as the capacity of a system to maintain its stability, then it is simply not true. Man, by means of science and technology is capable of counteracting discontinuities, but only at great cost. The cost is in terms of reduced stability and hence of greater discontinuities in the future, with which science and technology will eventually no longer be capable of dealing. What, in our industrial society, we take for adaptation, is usually pseudo-adaptation, as Boyden calls it.

The notion that Man is only capable of adapting to that range of environmental changes which can be catered for by a traditional cultural pattern, conflicts with the notion that the substitution of a pattern of objective knowledge for his traditional knowledge increases his range of adaptations.

In reality as we diverge from the environment to which Man has been adapted biologically, by means of phylogeny and ontogeny, and socially, by means of his society's cultural evolution, and his own education, so are we creating a host of maladjustments at different levels of organisation.

Thus, it is becoming increasingly apparent that a whole new range of diseases is appearing which is unknown in tribal societies living in their natural habitat – what is more the incidence of these diseases is increasing with *per capita* GNP. I refer to cancer; in particular cancer of the lungs and bowels, ischaemic heart disease, diverticulitis and tooth decay. These are already known among many researchers as the 'diseases of civilisation'. Boyden refers to them as the 'diseases of biological maladjustment'. [27] They appear to be, caused by environmental factors which were absent in primitive conditions, and what is more, the further we diverge from such conditions, as measured by *per capita* GNP, the greater is their incidence.

It is also becoming increasingly clear that we are faced with an ever increasing range of social pathologies, which were also absent in 'primitive' conditions. Their incidence also appears to increase with *per capita* GNP – I refer of course to crime, delinquency, alcoholism, illegitimacy, suicide, etc. These are best regarded as 'the diseases of social maladjustment'.

Contrary to what many might think, against these ills modern science is impotent. In spite of enormous investments in research no cures have been found nor are they likely to be. Remedies provided by science are technological ones whereas the problems are biological and social ones, requiring biological and social solutions. Technological remedies do no more than mask the symptoms of a disease thereby rendering it more tolerable and serving in this way to perpetuate it. Their effect is thereby to accommodate trends rather than reverse them, to permit in fact a yet further deviation from the optimum environment to which we have been adapted by evolution, and thereby further increasing maladjustments at all levels.

This is what happens, for instance, when we fight crime by building more burglar alarms and armoured cars. If a system is limited in its range of adaptations, for somatic reasons, so it is for informational ones. As the relationship between a system and its environment undergoes change, so is its model ever less capable of representing it.

This means that we become ever less capable of understanding our relationship with the constituents of our changing environment, which, to use Forrester's expression is becoming increasingly counterintuitive.

Thus, whereas our Palaeolithic ancestors had no difficulty in understanding what was their relationship with the cave bear and the woolly mammoth, we have no means of understanding what are the implications for us of subjecting our children to X-rays, of permitting a nuclear power station to be built in the vicinity of our homes, of allowing supersonic transport to erode the ozone belt which shields our planet from the sun's radiation, of cutting down the world's remaining stands of tropical forest, of countenancing, in fact, the industrialisation process itself.

Few people understand the full implications of these things, and hence, few are capable of reacting or influencing society to react adaptively to the strange new happenings which are rapidly transforming the world we live in. The result, of course, is that our scientifically influenced behaviour, which, as we have seen, remains based on subjective foundations, becomes increasingly unadaptive.

The development of science as part of the industrial process

It may well be that these arguments are all of purely academic interest, for the scientific adventure is condemned to failure by virtue of the fact that it can only occur in specific conditions – those, which in any case, must inevitably lead to the deterioration of the biosphere and if it continues for long enough, the annihilation of complex forms of life, such as man himself. I have argued elsewhere that there can be no flying saucers, since a planet whose inhabitants have developed the requisite technology, who are in fact technologically several decades, if not a century, in advance of us, would long ago have

collapsed from the combined effects of environmental pollution, resource depletion, starvation and social chaos.

The same argument applies to the development of modern science. It could not have occurred in a hunter-gatherer society, nor in an idyllic rural society, but only as an integral part of that singular process of which technological development and industrial growth are the other necessary ingredients. That scientists, with all their remarkable ingenuity and capacity for improvisation, cannot deal with the problems which this process inevitably gives rise to, has been the subject of this paper. If they have an important contribution to make today it is in admitting their own inadequacies, in informing our political leaders, and the public at large that scientists are not the universal conjurers they are supposed to be.

Scientists must become sages rather than conjurers. They must re-assume responsibility for the study of the assumptions upon which their work is based, and organise objective knowledge into something approaching a general model of behaviour. Even if this will never be used to control our society, at least it may help divert the efforts of scientists from furthering the cause of technological development and industrial growth: for it will serve to reveal just how unjustified are such efforts. Further it will demonstrate that de-industrialisation is the only course of action which can be justified on the basis of available objective knowledge.

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Living with nature

by **Edward Goldsmith** · July 1, 1970 · [Leave a Comment](#) · [Share](#) · [Print](#)
This is the original editorial piece that launched The Ecologist in July 1970.

THE PLANET EARTH is unique in our solar system in displaying those environmental conditions required to sustain complex forms of life.

In what are, in evolutionary terms, very recent times, its surface or biosphere has been seriously disturbed by two events giving rise to tendencies which, if unchecked, could transform it into a lifeless waste.

The first of these events was the agricultural revolution that occurred some 10,000 years ago. Until then, man was a hunter-gatherer and the societies in which he lived were endowed with cultural controls that permitted them to fulfil their correct ecological functions within that vast integrated system that is our biosphere.

When he discovered agriculture, he possessed a means of increasing his numbers beyond ecological requirements.

He also developed new needs; and to satisfy them, he hacked down forests, extracted minerals from the earth and built great cities. Man had set out on his career as a parasite.

Fortunately, the host, our biosphere, had considerable resources. It possessed vast primaeval forests sheltering every type of bird and mammal, while its unpolluted oceans and crystal-clear rivers teemed with myriad forms of life. Thus the parasitical activities of agricultural man caused only a localized infection which our biosphere soon learned to live with.

Meanwhile, to look at the other side of the medal, man, with his new wealth, developed a way of life that we have called civilization. It was characterized by great elegance of thought and form.

The second event that disturbed our biosphere was more serious. Man learned to harness the energy of fossil-fuels locked up within the earth's crust. He built machines driven by this energy, and industry was born.

The results were cataclysmic. The population of the world at the end of the 18th century was probably about 800 million and it had taken at least a million years to achieve. 100 years later it had risen by another 800 million. Forty years then sufficed for a further such increase, while today it will take eight years to add that many people to our congested planet.

Dr. Aubrey Manning in *No Standing Room* points to the intolerable consequences of this population explosion. That it is incompatible with the survival of civilized man is beyond doubt; that it might, if unchecked, lead to his extinction is not far-fetched. In the meantime, more people has meant more agriculture to feed them, thereby permitting still more people requiring still more industry and in turn still more agriculture; and so the disease has spread and is still spreading, exponentially.

What, it might be asked is the pathology of this disease? In what way is our biosphere being affected?

Waste

First of all, the disease gives rise to waste. In a balanced ecosystem, the waste products of one process serve as the raw materials for another and waste is reduced to a minimum; but when one of its parts expands beyond its optimum size, it generates more waste than the others are capable of absorbing.

In this way, the ecosystem, previously made up of finely differentiated parts, each with a specific role to fulfil, gradually accumulates random parts or waste which only serve to clutter up its delicate structure and reduce its 'order' and efficiency.

We normally think of waste as things that cannot be made use of in the course of our every-day life: rubbish, in fact, that has not been collected by the dustman.

However, we are reaching the point where, *vis-a-vis* the biosphere, we ourselves, the food we produce that will permit more of us, and the products we manufacture – motorcars, refrigerators and the like – are all waste. All have long since ceased to play any useful ecological role; all increasingly interfere with the subtle mechanisms of our ever less efficient biosphere.

Natural resources

Waste, however, cannot be produced from nowhere. As in all processes, raw material is required. In this case it is our biosphere itself, whose essential parts are chewed up by innumerable machines and systematically transformed by innumerable machines into waste.

Until now, we have assumed that these parts, or resources, as we anthropocentrically refer to them, are limitless.

Progress, as we conceive it, to the achievement of which all our efforts are geared, demands a continually increasing standard of living, which chiefly means boosting our consumption of agricultural and industrial produce.

It is perfectly evident that such expansion is only conceivable if our stock of the requisite raw materials is also expanding. Yet we know that this is not the case. Our planet's stock of minerals and fossil-fuels, for instance, is already sadly depleted, and it is only a question of time before it is totally exhausted.

Once this occurs, that already tottering technological superstructure – the 'technosphere' – that is relentlessly swallowing up our biosphere, will collapse like a house of cards, and the swarming human masses brought into being to sustain it, will in turn find themselves deprived of even this imperfect means of sustenance.

Complexity

But our biosphere is being affected in yet another way. It is one of the basic principles of ecology that stability is achieved by increasing complexity, or diversity. Yet most human activities are tending towards the systematic simplification of our biosphere. By cultivating one crop where previously there were countless varieties, we are reducing complexity and hence stability.

By cultivating a single high-yield strain of a particular crop throughout the world, we are replacing countless local strains (see "The Green Revolution: triumph or calamity?") and thereby further reducing stability. By destroying and absorbing countless non-industrial cultures, we are reducing cultural complexity, and thereby rendering our species that much less stable and that much more vulnerable. (See Robert Allen's *Eskimo Knell*).

By replacing subtle and highly complex natural processes such as those that normally prevent the explosion of bacterial and insect populations by crude ham-fisted technological ones such as antibiotics and pesticides, we are further simplifying our biosphere and further increasing our vulnerability.

Social disorder

The disease is also affecting human societies. The latter, like all other systems, have an optimum structure that cannot be maintained when growth is too rapid and when they are subjected to environmental conditions to which they simply cannot adapt – and I include in this category the vast urban wastes that we refer to as our cities.

When societies cease to display their correct structure they become disorderly, and cease to act as adaptive units of behaviour. They break up into their constituent parts and their members, who cease to regard themselves as bound by any duties to a larger longer-term whole, become unhealthily preoccupied with the petty and the short-term to the detriment of the important and the long-term – a situation which can only lead to further social disintegration.

Short-term preoccupations

To cater for these short-term requirements is the principal function of industry, whether it be organized on a capitalist basis as with us or in vast state enterprises of the Communist type. It is thus not surprising that we should be so preoccupied with economics as to have lost the ability to take into account the host of factors equally affecting our lives which are not neatly quantifiable in the narrow, technical jargon of economists geared to the study of short-term economic currents.

This is reflected in current agricultural practice. As Professor Lindsay Robb writes in *Agriculture and Medicine* – is a merger needed?:

“Almost everywhere . . . agricultural policy is based on the production of the largest quantity in the shortest time at the lowest cost and the highest cash profit. There is virtually no regard for quality, nutritive value or the future of the land.”

Medicine is also concerned with the short-term. Its main preoccupation is with fighting the symptoms of disease, not the disease itself. Thus, Lindsay Robb describes our National Health Service as “*a repair service for current sickness, rather than a health service*”.

International bodies such as FAO are equally preoccupied with the short-term. The solution to the world’s long-term food problems advocated by FAO – the intensification of agriculture – is essentially a short-term one as Michael Allaby shows in: *A Jump Ahead of Malthus*.

Politics are exclusively concerned with short-term issues. In fact our government is a sort of universal nanny, showering short-term benefits of every conceivable sort on an ever more demanding and self-indulgent electorate. Unfortunately, to take the measures required to prevent the further spread of the disease means persuading the electorate to forego some of these benefits in the interests of its future.

In fact the nanny must become a schoolmaster. But is she willing to undergo so radical a transformation? Is she in fact capable of it?

On this score, the pronouncements of our politicians are not reassuring. Mr. Crossman publicly announces that Britain can easily support 75 million people, while Mr. Wilson and Mr. Jenkins even consider this desirable as it will increase consumer demand and enable our industry to benefit from the economies of large-scale manufacturing.

Such ignorance of the long-term factors involved in determining an acceptable population for this country, and such blind preoccupation with short-term economic values on the part of those called upon to direct our destiny are truly terrifying.

Needless to say, the Strasbourg Conference, one of the highlights of the European Conservation Year, reflected an identical attitude on the part of continental governments. All took it as axiomatic that the disease would be allowed to spread unchecked. Population growth and economic expansion were regarded by all as inevitable and though many expedients were proposed for rendering the ravages of the disease that much less intolerable, that effective action might be taken to check its spread was not so much as suggested.

Unfortunately, one cannot solve long-term problems with short-term solutions. One cannot cure the disease by eradicating its symptoms. On the contrary, by rendering it more tolerable one simply contributes to its perpetuation.

As Doctor Aubrey Manning writes in *No Standing Room*: “How can the planners be so myopic as not to realize that to plan man’s environment we must begin to plan the numbers of man himself?” And so too, must we plan his level of consumption, i.e. his ‘standard of living’.

To do so requires a radical change in our way of looking at man’s relationship with his environment, for it must involve taking measures that in many cases are contrary to our accepted values. Thus, to control population we may have to interfere with ‘personal liberty’, while to reduce economic expansion we are forced to curb ‘the march of ‘progress’’. But surely all this is but a small price to pay if we consider the long-term alternatives to such a policy.

A unified science

It is perhaps at the scientific level that the most basic change is required. At the moment science is divided into a host of watertight compartments, each one concerned with a specialized aspect of our biosphere. The latter, however, is not compartmentalized in this way. It is, on the contrary, a closely integrated system that came into being over thousands of millions of years, as a single process. By regarding its differentiated parts as separate self-sufficient fields of study, scientists like everyone else in our society, become preoccupied with the petty and the short-term and are blind to the long-term problems that beset us.

In addition, the factors that may influence a situation whose course they wish to predict and that must therefore be taken into account if such predictions are to be at all accurate, will not be conveniently limited to one such specialized field of study. As a result their predictions will not be sufficiently accurate to guide any major aspect of public policy. Indeed, if the object of science is to organize information so as to make predictions, then it is clear that modern science is simply not scientific.

To adapt Clemenceau’s famous formulation: “*Science is too serious a matter to be left to the scientists*”. And this will be so until they have developed a unified science, in terms of which it will be possible to understand the interrelationship between such diverse things as societies, plants, and minerals, in the light of their specific contributions to the workings of the biosphere.

Cybernetics or General Systems provide a tool for such an undertaking (see E. Goldsmith: “Bringing Order to Chaos”) and it is up to them to make use of it. Once this is done it is but another step for our educational apparatus to imbue people with that sense of values and to supply them with that information which will enable them to fulfil their correct functions as members of their families, communities and ecosystem.

In this way they will be able to learn to attach greater importance to the quality of life than to increasing their standard of living measured in terms of the accumulation of goods and services. Only then will man become capable of living with nature, instead of against it and thereby halt the spread of the disease with which he is afflicting the biosphere.