

The

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Ecologist

Man and the environment ■ The Quality of life ■ Pollution ■ Conservation

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July 1971

Britain's water shortage ■ Social disintegration and its causes

The man who sued the Torrey Canyon



Has
Oxford
a future?

by Helen Turner

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The Ecologist

Vol. 1. No. 13 July 1971

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... and with an anti-pollution plant of the most advanced design here, we will at last have brought the full benefits of progress to this backward and neglected island.

Editorial

We can't have our cake and eat it

When, in time of drought, a tribal rainmaker fails to bring about the required rain, the tribesmen, sadly surveying their parched fields and ailing crops, do not question the efficacy of the magical rites that he performed in vain.

Age-old tradition has conferred on them a respectability that no individual failures can possibly impair. They are above suspicion; they are *a priori* verities that cannot be questioned without casting some horrible doubt on the tribe's entire cultural pattern.

Thus, there is no choice but to ascribe the rainmaker's failure to some technical flaw in the performance of the rites—the presence, for instance, of someone who has violated a taboo.

Today, we are faced with the perfectly hopeless failure of our scientists, technologists, businessmen and politicians to arrest the ever more rapid disintegration of our environment.

If we were capable of looking at things objectively, it might conceivably occur to us that the reason why the efforts of so many able and highly educated men were so totally fruitless was that there was something radically wrong with the basic principles underlying them, and that the entire behaviour pattern of our industrial society, rather than any of its avoidable features, may in fact be unadaptive, leading to what can only be inevitable disaster.

Progress, towards which end all such efforts converge, appears to consist mainly in the substitution of technological processes for natural ones.

Technological processes, by their very nature, are dependant on the use of non-renewable natural resources such as metals and fossil-fuels. Their extraction and transport must inevitably cause serious environmental disruption. By their very nature, they must also give rise to pollution, and it is naive to suppose that this can be

brought under control. The USA must spend about \$31 billion to build secondary sewage treatment plants and about \$90 billion to install tertiary treatment plants so as to have relatively clean water.

The capital costs of controlling air pollution from stationary sources alone has been estimated at about \$100 billion. To control that from moving sources would involve yet another massive outlay. America cannot begin to afford such expenditures.

In addition, many types of pollutants cannot be controlled; heat, from the combustion of fossil fuels, for instance—and the only way to avoid pollution by fertilisers and pesticides is by limiting their use, which simply means preventing the industrialisation of agriculture, one of the key stages in the pursuit of progress.

Another essential concomitant of progress is urbanisation. It is inevitable, for as soon as machines take over in the fields, the “uncompetitive” small farmers and farm-labourers must move to the cities.

From the ecological point of view, the optimum deployment of a population is in small villages, as in India. It is in this way that it has the minimum impact on the environment. Think, what would happen if 550 million Indians were shifted from the half million villages they inhabit to cities of over a million inhabitants. At the moment, sewage is returned to the fields where it belongs. They would now require several hundred billion dollars worth of sewage plants. At the moment, little welfare is needed, the extended family looks after its sick and elderly members. They would now require an elaborate bureaucracy to dispense, at unbelievable cost, aid to an ever more anarchic urban population.

There is no reason to suppose that any society can afford the cost of social disintegration arising from total urban-

isation. Anarchy can only get worse, because the technosphere on which the whole urban population depends for its livelihood is a most unstable structure. By its very nature, it must eventually collapse causing vast unemployment and hence infinitely greater social chaos.

This is so because its maintenance depends on the availability of non-renewable resources, metals of various types and fuels of which the world has a limited stock, and one that is rapidly nearing exhaustion; because the environment has a limited capacity to absorb wastes, and this is equally rapidly being attained; and because technological processes are not self-regulating like those of the biosphere they have replaced, but depend on our efforts to keep them functioning.

Eventually, when all the basic requirements of life are furnished by machines; when the water we drink, the food we eat, the air we breathe, are all furnished by factories of different sorts, the instability of our society will be such, that the slightest technical hitch, the unavailability of some key resource, an industrial dispute, an act of sabotage—any one of these could lead to the collapse of the whole caboodle.

Most of the politicians of the so-called developing countries insist on industrialising in order to achieve progress, and they think that they can do it and at the same time avoid the terrible social and ecological problems that industrialised countries are encountering.

Politicians from the latter countries appear equally convinced that such problems can be solved by the use of ingenious technological expedients that would require the curtailment of none of their plans for industrialisation.

These are sheer illusions. It is precisely progress that is causing all our problems, and they cannot be solved save by foregoing it; but it needs a lot of courage to face this, and still more to sell it to an electorate.

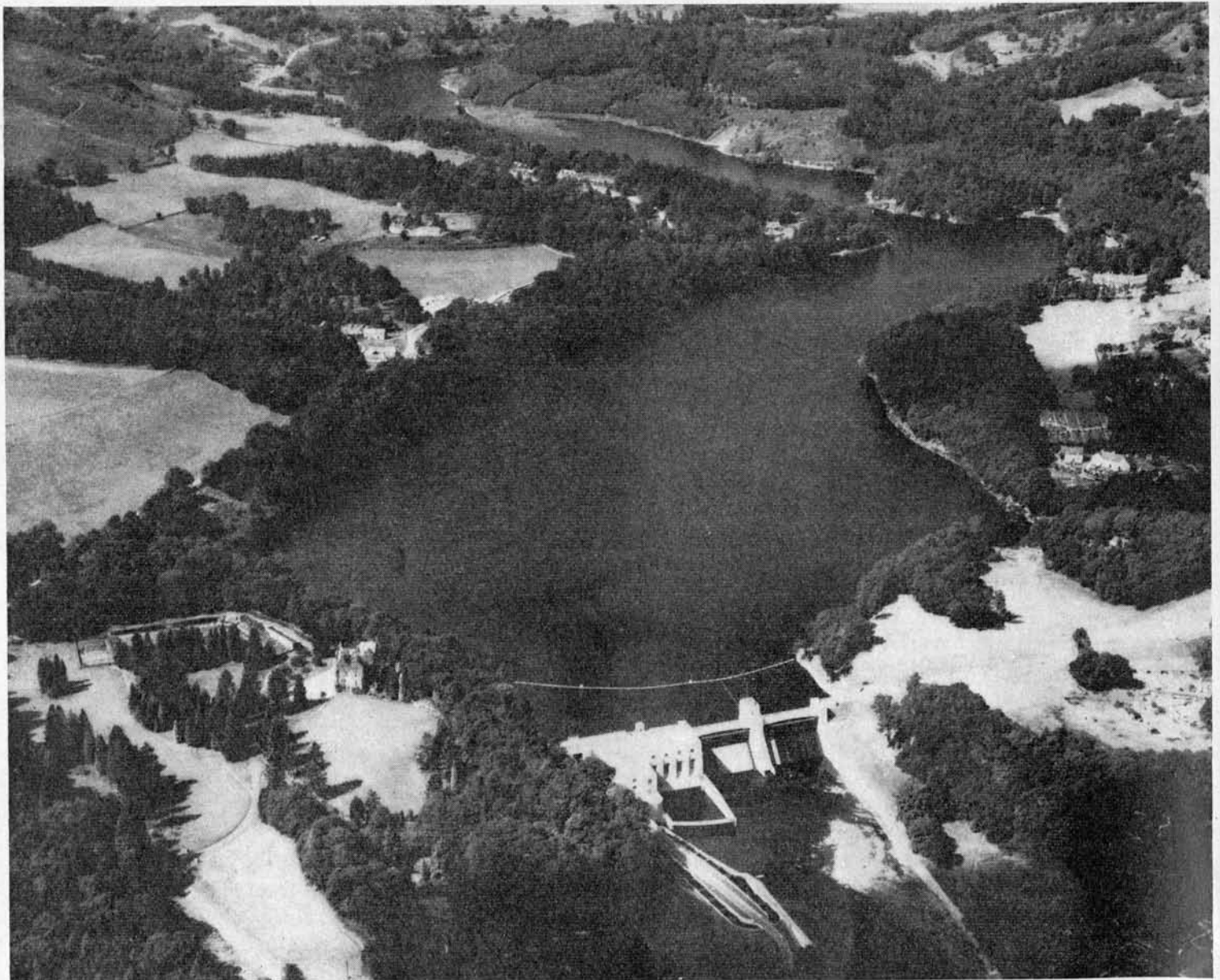
Nor any drop to drink

by F. N. Steele

It is popular to regard the year 2000 as some kind of watershed in the lives of men, and while we are so engaged in forecasting the problems that will confront us in that year of the magic numbers, we tend to ignore, or pass over the problems that are confronting us now. Problems which if not tackled very soon will grow by the end of the century to such proportions and reach such complexity that they will be beyond man's powers to repair both in terms of technology and cost.

Reservoir near Pitlochry

Photograph: Aero films and Aero Pictorial Ltd



Even taking the present rate of utilisation of the Earth's resources and without making any allowance for an increase in demand, we can easily visualise that many of these resources will be so costly as to place them before the end of the century beyond the reach of any but the richest nations. Rather than the developing nations sharing the standard of living of, for example, the United States, they will be forced to sell their raw materials to even maintain the standards of living they have today. Even water, that most vital resource, will cost much more by 2000, indeed it is highly likely that its price will be significantly increased by the end of this decade.

It seems inconceivable that water could ever become a scarce resource when 71 per cent of the Earth's surface is covered by it, but the fact of the matter is that the world is threatened by a serious water shortage which, if nothing is done about it soon, could become acute by the end of the century. Why should this be the case when the amount available on this planet has probably not altered much over the last million years or so? The answer lies in the way it is distributed, unevenly so that it is not necessarily found where it is most needed, in the demand which is spiralling due to the rapid population increase and the requirements of technology, and in man's waste and pollution of it.

From the earliest times communities have sprung up and grown along river banks, the rivers providing the vital water and at the other extreme a convenient means of disposing of wastes. Until the arrival of the Industrial Revolution the rivers could by and large quite easily cope with the demands Man made upon them, but with the explosion of population and industry in the last 100 years or so, the rivers have been quite unable to meet Man's requirements. In the industrialised countries in particular Man has to look further and further afield to satisfy his needs. Reservoirs must be built, often sited many miles from the towns and cities they serve, and frequently the groundwater must be tapped. Frequently too the most densely populated areas are to be found in the driest places. For example in the south-east of England, one of the most overcrowded parts of Britain, the natural evaporation of water from the land can in the summer months exceed the rainfall, and indeed London without groundwater and its reservoirs would be faced with water starvation. Even in

those areas where there is an abundant rainfall, such as parts of north-west England and southern Scotland, there is a growing danger of a water famine. It is not surprising, therefore, to come to the conclusion that water shortages, now more commonly associated with the arid regions of the Earth will in the future, unless action is taken to prevent them, be commonplace in areas which have abundant rainfall, and will seriously affect the industrial nations.

Water is essential to industry and the quantities used are staggering. 4,400 gallons of water are required to make one ton of steel, 350 gallons to make 1 gallon of beer, 800 gallons to make 1 ton of cement and 20,000 gallons to make 1 ton of paper. Of the 8,740,000 million gallons of water authorised for use in the United Kingdom for the year ending September 30th 1969, no less than 4,857,000 million gallons were used by the Central Electricity Generating Board alone for cooling and steam raising. Although most of this water is recycled, much more will have to be conserved if industrial civilisation is not to be brought to a halt. Indeed it may be the shortage of water that could bring this about and not the shortage of other resources or the breakdown of social structures. The situation could be particularly serious for the smaller highly industrialised nations such as Japan and the United Kingdom, both of which incidentally have a natural abundance of water but both of which waste millions of tons each year, but while such countries will be the first to feel the effects of a water shortage, the larger countries will not be too far behind. The United States is at present moving into a position where water will be at a premium. It is estimated that in the 10 years from 1970 to 1980, the total water demand (domestic and industrial) in urban areas will increase by 30 per cent. 16 per cent of this will be required to take account of population growth at the current demand rate, 11 per cent for the increased demand by the original population and 2 per cent for the increased demand of the additional population. By 2000 America's needs will have trebled, Britain's doubled and taking the world as a whole, four times as much water will be required. As Man advances, his thirst for water rockets. In the developing countries a man might get by on 2½ gallons a day, but a Londoner needs 33 gallons for his domestic use and in some cities of the United States the citizens

cannot do with less than 55 gallons.

Water shortages on a wide scale will be very prevalent long before the end of the century. It is quite possible that severe shortages will be hitting British and American industry by 1980, and some people believe that unless the problem is tackled now, by 1980 the position will have reached the point of no return. Can the problem be solved? If we tackle it now, it can.

Firstly we must understand the problem in its entirety, we must know where we get our water from and to do this we need a thorough understanding of the hydrological cycle. This, for brevity's sake, is the circulation of water between ocean, atmosphere and land surface. The Sun's energy evaporates oceanic water, acting rather like a huge still, and this "fresh" water is taken up in the atmospheric machine and is eventually precipitated as rain, snow and hail. Of the proportion of this that falls on the land some is locked up in permanent snowfields or glaciers or runs back to the sea down the rivers, some finds its way into the more porous strata of the continental rocks, and some is re-evaporated off the land by the energy of the Sun. Areas covered in forests or jungle retain the moisture better than those covered with other types of vegetation, but all land covered by plants retains its water content much better than areas of barren rock, sand and concrete. Any interference with the natural water regime obviously bodes ill. The current craze for deforestation is an obvious threat and even the building of dams and reservoirs for the very purpose of water catchment can have an adverse effect. Some of the practices currently in common use actually impair the efficiency of the catchment system. One practice which is thought to improve efficiency has in fact the very opposite effect; this is the stripping of the hill-sides around a reservoir of their trees, and in some instances all vegetation, replacing these with concrete slopes. This arose from a belief that the water would run quickly into the reservoir without taking in a load of soil and vegetation debris, but what was ignored was the fact that water was lost, particularly at times of comparatively low precipitation by evaporation off the concrete. What was further ignored was that vegetation itself conserves water and also because of the relatively higher humidity in a vegetated area evaporation is reduced from the surface water in the reservoir.

The siting of dams and reservoirs brings other problems. Since the Second World War perhaps the most notorious has been the building of the Aswan Dam in Egypt. No doubt the idea behind this dam was to enhance the welfare of the Egyptians though it seems that prestige considerations were rather high up on the list of priorities. Very little thought must have been given to the ecological and medical aspects of siting a dam across the Nile. Within a few years of the dam's completion, a valuable fishery in the Lower Nile Delta has been destroyed depriving thousands of people of their livelihood. The fertility of the Nile valley itself has been reduced, so much so that part of the power generated by the dam has to be used in preparing artificial fertilisers to replace those that were once brought down by the Nile itself. The Nile, which for thousands of years sustained an advanced civilisation, has in a matter of less than a decade been destroyed by 20th century Man.

However, the growing demand for water makes the building of reservoirs imperative—water storage is an important aspect of the conservation of the resource—but these alone will never be sufficient. The water we have will have to be used over and over again and drastic attempts made to cut down wastage and pollution. Urban areas are particularly wasteful of water. Much of the storm water runs straight off the ground through the drainage system, very often down common pipes with sewage thus contaminating it by the time it gets into the rivers. What doesn't run off is directly evaporated into the air, whether this be through solar energy or the energy coming from the man-made power plants within the buildings. Modern agricultural methods are wasteful of water, again much of it runs off the land and is frequently contaminated by artificial fertilisers and pesticides. But so much of our water is wasted by ourselves in the home. In countries where water has been up until now plentiful it

has been taken completely for granted, an inexhaustible supply at the turn of a tap. Before water was available on tap the average British domestic consumer used five gallons a day, now he wastes four gallons a day purely because of dripping taps and burst pipes and he uses far more than he really needs. Water is cheap, a mere 17½p per 1,000 gallons for the domestic user in Britain. Compare for example his opposite number in Kuwait who has to pay £1.50 for the same quantity and treats water with the respect it deserves. Metering is an obvious deterrent to this type of wastage. A survey of 136 American towns and cities with populations exceeding 25,000 showed that the overall daily consumption (all uses) per head where 10 per cent of the supplies were metered was 143 gallons but when 50 per cent of the supplies were metered this fell to 58 gallons. A salutary example.

Closely married to waste is pollution which is really part of wastage because polluted water frequently cannot be used for industrial purposes and may be dangerous to domestic users. It can also be a threat to the food supply by being a hazard to domestic animals, to fish in rivers and lakes and ultimately in estuaries and coastal waters. Pollution has become one of the major problems of the latter half of the Twentieth Century and has particularly affected water supply in the latter half of the 1960s. Many of the rivers of the industrial nations of the northern hemisphere have been referred to as "open sewers" with a great deal of justification. A 1958 Ministry of Housing and Local Government survey of Britain's rivers showed that 1,278 miles, 6½ per cent of the total river length of England and Wales, were grossly polluted and 4,144 miles, 20 per cent of the total, needed improvement. The Institution of Water Engineers in a 1970 report estimate that "nearly as much as a quarter of the England and Wales water supply is drawn from sources that are frequently or continuously polluted in degrees varying from

slight to dangerous, and a further quarter from sources liable to sudden pollution, varying from slight to severe". One of the most badly polluted river systems is the Tame and its tributaries, particularly the Tame which drains Birmingham and other West Midland towns; these are so polluted that many people believe that they can never be cleaned. Severe pollution problems are found in the Coln, Calder, Ouse, Lee, Tyne and Humber and Mersey river systems to name but a few. The situation is the same in many of the great rivers of the industrialised world, the Seine, the Rhine which has been called the longest sewer in Europe—and many of the American rivers. The Great Lakes, vast stores of valuable freshwater, are being seriously threatened; Lake Erie is devoid of aquatic life and Lakes Michigan and Superior are heading in the same direction.

By far the biggest culprit in freshwater pollution is sewage, domestic and farm, which if untreated makes very great demands on the oxygen dissolved in the water on which aquatic life depends and which helps to keep the water "fresh". Although more and more effort is being made to increase sewage treatment facilities, the amount of untreated sewage being pumped into our rivers represents a serious threat to our water supplies. But sewage is only one of the pollutants, the industrial effluents add many more. Treatment of these is vital particularly when we consider that if it were not for returned effluents many rivers would not flow at all in dry weather. Taking the Trent as an example again, the amount of water abstracted is about 20 times the natural dry-weather flow of the river and about twice its average flow. It is estimated that the contribution of effluents to the dry-weather flow of this river will triple by the year 2000. A similar situation is found in the Calder, Mersey, Weaver and Lee river systems. In fact there are instances where the water requirement of a factory exceeds the natural dry-



THE

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Gordon
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author of 'The Biological Time-Bomb'

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weather flow of a river and this in effect means that the whole river flows through the factory and there is also some reverse flow in the adjacent river channel upstream from the discharge point. Such examples show vividly the extent of Man's impact on a natural system and his responsibility for what he does to it. Already many public water supplies depend heavily on the extraction of returned effluents. In the London area we have the well-quoted example of a cup of fresh water from a tap having been through seven or eight other persons previously. What will be the position by the year 2000 when the population of the south-east of England will have risen from 20 millions to 28 millions with a projected doubling of the demand for water? And this is just one area. Unless pollution is minimised, more and more water recycled, and more efficient methods of water catchment and regulation are devised, the situation could become very serious. Accepting therefore that this must be done, there is pressing need for considerably more detailed planning and control than currently exists and also for much increased charges for water.

In Britain one of the biggest stumbling blocks to achieving the necessary planning is the fragmentation of the present system of water distribution and control. There are 29 River Authorities and 500 Water Undertakings. The former are responsible for the catchment areas of the major river systems in the British Isles and each one has wide powers for controlling rivers and water resources, for land drainage, prevention of pollution and the control of fisheries, and they are also responsible for estimating demands for water at least 20 years ahead and for planning the resources to meet those demands. The Water Undertakings, which can either be public authorities or statutory companies, are responsible for the supply of water in urban or rural areas. What the River Authorities are not currently responsible for are the sewage disposal

systems and there is no comparable planning activity for the systems required as a consequence of the provision of water. Yet such systems cannot be divorced from one another. The Report of the British Government's Working Party on Sewage Disposal puts the point very strongly, "Not only is the disposal the consequence of the abstraction, but the quantity, quality and location of disposal may well be related to another abstraction within the river system. The two operations of abstraction and return to the river are in practice inextricably linked; they are part of the overall river system". Even with the Water Resources Board which is above the River Authorities and Water Undertakings and which is the national planning authority for water, Britain lacks an overall water control system to take into account all the aspects of water resource conservation and exploitation. Such a system must be set up. Under such a regime the water resource could be planned and distributed on a truly national scale. It should have executive powers not only to control the utilisation of the water but to ensure that the resource is not misused or polluted. It would also fix the cost of water to industry and to the individual domestic user. For whether we like it or not we are going to pay more for our water and the psychological barrier which currently prevents government or local government from charging a realistic price to the consumer must go. There is a belief prevalent in our society, and I suspect in most western countries, that we have as much a right to clean water as we have to clean air. As we have neither, since we have all been party to the pollution of both, we have to pay to clean it up, and we have to pay for the wastage. In addition, we must pay for the distribution, an item that is frequently forgotten by those that maintain that water should be free.

The three aspects of the water scarcity problem, demand, wastage and pollution will have to be tackled on a national

scale. The cost and complexity forces this upon us. In this sense we in Britain are fortunate, for continental countries may have to tackle it inter-governmentally, a more delicate task. Even if we solve most of the wastage and pollution problems, we cannot overlook the fact that the demand will always present the major problem. At the present rate of world population increase, freshwater availability will be inadequate to meet demand at some point in the future, and other sources of freshwater will have to be explored. Indeed some countries are already extracting freshwater from seawater to meet their 1971 demands. Kuwait for example relies heavily on desalination and while it cannot be denied that this has brought great benefits to that country, which incidentally can afford to pay for it, the prospect of world-wide desalination brings its own problems—thermal pollution, the power requirements (and let us not forget that nuclear power has many disadvantages).

Even if the population stabilised at present-day numbers, or a little more, the supply would still be outstripped by demand if every country aspired to a standard of living comparable to, for example, the United States. But on available information even the United States will be feeling the pinch and this well before the end of the century. By the end of the century many of the now "rich" nations will be in the same boat and far from being able to help those who are less endowed with wealth and technical know-how, they themselves will be pressed to the utmost of their ability to keep going. For all the water there is on the planet Earth, it is perhaps as well to remember that only 2 per cent of it is available to us as freshwater, 1 per cent is locked in the ice and snows of the polar regions and the other 97 per cent forms that vast and important controller of our climate, the ocean. Thus we have to plan not only that this 2 per cent is used rationally but also that our numbers do not exceed what the resource can sustain.



Social



When social systems (or any other system for that matter) join together to form a larger one, they are said to integrate. When the opposite occurs, the larger system must be regarded as disintegrating—in other words, its order is being reduced: the bonds holding it together are being weakened until eventually they are no longer capable of holding the system together. At this point it breaks up into smaller systems.

This process can occur at all levels of organisation. Thus a modern state is often an unstable system held together externally by a vast bureaucracy. It may be made up of different territorially-based ethnic groups, each with its own culture and traditions that will furnish it with stronger and more lasting bonds than those linking it to the other groups that make up the national state. It is not difficult for such a state to disintegrate into such ethnic groups. Austria after the first world war and Spain during the Republic are particularly striking examples.

It may also disintegrate into ethnic groups that are not territorially based, but that, before disintegration set in, lived symbiotically with each other as did the whites and the negroes in the USA when the latter worked on plantations in the Southern states and more spectacularly as do the different castes in India.

disorganisation and its causes

by Edward Goldsmith

Our society is rapidly disintegrating.

What does this mean?

Why is this happening?

The author treats a human society as a specific instance of a "system" and shows that it will disintegrate for precisely the same reasons as other systems, i.e. when environmental requirements for various reasons cease to justify its maintenance as an autonomous unit of behaviour.

When this occurs, then the national state ceases to be a self-regulating unit of behaviour; it becomes unstable and has to be run externally by a bureaucracy and possibly also an autocrat.

In such cases the new social units into which the original society disintegrates can become viable, self-regulating societies if conditions are right, though in the latter case it would require granting each group its separate territory.

If a society disintegrates beyond say, the clan or village levels, it ceases to be a viable social unit. Such disintegration one can qualify as pathological.

Thus, the peasant societies described by Banfield are pathological. The largest unit of organisation is the family. Above this, no effective co-operation is possible, as there are but the flimsiest bonds linking the families to each other. According to Banfield, such a society will display a number of related characteristics. For instance, "no-one will further the interest of the group or the community except as it is to his private advantage to do so. In other words, the hope of material gain in the short run will be the only motive for concern of public affairs... the law will be disregarded when there is no reason to fear punishment... an office holder will take bribes when he can... but whether he takes bribes or not, it will

be assumed by society that he does." Clearly such a society will not be capable of running itself, i.e. of constituting a self-regulating system. Rather, it will require a bureaucracy and other external controls to keep it together.

Pathological societies

In the same way, a society in which the families themselves have disintegrated, and in which the largest unit of effective organisation is the individual and the incomplete or single-parent family, is even more clearly pathological. An example is the sort of society so admirably described by Oscar Lewis. The main social and psychological features of such a society "include living in crowded quarters, a lack of privacy, gregariousness, a high incidence of alcoholism, frequent resort to violence in the settlement of quarrels, frequent use of physical violence in the teaching of children, wife beating, early initiation into sex, free unions or consensual marriages, a relatively high incidence of the abandonment of mothers and children, a trend towards mother-centred families and a much greater knowledge of maternal relations, the predominance of the nuclear family, a strong predisposition to authoritarianism, and a great emphasis upon family solidarity—an ideal only rarely achieved. Other traits include a strong

present and time orientation with relatively little ability to defer gratification and plan for the future, a sense of resignation and fatalism based upon the realities of their difficult life situation, a belief in male superiority which reaches its crystallization in 'machismo' or the cult of masculinity, a correspondingly martyr complex among women, and finally, a high tolerance for psychological pathology of all sorts."

He regards this related set of behavioural traits as a culture all of its own which he refers to as "the culture of poverty".

This is to be found not only in the slums of Mexican cities, in which Lewis carried out most of his work, but also in a large number of other urban societies. Thus he writes "it seems to me that the culture of poverty has some universal characteristics which transcend the regional, rural, urban and even national differences". The "culture of poverty" is thus a behavioural response that occurs spontaneously when environmental conditions are propitious.

The main feature of such a culture is that it is very rudimentary. As Oscar Lewis writes "poverty of culture is one of the crucial traits of the culture of poverty".

It is thereby incapable of ensuring self-regulatory behaviour at the level of

the community or even of the family, and appears to be exclusively associated with the lowest possible level of social integration; that in which the unit of behaviour is the individual or the incomplete nuclear family.

Degrees of order

Probably the most important thing to know of a society, if one wishes to predict its behaviour, is the extent to which it is integrated, i.e. its degree of order. Unfortunately, no terminology is available to classify societies in this way. One is thus forced to coin one's own. I suggest using the prefixes ethno- (a nation), oikio- (a family or hearth from which eco- as in economics and ecology is a corruption) and ego- (the self) together with a suffix—telic (from telos, an end or goal), which would give one the terms ethnotelic, oikiotelic and egotelic to designate these three degrees of integration.

These terms are needless to say crude ones as there are clearly different degrees of ethnotely, oikiotely and egotely.

Thus extreme egotely or social entropy would be temporarily achieved by putting together on an island a mass of heterogeneous people of different race and culture and speaking different languages, i.e. with nothing whatsoever in common with each other. However, it would not take long before they started organising themselves into couples, families and eventually small communities simply so as to be able to meet environmental challenges—and at the same time developing the basis of a common culture. Indeed, as Whyte has shown, the members of even the worst slums are linked together in some way, i.e. there is some sort of community life, however rudimentary. That is why slum clearance schemes usually increase egotely rather than decrease it.

It is important to realise that social systems exist in time as well as in space. They are in fact four-dimensional. Disintegration is not simply spatial but also temporal.

As pathological disintegration sets in, so one must expect to see a corresponding decrease in temporal organisation.

An individual in a stable ordered society considers himself as but one stage in a long process of which his ancestors were the previous stages and his descendants the subsequent ones. That is why there is little fear of death and little concern with the after-life in

such societies. A man considers that he will simply live on in his children. This is particularly well illustrated by Hsu with regard to traditional Chinese society. As a society disintegrates, so a man tends to regard himself more and more as isolated temporarily as well as spatially. That is why he is over-concerned with his own petty interests to the detriment of those of his community and also with the present and short-term to the exclusion of the long-term. As a result there is nothing to hold together the larger four-dimensional social system, save a set of precarious external controls which is unlikely to prevent further disintegration both in space and in time.

Why do societies disintegrate?

In this paper I shall try and explain why societies disintegrate. I shall be concerned particularly with pathological disintegration and shall try and determine in what conditions this is likely to occur.

A society can be subjected to many modifications that will adversely affect its capacity for self-regulation, and hence adaptation.

Apart from those that are to all practical extents unpredictable, modifications are most likely to occur during periods of rapid growth.

As such they can be regarded as feedback controls preventing growth beyond the optimum point.

How they operate is best studied at the level of a simple tribal society which often displays a very high degree of order.

I shall take self-regulation as the most important feature of an ordered social system, as it is the mechanism ensuring adaptation to the environment.

Ordered societies do not require any external controls in the form of formal institutions, still less tyrants or autocrats. This in itself makes for greater stability. If a society is controlled by one man, his demise leads to a vacuum which often cannot be filled very easily. If on the other hand, it is achieved by the society as a whole, there is no way of upsetting its organisation save by extermination.

It also means that the society behaves in a way that favours its own interests as opposed to those of one of its parts. In other words the controls are themselves subjected to the control of the system as a whole.

As Lowie writes, "It should be noted that the legislative function in most primitive communities seems strangely curtailed when compared with that exercised in the more complex civilisations. All the exigencies of normal social intercourse are covered by customary law, and the business of such governmental machinery as exists is rather to exact obedience to traditional usage than to create new products."

This essential principle is clearly established by Lucy Mair in her book, *Primitive Government*.

The function of government is assumed by the citizens as a whole. The most important influence is tradition, any deviation from which is severely frowned upon. The ancestral spirits, the council of elders and public opinion in general combine to oppose and chastise any unnecessary departure from the traditions and customary law that are handed down from generation to generation.

Even where there is a king, the latter's authority is still strictly limited.

Thus, among the Ashanti and other West African people, he can be dethroned by a mere show of hands.

The same was true of the Hellenic kings of Homeric times.

The real power did not reside in them but in the "Demouphemos" or public opinion. Later this was institutionalised into the "Demoukratos". The latter without the former as we find in most modern states is of no value save to provide a facade behind which powerful individuals and groups will vie with each other for the real control of the society.

On the other hand, once the society has totally disintegrated, its capacity for self-regulation breaks down.

As Fortes and Evans Pritchard write, "The evidence at our disposal suggests that cultural and economic heterogeneity is associated with a state-like political structure. Centralised authority and an administrative organisation seem to be necessary to accommodate culturally diverse groups within a single political system, especially if they have different modes of livelihood." Indeed only an elaborate bureaucracy run by a shameless autocrat can hope to control a heterogeneous mass of people deprived of a common culture and a sense of duty towards their society.

It is customary today to criticise certain autocratic Governments such as that of the colonels in Greece.



The Gorbals, Glasgow

Photograph: Ken Lambert

Little do people realise that the choice in such a society is not between dictatorship and democracy but between dictatorship and chaos. Democracy in the sense of self-government only becomes possible once the people become bound by a common culture, and once a strong public opinion develops to oppose any deviation from the established code of behaviour.

What is likely to happen during rapid growth of a society that can lead to disintegration, and hence a breakdown in the process of self-regulation?

Let us seek examples among simple self-regulating societies. In Fiji, a tyranny was possible when a chief with limited authority over his people allotted land to refugees fleeing from another locality. These formed a minority that did not belong to the body politic, and who developed personal allegiance to the king, thereby greatly enhancing his prestige and authority and hence his ability to tyrannise his subjects.

Similarly the Emperor Frederick II, hampered by the obedience owed to

the Pope by his subjects, transferred 16,000 conquered Moslems from Sicily to Apulia where they founded a colony, forming a troop directly responsible to him and immune to excommunication.

If a society embarks on a career of conquest and establishes hegemony over alien peoples, the would-be tyrant is then in a position in which he can use any of these alien peoples against his own citizens.

In addition to this, in order to maintain sway over heterogeneous peoples held together by no social bonds, a personality cult is likely to develop.

The king or leader becomes the principle bond holding them together, which will make possible the most autocratic behaviour on his part. The Hapsburg Empire is clearly an example of this.

Also to maintain sway over these people, an army will probably be required, the bigger his empire, the greater the necessity for such an army and the greater the probability that it will degenerate from being a citizen army that owes allegiance to the com-

munity as a whole to being a professional one with allegiance to its leaders only.

This is precisely what happened during the latter part of the Roman Republic and the subsequent Empire. It was this that rendered possible the civil wars between Marius and Sulla and later between Pompey and Caesar.

The emergence of a proletariat

The most common cause of social disintegration and the emergence of an autocracy is the development of a proletariat. In a sense, this is an unsatisfactory term. It tends to be identified with the working class, which is wrong. The latter includes trained people with a definite role and place in society. The proletariat should really be used to designate the unintegrated members of a society. Those parts of a social system that have come into being by multiplication as opposed to differentiation; what Homer called "the tribeless, clanless, hearthless ones."

Plato described the proletarian of a Hellenic city "as he who dwells within

the city without falling into any of the categories of the city, whom one can call neither trader, nor artisan, neither knight nor hoplite, but only poor or indigent”.

The Plebeians originally fell into this category. The history of the Roman Republic is to a great extent the history of the slow absorption of the Plebeians, of their transformation into citizens capable of participating in the government of the city.

However, how little they were integrated to begin with is well illustrated by the story of their mass departure from Rome and voluntary exile to the Sacred Mountain.

They left, “since the Patricians wish to possess the city for themselves, let them do so at their leisure. For us Rome is nothing. We have neither hearth nor sacrifices nor fatherland. We are leaving but a foreign city. No hereditary religion attaches us to this site. All lands are the same to us”.

However, their voluntary exile was short-lived. This structureless mass of people was incapable of creating a city on the model of that which they had left and which was the only one they had known. Consequently they returned to Rome and after many struggles established themselves as citizens of the Republic.

The Plebeians were absorbed, but Rome never succeeded in absorbing the vast mass of slaves and foreigners who thronged to Rome towards the end of the Republic and throughout the period of the Empire, and which undoubtedly caused the disintegration of this great civilisation.

It is the main theme of Aristotle's *Politics* that tyrannies in the ancient world invariably arose as a result of the alliance between the king or ruler and the proletariat against the citizens.

This was so in the case of Pisistratus at Athens, Theagenes at Megara and Dionysius at Syracuse.

A proletariat tends to develop once a city becomes prosperous.

It can thus be regarded as a feedback mechanism preventing the development of excessive wealth rather than too high a population.

The mechanism is simple. With prosperity food can be bought from abroad to feed more people than previously. Starvation no longer exerts a control over population.

People come from the surrounding country to take advantage of the



Back street in Hackney

prosperity. Even if of a different culture, they are welcome, as the developing economy requires cheap and abundant labour.

They may come as slaves as they did to Rome, as peasants from the surrounding countryside to the developing cities of Flanders, Bohemia and Southern Germany during the late Middle Ages, or as foreign immigrants to the industrialised countries of Northern Europe at the present time.

Samuel Dill and Edward Hartpole Lecky make it abundantly clear that Rome, rather than fall as the result of the Barbarian invasions, was the victim of internal disintegration, due to the urbanisation of the yeomanry, and the vast population of liberated slaves and their transformation into a structureless and depressed proletariat entirely dependent upon state welfare for its livelihood and entertainment. Chelod describes the fall of Mecca in very similar terms.

Norman Cohn traces the growth of a proletariat in North European cities of the Middle Ages and the Messianic movements that arose to reintegrate the alienated masses into a new society by providing them with a separatist culture of their own.

Kornhauser shows that totalitarian movements are only possible in societies that have lost their basic structure or mass societies as he calls them.

Autocracy and bureaucracy

Once autocratic government just like any other type of external control is instituted, it tends to perpetuate itself by creating the need for further autocratic government.

It is one of Durkheim's principle themes that a vast centralised bureaucratic machine destroys a society's essential structure and renders it so unstable that it loses its capacity for self-government. He writes, “The social forms that used to serve as a framework for individuals and a skeleton for the society, either no longer exist or are in course of being effaced, and no new forms are taking their place. So that nothing remains but the fluid mass of individuals. For the State itself has been re-absorbed by them. Only the administrative machine has kept its stability and goes on operating with the same automatic regularity.” This must be so as it destroys the spirit of self-reliance, the sense of duty to the community, all the associated cultural traits that together permit social self-regulation.

Societies that over a long period have been governed by an autocracy or a vast bureaucracy must lose the habit of self-government and must thereby be condemned to be governed by a succession of tyrannies from which they become incapable of extracting themselves.

The principle involved is simply the law of economy. A society like any other system will display the minimum size and also the minimum organisation or order necessary to face a given environmental challenge.

Autocratic government reduces the need on the part of a society to furnish any effort. So it simply loses the capacity to furnish this effort.

Welfare does exactly the same thing. Peasant society, as Banfield shows, can only exist because the state provides it with all sorts of services that would normally have to be provided by the society itself and that would force it to organise itself into larger units than individual families.

He writes, "Amoral familism (or oikotelic society as I have referred to it) is not a normal state of culture. It could not exist for long if there were not an outside agency—the state—to maintain order and in other respects mitigate its effects. Except for the intervention of the state, the war of all against all would sooner or later erupt into open violence, and the local society would either perish or produce cultural forms—perhaps a religion of great authority . . . Because the larger society has prevented indigenous adaptation of this kind without making possible the full assimilation to itself of the local culture, the Montegrano ethos exists as something transitional and in this sense, unnatural."

If welfare is pushed further to usurp functions that should be fulfilled at a family level as well as those that should be fulfilled at a communal one, then the family units themselves will tend to disintegrate and the society will become egotelic.

The extended family as Murdock has shown (which may be bilateral, matrilineal, or patrilineal) is a feature of all simple stable societies so far studied by anthropologists.

The nuclear family

The nuclear family made up of two parents and their children is unstable. Thus if one parent dies, the remaining one is incapable of fulfilling all the

necessary functions required to bring up the children. Whereas in the extended family, countless relations are available for this purpose.

The nuclear family is usually a feature of a disintegrating society. *A fortiori*, the one parent family and the isolate can only survive in an environment which does not display sufficient challenges to justify the existence of the larger family group—such as the modern welfare state.

Free education, a free health service and family allowances make it quite unnecessary for a father to struggle so as to be able to cater for the basic requirements of his children, i.e. to fulfil his most basic fatherly functions.

The effect of behaving in a less fatherly manner will be to lead his children to behave in a less filial way.

Creches and nursery schools are available for the mother who wishes to forgo the satisfaction and duty of bringing up her own children, while if she wishes to abandon them altogether, there are institutions to which they can be consigned.

Moreover a highly developed pension scheme means that people do not have to depend on their children to provide for them in their old age, a further disintegrative influence.

It is a serious error to suppose that poverty is the main cause of social disintegration. Thus one of the most apparent features of oikotelic society in Southern Italy is the gloom and general feeling of hopelessness. The Italian peasants refer to it as "la miseria".

Banfield writes . . . "La miseria arises as much or more from social as from biological deprivations. This being the case, there is no reason to expect that a moderate increase in income (if by some miracle that could be brought about) would make the atmosphere of the village less heavy with melancholy. On the contrary, unless there were accompanying changes in social structure and culture, increasing incomes would probably bring with them increasing discontent."

The same is true of an egotelic society.

A slum is a slum

A slum is a slum, not because its inhabitants are poor nor because its housing facilities are bad, though these may be contributing factors. It cannot be turned into a sound and stable com-

munity by pumping money into it, nor by lodging its inhabitants in brand new blocks of flats. These measures by reducing social bonds are in fact likely to do more harm than good.

This tends to be confirmed by the fact that the squatter communities that have appeared in many towns of South America and who live in far worse physical conditions than the conventional slum communities display few egotelic symptoms.

According to Mangin, the squatters establish themselves by taking over empty lots on the periphery of the big cities. If this were done in a haphazard way, they would be driven off by the police, so a sort of military operation is required whereby some thousand squatters take over the lot in one fell swoop under cover of darkness so that when the morning dawns a new shanty town has appeared, too big to be demolished by the police without causing a serious popular outcry.

The city authorities react by refusing to recognise the very existence of the new shanty town. As a result, its inhabitants have to fend for themselves, organise their waste disposal system, police, schools, etc.

For this purpose they form neighbourhood committees in which all participants elect their own leaders and soon develop relatively sound communities that contrast only too sharply with the conventional welfare-maintained slums. As Mangin writes. "Although poor, they do not live the life of squalor and hopelessness characteristic of the 'culture of poverty' depicted by Oscar Lewis."

Welfare is clearly not the only factor tending to reduce the challenges that justify the survival of such essential social structures such as the small community and the family in a stable ordered society.

Modern industry is another. The family in a stable ordered society is an economic unit. People get married because they want children but also because the co-operation of the different members of the family is required for the fulfilment of those tasks necessary for survival.

With the development of modern industry there has been a radical reduction in the number of tasks that have to be fulfilled at the communal level and even more so at that of the family.

The wife no longer has to bake the bread, or tend to the vegetable garden

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nor gather faggots for the fire. Bread, vegetables and any other food for that matter can be brought at the supermarket neatly wrapped in cellophane, and her home will probably be central-heated.

With the proliferation of tinned and frozen foods she no longer even has to do any cooking, an activity which until the last generation, took up most of the time, skill and ingenuity of the average housewife in countries as advanced as France and Italy. Men can open tins and thaw out meat as well as women and the economic necessity for the family unit correspondingly decreases.

The modern dogma that men and women are psychologically if not physically fit to perform the same tasks and the development of an educational system in which women acquire the same information and are provided with the same social and economic aspirations as the men has led to a further disintegration of the family. What bonds are there to hold together two people who both have similar jobs, earn the same amount of money and live in a household in which all the household chores are done for them by big corporations?

Sexual attraction is about all that is left, and in this respect it is interesting to note that of all the 3,000 or so societies so far examined by anthropologists ours is the first in which sexual attraction is regarded as a reason for marriage. It is undoubtedly the most unstable of links, too much so to serve as the principle if not the only bond to a union on whose duration must depend the stability and mental health of any children born of it.

The modern industrial state also favours the disintegration of the family because of the proliferation of communications media which increase the influence of random sources of information to the detriment of the familial ones, in determining a child's moral and intellectual development. Increased mobility also reduces the parents' influence.

Effects of rapid change

Among the most powerful disintegrative forces however are the rapid changes to which our society is being subjected.

It is basically "experience" that the elders communicate to youth, and this is of little value in a changing situation in which the latter's innovative ability is at a premium.

To maintain social stability environmental changes must be kept within certain limits. There is simply no other solution.

This brings us to another consideration. A culture develops as an adaptive response to a specific environment. If the latter undergoes a radical transformation, then the culture is no longer adaptive—and it must itself be transformed. However, for a new one to develop, the original one must first of all disintegrate. Thus religious conversions are usually of a purely "terminological" nature unless the culture of the society to be converted is first of all destroyed. The same is true of a human personality. As Sargent shows, a nervous breakdown is adaptive in that it ensures the breakdown of a behaviour pattern that in changed environmental conditions may no longer be adaptive.

Similarly, during historical times, many societies have disintegrated because changed economic conditions removed their very *raison d'être*.

This was probably the case of the cities of South Arabia after the main trade routes shifted to the Red Sea—also of the Mediterranean maritime cities such as Genoa, Pisa and Venice when trade shifted to the North Sea and the Atlantic.

Our culture developed to adapt our society to industrial growth, which is becoming increasingly less viable, and it may have to disintegrate before a new post-industrial society can hope to emerge.

The Ecologist's Readership Survey

The response of our readers to this survey has been truly magnificent—so much so that we have been overwhelmed, and it has taken much longer than we expected to analyse the results.

Who reads *The Ecologist*? Where do they live? Do they like it? Above all, what do they want and what is *The Ecologist* going to do about it. For full details see next month's issue.

OUTFOX CORPORATE AMERICA! *

Tired of seeing pollution belch from factories and their products? Industry talks a good clean-up in its advertising, but real changes are not happening. Environmental Action believes that citizens can pressure corporations and other institutions into controlling pollution. One Kane County, Illinois citizen, who calls himself the "Fox", is using creative tactics which have included:

- dumping the effluent of a corporation on the white rug in the lobby of its headquarters.
- hanging from a railroad bridge a 60-foot banner which read: "We're involved — in killing Lake Michigan, U.S. Steel."
- sticking labels on bars of soap in supermarkets all over the country which read: "Armour Dial pollutes our air. Armour Dial pollutes our water."

And he's not alone. Other citizens have taken the initiative by:

- dyeing the effluent of a factory red so that people can see how far it travels.
- attaching stickers which mark products as "Ecologically Superior" to their competition.
- cutting down illegal highway billboards.

These actions have inspired Environmental Action to launch a national Ecotage Contest to develop new tactics which can persuade corporations and other institutions to stop polluting, exploiting, or otherwise threatening the survival of life.

Ecotage

eco-tage (ë'-ko-tazh or ë'-ko-tazh), n. [MnE. *ecology* and *sabotage*, from Gr. *oikos*, a house, and *logy*, to study; and *saboter*, to damage machinery with wooden shoes], the branch of tactical biology that deals with the relationship between living organisms and their technology. It refers to tactics which can be executed without injury to life systems.

Rules

- o entrants may submit more than one idea
- o all entries must be typewritten, double-spaced
- o more than one person may work on an entry, but only one representative can receive the award
- o entries may be submitted with a pseudonym
- o all submissions become the property of Environmental Action and may be reproduced by the organization
- o contest void where prohibited by law

Prizes

1 FIRST PRIZE

a trip to Washington, D.C. to receive the "Golden Fox" trophy on national television.

3 SECOND PRIZES

an ecology library compiled of the 15 most important books on ecology published during the year

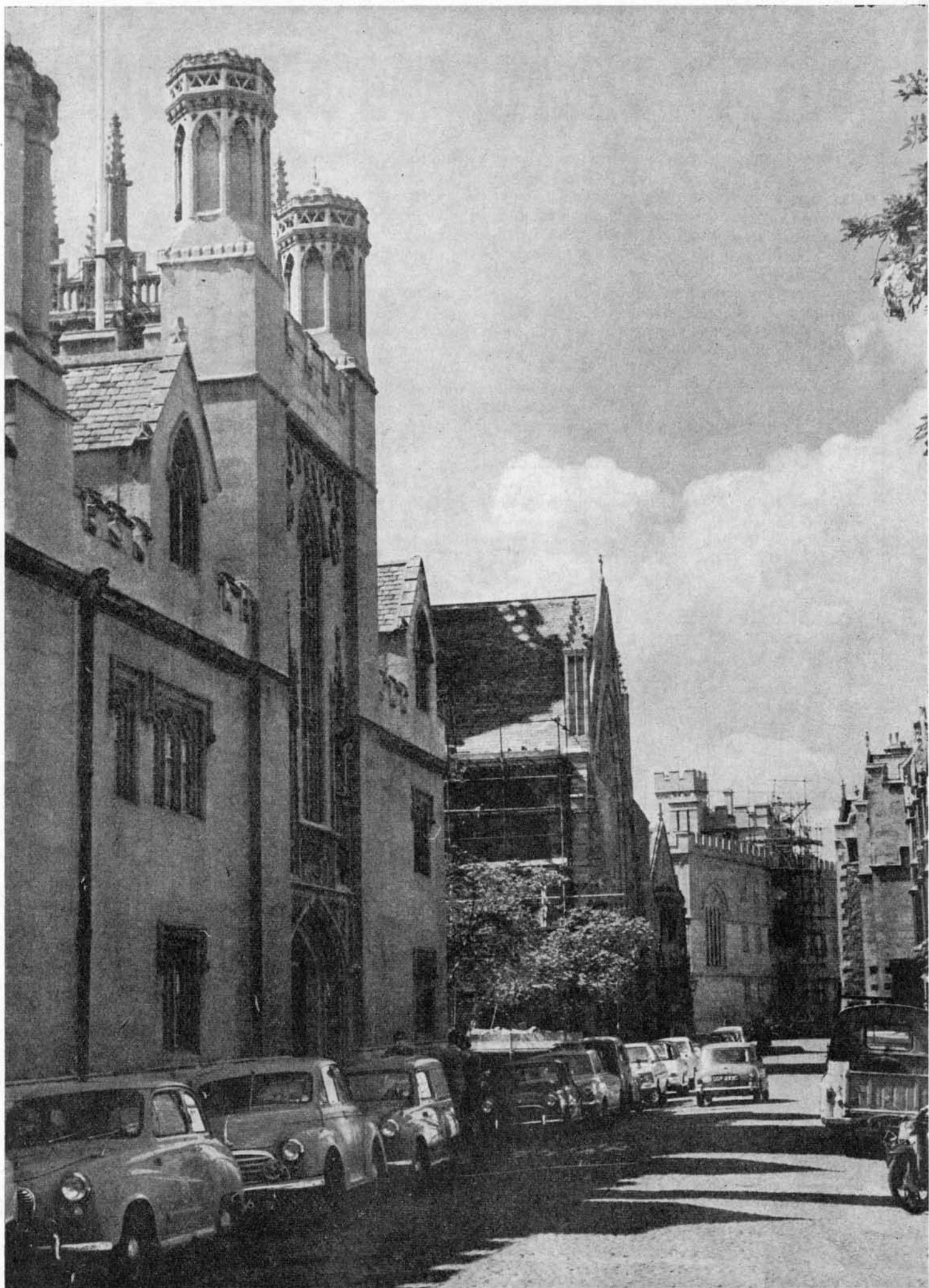
10 THIRD PRIZES

one copy each of *Profiles in Corporate Irresponsibility* and *Earth Tool Kit*

Stop lamenting and start thinking of effective tactics to combat environmental damage! Entries may range from simple ideas which embarrass corporations to more complex plans for stopping corporate irresponsibility. Tactics will be judged on creativity and feasibility. Contest entries should be mailed to Ecotage, Environmental Action, Room 731, 1346 Connecticut Ave. N.W., Washington, D.C. 20036 no later than September 1, 1971. ◀



* and Britain! Also open to residents of the UK.



Has Oxford a future?

by Helen Turner

Oxford, like most of our cities, is being ruined simply so that more and more motor cars can be accommodated.

If this process goes on much longer it will become uninhabitable, as is rapidly becoming the case with most urban areas in the USA. It is time our Government realised that—regardless of the ingenuity of our planners—there is a limit to the number of cars that can be introduced into this small Island, and that this limit has probably been reached already.

Oxford's classic way of dealing with a problem is to defer it. There is wisdom in this, for many problems do disappear or solve themselves with time. The City's traffic problem has not been so obliging. Ever since the now famous Christ Church Meadow Road was first proposed by Dr Thomas Sharpe in 1948, the need for a southern relief road for Oxford, and the best route for it, have been under discussion. The latest of a series of public inquiries into amendments to the Oxford Development Plan has just finished. All the old arguments have been dusted and displayed. The novel element at this year's Inquiry has been the "people before cars" lobby, whose arguments are outlined in the Oxford Civic Society's booklet *Let's LIVE in Oxford*.

The 25-year long progression from Sharpe's decorous Merton Mall, through Buchanan to the present plan for 8 miles of urban motorway within the city limits shows very clearly the rise to power of King Car. Do we submit to this tyranny, or do we act to preserve the environment of our towns? The decision must be a national one,

but the microcosm of Oxford serves to highlight the problem.

Most of our ancient cities are built to either a cross or a wheel pattern. Oxford has a central cross, Carfax. All the radials serving this central crossroads, which is the hub of both the city's commerce and the University, are overloaded, but the problem is most acute to the west. Here the spread hand of roads serving industrial Cowley, Headington, Marston and Iffley all converge on the slender wrist of Magdalen Bridge and the admired High Street. For long the port glasses in the senior common rooms of Magdalen, Queen's and University Colleges have tinkled to the thud of passing traffic. Now there is real danger that the college structures will be irreparably damaged by constant vibration. To save the High Street and Magdalen Bridge, the obvious route is to the south, where, beyond the university complex, are open meadows and the river Thames.

But other factors are also important in assessing Oxford's traffic situation. The city is completely encircled by a ring road, which is nowhere further

than 3 miles from the centre. Congestion on the radial roads is worst, as one would expect, during the morning and afternoon rush-hours, but traffic surveys have established that commuters are responsible for only 40 per cent of car movement; the remaining 60 per cent consists of car journeys within the city. Public transport in Oxford is the monopoly of the City of Oxford Motor Services Ltd., a subsidiary of the National Bus Company. Largely due to delays caused by traffic congestion, the bus service is generally considered unsatisfactory. The City Council is building a large new shopping centre, the Westgate, in a central position to the south-west of Carfax, and has plans to develop other parts of St Ebbe's commercially.

In 1965 the City Council approved the original plan for a south relief road through the meadows between Christ Church and the river, despite the

Opposite: Merton Street, Oxford

*Photograph by courtesy of James Stevens
Curl*

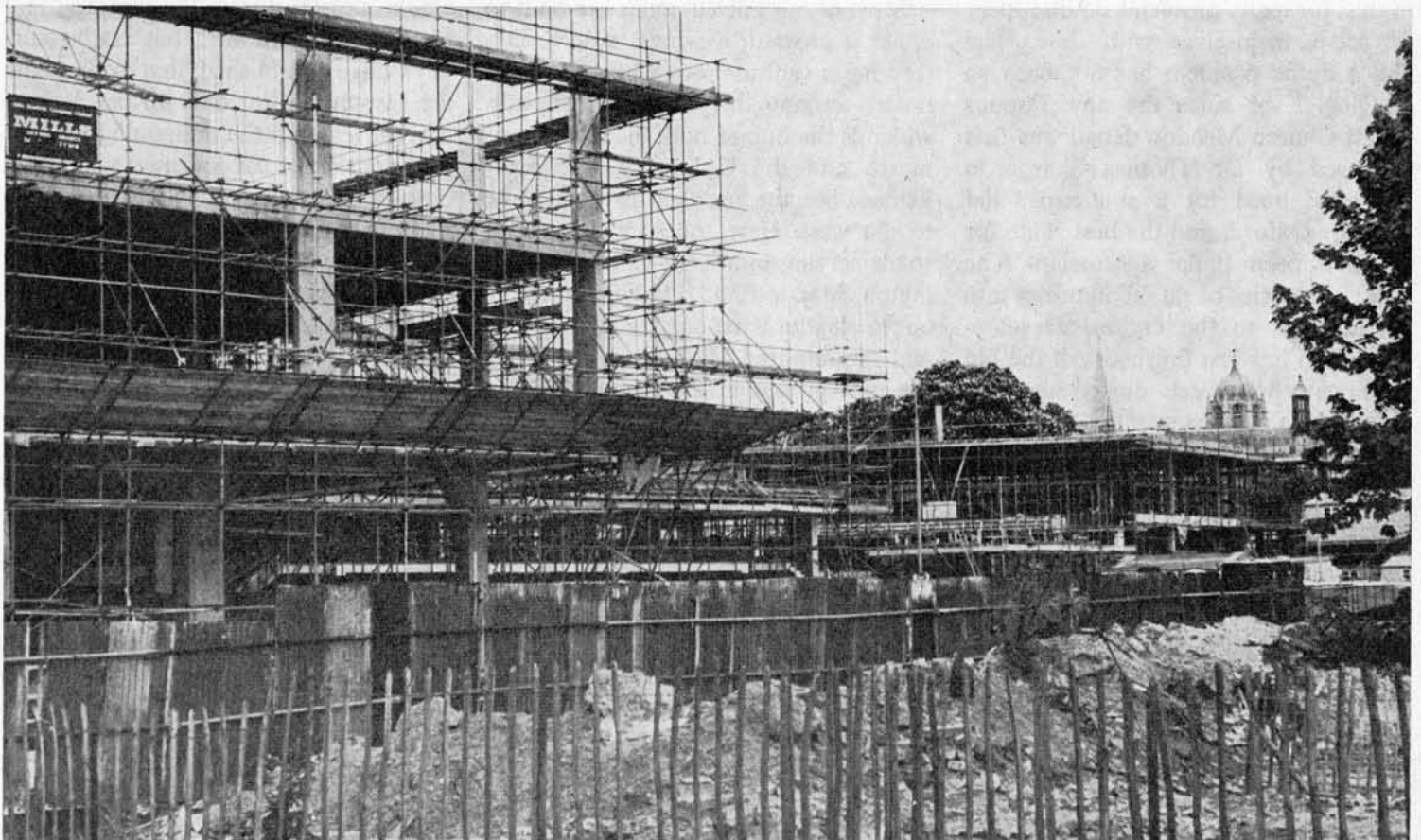
relief road, known as the Eastwyke Farm Route, which takes a line further south than the Meadow, but cuts through south Oxford and Hinksey Park to link St Ebbe's with the bottom

Destroyed by roads

Since the 1940s, it has been assumed that road building is the only possible solution to Oxford's traffic congestion. The Consultants' brief was to save the

actually demolished to provide the carriageway are only a small part of the total devastation. The fumes and dirt, above all the noise, cut a far wider swathe along which property is blighted.

St Ebbe's Oxford—Westgate Centre under construction, Tom Tower, Christ Church in background
 Photograph by courtesy of G. L. E. Turner



Planners and councillors describe the areas affected as "of little architectural merit", and talk glibly of re-housing. But if the near-in residential districts are destroyed, and their inhabitants moved further out, this merely generates more traffic. People, strangely enough, like living close to the centre of a town, and find nothing wrong with these sturdily built Edwardian terrace houses. Property in Grandpont and Jericho is much sought-after, and these areas have a community life and spirit which have yet to mature in the new estates of Rose Hill and Blackbird Leys. Sociologists are not popular at public inquiries. Their reports of mental disturbance caused by the uprooting of communities are dismissed as subjective and sentimental. Could this be because what they are saying is too true to be palatable?

The right of people to enjoy their homes in quiet, to walk about and see their children play in safety, is subordinated to the right of a minority to drive their cars when and where they want. In 1966, 46 per cent of Oxford households had no car. The average car is in use for about 2 per cent of its life. Car occupancy in Oxford, I quote from the Consultants' Report, is 1.58 persons per car on average. The logical conclusion of these facts is not to build more roads, but to devise some mode of movement better suited to an urban environment, and indeed one which makes more sense economically.

The consultants and (following them) the City Council, believe that the public would refuse to accept stringent restraint of the car, and that the decline of public transport is bound to accelerate. This view, however, is not supported by any local evidence. The consultants' report includes no research into the wishes and ideas of Oxford ratepayers. A recent 3,500-signature petition asking the Council to reconsider the extension and improvement of public transport before committing the city to the expense and disruption of new roads has been officially ignored on the grounds that it was conducted by amateurs, and that "people will sign anything". When the consultants' report first appeared at the end of 1968 a number of public meetings were held in affected areas to discuss its implications, and an admirable digest appeared in the local press. These measures were considered adequate by the City Council to ensure that Oxford citizens know

what is being planned for their city, and at what expense. In fact, the vast majority of Oxford people do not understand what is being planned and have no idea of the effect of the plan on the City's finances.

Other cities with major reconstruction plans, Leicester for example, have produced simple, written outlines of the proposals and made them available to the public at libraries and council offices. Another method of informing people about major planning development would be to send literature with the rate demands, which would ensure that all ratepayers at least, were properly informed. The *Central Area Study* is a long, technical document that costs £3. These considerations limit it to a strictly professional market. Oxford City Council is guilty of a serious failure in communication, since full knowledge of what is involved by all residents is the only satisfactory basis for the adoption of a plan which so vitally affects the life of the city.

The modal split

The crucial factor behind the consultants' report is what planners call "the modal split"—the division of total travel between private and public transport. The whole purpose of a transportation plan involving major new road construction is the assumption that car usage will continue to increase sharply, and that little can, or should, be done to stop it. If, instead of this, the assumption were made that the car is destructive to urban environment, and that strong measures are needed to protect that environment, then an entirely different type of plan would result. This is the basis of the attack made on Scheme Doxo by the Oxford Civic Society and other objectors at the 1970 Public Inquiry.

It will take 20 years to complete the road building described in the scheme; not for about 10 years will any benefit be experienced from any of the new roads. The consultants themselves, therefore, have postulated an interim stage when restraint of the car will have to be extremely strict. What they have failed to realise is the potential of public transport, since their Scheme X leaves Oxford's bus service very much in its present state. This failure is curiously old-fashioned, in view of what the government White Paper, *Public Transport and Traffic*, has to say:

"All the studies so far, from the

Buchanan Report onwards, suggest that our major towns and cities can only be made to work effectively and to provide a decent environment for living by giving a new dynamic role to public transport, as well as expanding facilities for private cars. Unless we recognise this, we shall pull down the centres of our towns in an attempt to get rid of congestion; and at the end of the day we shall find congestion still with us, and the character of our towns destroyed." To build new roads leading to central car parks may relieve congestion for a time in the older streets. But if American experience teaches anything, particularly the horror of Los Angeles, it is that the number of cars will always increase to fill the roads provided. The basis of an urban transportation plan today must be restraint of the car and the extension of public transport, *and not primarily major road building*. The obvious corollary to this is that car parks must be at the end of the city, not in the centre. Mr Leslie Smith, General Manager of Leicester City Transport, who is the pioneer of the "Park and Ride" experiment, believes that in 20 years every city will have to make use of this now controversial scheme.

It would be absurd to suggest that, with only 40 per cent of car movement caused by commuters, Park and Ride is the complete answer to Oxford's traffic problems. It would, however, help tremendously to relieve pressure at the peak hours. Other measures would have to be considered to reduce car usage within the city. Traffic management to give buses priority over the car on a big scale (as in Reading, where bus usage has risen dramatically), must be courageously implemented. Other possible ideas are routed taxis, mini-buses within the central area, and extended and simplified car hire facilities. The great advantage of such experiments is that they are reversible. If they don't work, something else can be tried. A road, once built, is there for good.

People are at last beginning to put a value on environment—something no less real because it cannot be assessed statistically. The Oxford Civic Society was started a year ago. It is one of many pressure groups forced into existence by the realisation that the fabric of urban life is under threat. It remains to be seen whether we have woken up too late—whether we have indeed missed the bus.

The man who sued the Torrey Canyon

by Edward Owen

One of the only three private individuals to sue the owners of the *Torrey Canyon*, 51-year-old Lt. Col. Patrick Wootton, has received £750 "ex gratia compensation" for the damage caused by oil from the wrecked tanker to his private island of Lihou, off Guernsey, in the Channel Islands.

Col. Wootton, who filed his claim in the US courts along with those of the British and French Governments, fought long and hard to get the Barracuda Tanker Corporation to accept liability for "loss of amenity", especially the harm done to the island's marine life, but the shipowners were only prepared to take account of the cost of clearing the oil. Nevertheless the colonel feels he has won a small victory. "I hope that what I have done will encourage other individuals to fight this menace and not be daunted by the powerful interests of big business."

Oil from the *Torrey Canyon* reached Guernsey on 6 April 1967. Col. Wootton crossed the mile-long causeway to Lihou at the next low tide and watched helplessly as the slicks approached his 50-acre isle. "Soon a wide expanse of shoreline was thickly contaminated with a purplish-brown

mass of foul-smelling crude oil," he recalls. "We found razor-bills, cormorants and other sea birds smothered in the stuff and very few survived."

Few men could have been more distressed and angered by such pollution than Patrick Wootton because his whole purpose in acquiring Lihou six years previously had been to make this wild, uninhabited island the centre and symbol of a new youth project—one aimed to giving young people "a more balanced sense of values and a more constructive pattern of living by awakening them to the significance of their natural environment".

By 1967 the Lihou Youth Project was in its third year and several camps had been held there for young people aged from about 17-22. In line with the project's "three-S" slogan—"a spiritual outlook to life, a scientific interest in life, and a sociological responsibility for life"—members had combined swimming and rock-climbing with studies of sea, bird and plant life, work on an experimental weather station, entomology, geology, astronomy, and an archaeological excavation of the site of a ruined Benedictine priory. For most of them it had been much more

than a camping holiday in the Channel Islands. As one young man put it on a prose-poem he wrote on his return home:

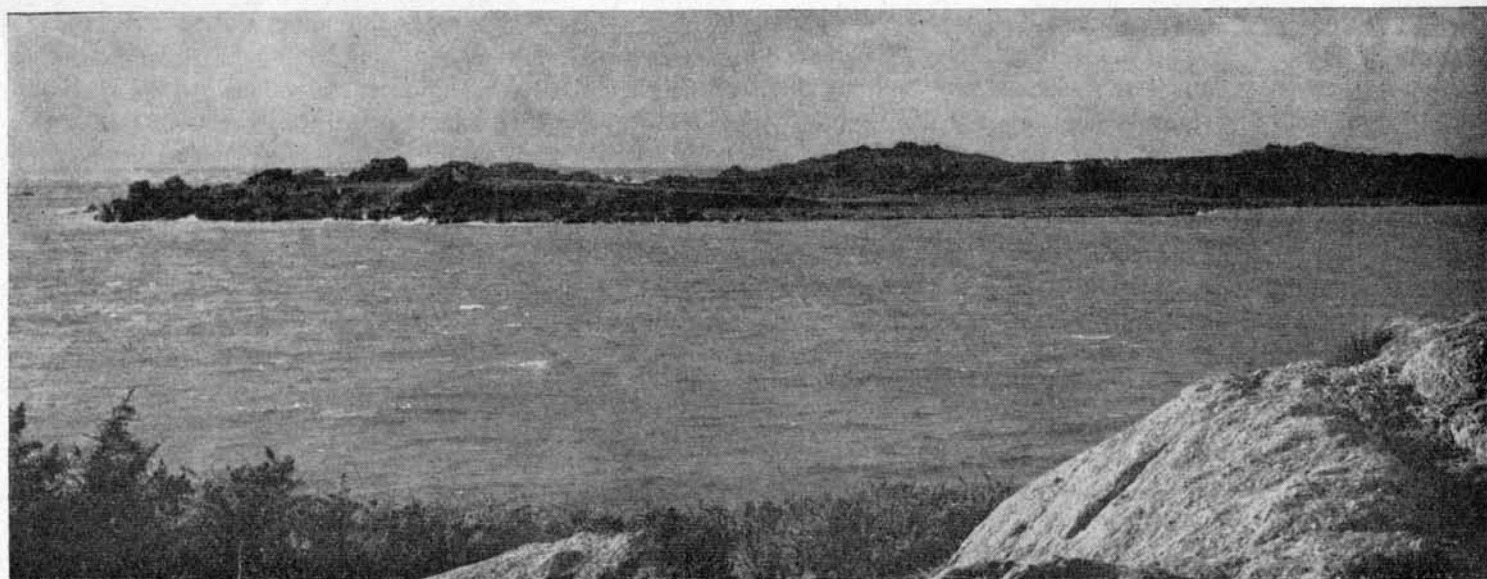
"I slow, I stop, I think and remember the simple peace of an island paradise, and I can live, once more."

So Patrick Wootton was not the man to take oil pollution lying down. He told local reporters at the time: "This business is an affront to nature and humanity. Unless we take a stand now, everything that makes life worth living will be destroyed." He was fully prepared to fight the case against the Barracuda Tanker Corporation in the American courts until the Treasury Solicitors in London persuaded him that the legal costs would be prohibitive. He then pursued his conservationist claim in lengthy correspondence with the shipowners' London solicitors, arguing that it was "unreasonable and illogical" of their clients not to accept liability for the damage done to Lihou's marine environment. Out of the compensation he finally received he has given £300 to the funds of the Lihou Youth Project.

Col. Wootton admits that he often finds it difficult to put the aims of his

The island of Lihou

Photographs: Carel Toms, Les Pages, Guernsey



project into words, partly because there is a strong mystical element in it. It began when he and his wife first saw Lihou in 1959 and learnt that monks from the Abbey of Mont St Michel had founded a priory there in the 12th century. The colonel had a vision of Lihou as a 20th century spiritual oasis helping to preserve civilised values as the Benedictine monks had done in their age. In 1961 he completed negotiations to buy the island, sold a large poultry farm he owned in Sussex and moved with his family to Guernsey.

Since then the colonel's ideas have developed considerably and he now sees spiritual values as inseparably linked with concern about man's natural environment—and, conversely, the conservationist cause as requiring a religious driving-force. "To rid the earth of physical pollution one must eradicate the spiritual pollution in man's heart and mind... A very large number of young people are groping about in a totally artificial and unbalanced environment." By bringing selected young men and women to Lihou and giving them a new set of experiences, he hopes not only to start a reorientation of their own lives but also to inspire them to lead groups of other young people in the same direction.

A well-to-do farmer and property owner, Col. Wootton has the money to act on his belief that small, unspoilt islands can be centres of re-education in the modern world. In 1969 he bought a second island to extend the project—80 acre Cruagh Island off the Connemara coast of Eire. It is quite likely that he will buy others; last summer he was considering buying an island off Madeira as a wild life sanctuary.

Some people take the Lihou project for a sort of Outward Bound movement or as an exercise in muscular christianity. The colonel himself certainly takes his stand on christian principles, though in an ecumenical spirit; but in fact there is little in his approach that would deter an open-minded buddhist—or for that matter an agnostic. In effect, his work is a small experiment in human ecology, an attempt to produce balanced human beings who can live without destroying each other or their environment.

About 400 young people from the UK and several other countries have so far visited Lihou and Cruagh, and the effect on some of them has been

profound. One 18 year-old girl fainted three days after arriving on Lihou and explained afterwards that it had been the sheer shock to body and mind of finding herself in such a peaceful, unspoilt place, and among people who had the time to reflect and discuss, after being numbed for so long by life in a big block of flats in a Midlands town.

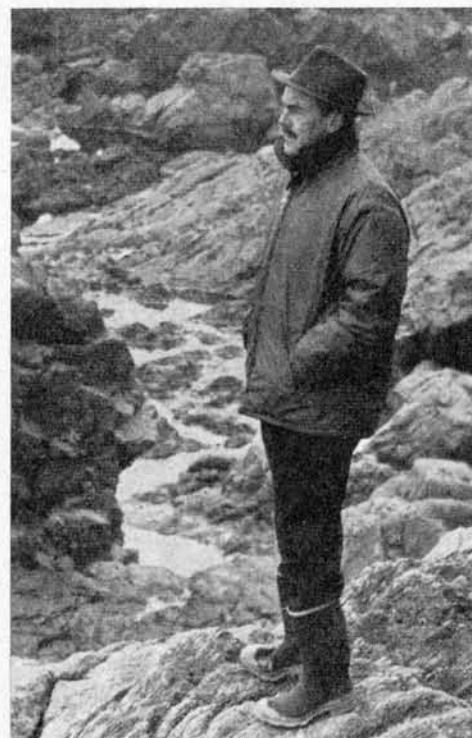
Most of the members have kept in touch with Col. Wootton and their letters seem to bear out his belief that the idea of a sanctuary is psychologically important to people living in a noisy, bustling man-made environment

—that though no man is an island every man needs at times to retire to an island, even if it is only a quiet corner in a city park. As one member wrote: "When we go back home we should not look on this island as a type of paradise and all of men's inventions as noisy ugly machines that the world would be better without. One cannot turn the clocks back and the world is always progressing, and as it progresses man will invent more machines, build newer and bigger cities—and this is the place where we have got to learn to lead balanced lives."

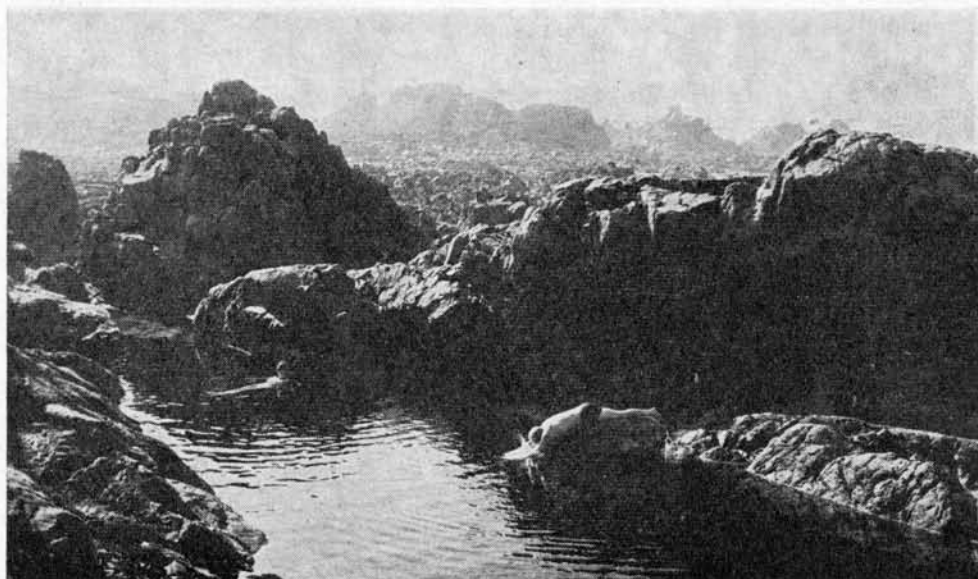
The priory ruins, Lihou



Col. Patrick Wootton



Venus Pool, Lihou Island



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Polynesian blood pressure

Ever since the first explorers returned from the Pacific with tales of crystal clear lagoons fringed with palms, and of happy, hospitable natives, the South Sea Islands have had an aura of enchantment about them which Gauguin and the *Bounty* have done nothing to dispel. By all accounts the natives were a remarkably healthy lot—but that was before they came into close contact with European man and his materialistic ways.

Now, if anyone wanted to make a study of typical degenerative diseases, he might well choose to go to the South Sea Islands. So long as he selected his site properly he would find the natives blessed with more than their fair share of the degenerative disorders more commonly associated with an industrialised urban society—obesity, diabetes, circulatory disorders, heart disease and gout, to name but a few.

The susceptibility of the Polynesian peoples to these degenerative disorders is quite extraordinary. New Zealand Public Health figures for example show that Maori women have a three to four times greater chance of dying of a heart attack between the ages of 35 and 55 than New Zealand women of European origin of comparable age.

After completing his medical studies in New Zealand, Dr Ian Prior went to the National Heart Hospital, London, but on returning to his homeland he became so fascinated by the disease patterns in the Maoris that he switched from cardiology to epidemiology. In 1962 he set up a survey of three different population groups on New Zealand Maoris in which he studied the incidence of high blood pressure and of other degenerative disease such as gout and diabetes.

When he pooled the data from the three populations he found the incidence of diabetes, gout and hypertension to be much higher than among comparable European populations in New Zealand. Out of a total of 784 subjects 10 per cent of the Maori men and women aged over 20 had diabetes and 10 per cent of the men aged over 20 had gout.

Could it be that the New Zealand Maoris and the Polynesians in general

had always suffered extensively from these degenerative disorders, and that previous observers who claimed them to be remarkably free of disease were just terribly unobservant? Or could it be that 140 years of "Westernisation" had left its mark on the New Zealand Maoris and on any other Polynesian groups that had come under European domination?

Dr Prior, who is now director of the Medical Unit, Wellington Hospital, New Zealand, set out to find the answers by sailing north to study populations of Maoris living in the Cook Islands.

Rarotonga is the most significant island of the group and in many ways it resembles a pocket size New Zealand. It is not a coral island but has hills and mountains and in parts is fairly fertile; like the New Zealand Maoris, the Rarotongans are somewhat westernised and have a cash economy; on average their incomes are in the range of 150 to 200 dollars a year.

Pukapuka, an island some 730 miles to the northwest of Rarotonga, could not be more different. It is comparatively small, and being a low-lying coral atoll it is not particularly fertile. The main crop is copra which the Pukapukans sell off to boats that call at the island some three to four times a year. The way of life is subsistence, and at most the islanders can expect individual incomes of no more than 30 dollars a year.

While the Rarotongans are conscious of status, and strive to possess land and material goods the Pukapukans lead a far more simple, "communistic" way of life in which the copra plantations are shared by all the islanders and each family collects and prepares copra according to its strength in numbers and ability.

"The difference in health between the two groups of islanders is quite fascinating, though not entirely unexpected," said Dr Prior in a recent interview with *World Medicine*. "If it is not unexpected, it is purely because of data collected from other islands in the Pacific like New Guinea where the natives are still leading their simple, primitive lives and are almost totally free of the afflictions that are most significant in urban, industrial societies. And the natives from such islands are neither malnourished nor die too young to manifest the degenerative diseases. Quite the contrary."

While the Rarotongans appeared to suffer essentially the same cardiovascular and metabolic disorders as the New Zealand Maoris, the Pukapukans were virtually free of vascular disease. Indeed they showed almost no increase in blood pressure with age—a change that is the hallmark of European and American medical statistics. The Pukapukans also had a lower incidence of diabetes and far fewer of them were grossly obese.

Dr Prior, with Drs H. Harvey and M. Neave, and Mr F. Davidson, a nutritionist, examined 471 Rarotongans from the island's main town of Avarua, and 379 Pukapukans. In both groups they selected only those who were aged over 20, and in only those who had lived in the town for 10 years or more. In Rarotonga they got over 95 per cent participation and in Pukapuka 100 per cent participation.

Weight and blood pressure proved to be significant parameters. In Rarotonga the clinicians found 3.7 per cent of the men to be grossly overweight and 21 per cent of them to have a blood pressure of 160/95—a level that was considered to be indicative of hypertension. Among the women they found 25 per cent grossly obese, with 36 per cent having a high blood pressure.

By these standards the Pukapukans were positively healthy. Of 379 Pukapukans aged over 20 only one male was grossly suffering from elephantiasis. Only two per cent of the men were hypertensive. Among the women 2.2 per cent were grossly obese and 4.4 per cent had a high blood pressure.

"Since getting this data we've been trying to unravel the factors that might have led to such big differences between the two population groups. It's not at all easy, but we are coming to the conclusion that diet and physical activity linked in some way to psychical stress probably play a significant part.

"Just take the differences between the women," said Dr Prior. "The Pukapukans are active both in the home and outside where they do a lot of hard work preparing the copra. The Rarotongan women tend to squat a lot of the time chatting weaving and doing needlework, and they eat practically the same amount as the men."

The differences between the female populations are not necessarily anything new. In a health survey of Rarotonga in 1925, a New Zealander, Dr S. M. Lambert noted that the men, as

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well as working hard outside also did a lot of the cooking and the housework. "As a consequence," he commented, "there were rather a fat lot of women, who relatively speaking, have about the easiest time of any womankind I know."

By the same token Dr Prior finds it most significant that in Pukapuka, of the few privileged wives whose husbands were on salaries because they were schoolteachers, radio-operators or policemen, 14 out of 20 were obese compared with only 25 out of 148 women whose husbands were not salaried.

"Contrary to what people in the developed countries tend to think about people living on a subsistence type diet we found no signs of malnutrition among the Pukapukans," said Dr Prior. "But what we did find were substantial differences between the Pukapukans and the Rarotongans in their salt intake. On the whole the Rarotongans ingest twice as much salt as the Pukapukans."

As the evidence stands at present there is a strong link between high salt intake and a high blood pressure. The Japanese suffer *par excellence* from a rising blood pressure as they get older and their food is very salty through being doused with savoury flavours such as soya bean sauce.

Dr Prior and his colleagues found the salt intake and excretion of the Rarotongans to approach that of the Europeans living in the New Zealand town of Carterton. The Rarotongans also had a relatively similar calorie intake.

The Pukapukans, as well as their much lower salt intake, consumed less calories per head, and if their pulse rate was anything to go by, were subjected to less psychical stress. Dr Prior found more than half the men and one-quarter of the women in Pukapuka had pulse rates below 70 per minute. In Rarotonga the proportions were just over the one-quarter and one-tenth for the men and women respectively.

Recently Dr Prior has had the opportunity of making an entirely new study of the Polynesian peoples. Some 300

miles west of Pukapuka there is a group of coral atolls known as the Tokelau Islands. In 1966 these islands were struck by a savage hurricane which did untold damage and made the living very precarious for the overcrowded population of 1,900. The New Zealand Government subsequently set up a voluntary resettlement programme with the idea of bringing up to 1,000 of the islanders to the mainland.

More than 340 of the islanders have already gone to New Zealand and others have stopped off halfway in Western Samoa. These recent immigrants into New Zealand and into the relatively well-developed regions of Samoa make an ideal group for the study of the various social, dietary and medical factors that might have led to the higher incidence of the degenerative diseases among the well-established populations of Maoris in New Zealand and Rarotonga.

In economic terms the Tokeluans lie somewhere between the Pukapukans and the Rarotongans, and they have developed something of a cash economy ever since two Portuguese traders set up shop on one of their islands and acquired land and property. But from the point of view of salt intake, their diet is akin to the Pukapukans.

Dr Prior wonders what will happen to the Tokeluans who are emigrating to New Zealand once they have undergone years of subjection to a consumer society's food and its high salt content. Measurements of the salt excretion of 15 Tokeluan immigrants shows that it has already increased—albeit only slightly.

Dr Prior is now collaborating with WHO in setting up a *Tokelau Islands Migrant Study*. He will be working with two anthropologists from Auckland, Dr Anthony Hooper and Dr Judith Huntsman, and Mr David Boardman of the Department of Social Administration and Sociology, Victoria University Wellington.

One thing that they may well show is that a status-seeking, cash-economy western society may not be as beneficial to a deprived, under-developed people's health as some health-conscious advocates of such a consumer society would like to think.

Peter Bunyard

Environment and birth defects

The gaps in our knowledge about the effect of the environment on the unborn were revealed at the Symposium on the Environment and Birth Defects held in New York City, 27 January, and sponsored by the National Foundation—March of Dimes in association with the Mount Sinai School of Medicine. Considering the wide range of pollutants introduced by man into the environment it is possible that many of these are teratogenic (capable of causing birth defects). However it is difficult to ascertain the effect of pollutants on human prenatal development due to the lack of data showing a direct causal relationship between such chemicals and birth defects. Some of the known teratogenic agents (such as viruses and drugs), mechanisms by which birth defects can occur, and new methods for testing for the teratogenicity of chemicals and for monitoring birth defects were discussed at the symposium.

The question of which chemical agents pose chronic biological hazards was discussed by Dr Samuel Epstein of the Children's Cancer Research Foundation. Dr Epstein listed several categories of pollutants: 1. a naturally found chemical in excess such as nitrates which have been shown to lead to anaemia, brain damage, and even death of infants; 2. synthetic chemicals which may enter the environment as either pesticides, drugs or food additives; 3. pollutants which might develop by reaction of two otherwise harmless agents, e.g., the interaction in the environment of nitrites and amines to give highly carcinogenic nitrosamines.

The lack of direct links between birth defects and pesticide uptake by the mother (via food, air, or water) should not lead to complacency about this potentially large source of teratogenic agents. Such a relationship has been shown for the threatened extinction of the peregrine falcon and the California pelican due to DDT causing abnormal egg shell development.

As the only class for chemicals for which a clear correlation has been shown between use during pregnancy and resulting birth defects in humans, drugs have received considerable notoriety. For example, the thalidomide-caused birth defects show the striking effects that drugs may have on the unborn. Dr Bearn from Cornell University Medical College cautioned that other

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drugs causing less obvious and unusual birth defects might well go unnoticed.

In addition to chemicals as teratogenic agents, certain viruses have been shown to produce congenital defects. Dr John Sever, Head of the Section on Infectious Diseases of the National Institutes of Health, mentioned rubella, herpes hominus, and cytomegalovirus as the three most widely found teratogenic viruses. In addition, the parasite, toxoplasmosis, transmitted in raw meat, also causes birth defects. Only for rubella has the vaccine been found. The other diseases, which are more prevalent in less developed countries, have not been well studied and better means of early detection and preventive vaccine need to be developed.

One of the most prevalent causes of congenital defects is nutritional imbalance in the developing foetus, which was discussed by Dr Myron Winick, Director of the Birth Defects Centre of the New York Hospital. Serious, irreversible damage occurs in the development embryo, especially in the brain, when proper nutrition is unavailable during the most active cell replicating stage. Even if proper nutrition is maintained at some later period of development, the total number of brain cells is less than it would be in a child with normal nutrition during the critical brain development stages and, hence, a brain with subnormal capacity will result. Prenatal development can also be impaired by hormonal imbalances and vitamin deficiencies or excesses which are caused by improper nutrition during pregnancy.

Although there was little discussion of which synthetic chemicals are teratogenic for humans (presumably due to lack of data), the mechanism by which synthetic chemicals could cause birth defects was described by Dr Ernest Freese, Chief of the Laboratory of Molecular Biology at the National Institutes of Health. Congenital abnormalities can arise from changes in the unfertilised egg or sperm cells or from damage to the developing embryo. Dr Freese discussed how environmental agents could act on the growing embryo. Agents such as certain chemicals, X-rays, and ultraviolet light are mutagens because they alter the DNA

(the genetic material) of the chromosomes in an organism.

The stage of cellular determination is the period of post fertilisation development during which a mutation (that is, chromosomal damage) is most likely to cause spontaneous abortion or serious abnormalities which will be present in the newborn infant. During this stage, at about one month after human conception, previously "omnipotent" cells in the embryo become determined, that is, the cells become committed to give rise to specific organs.

One determined cell may yield thousands of progeny cells in a particular organ. A mutation occurring in such a cell during determination can therefore be reproduced through the organ rendering the whole organ abnormal. Before determination if one cell is injured via mutation another is often able to take its place in development since the role of each cell has not yet become irreversibly fixed.

If a mutation is present in the germ cells of the organism, then it is possible for a congenital abnormality to be transmitted from offspring to the offspring's progeny and, in this way, even affect future generations. Therefore, mutagens are potentially more serious inducers of birth defects than are other types of agents which can affect only one generation at a time.

In order to limit man's exposure to possibly teratogenic agents, Drs Freeze and Epstein urged that new synthetic chemicals be carefully tested for their mutagenicity as well as for their toxicity. Those which are shown to pose a significant threat to health should be eliminated from the environment. A mutagenic agent which causes damage to one in a thousand humans would be considered highly dangerous; however, to test for such an agent either enormous numbers of laboratory animals must be used or very high doses of the chemical have to be administered to the animals. Pregnant laboratory animals can be used for testing compounds for teratogenicity but such work is quite costly and difficult. Since current screening practices for teratogenic agents are often inadequate, new methods were suggested.

As a relatively inexpensive although incomplete screening procedure for chemicals that cause birth defects, Dr Freese mentioned studies of bacterial spore formation in the presence of possibly teratogenic agents. A promising

experimental system for testing agents in foetal mice was discussed by Dr Maimon Cohen, Director of Cyto-genetics at the State University of New York at Buffalo. A technique for extra-uterine fertilisation of mouse egg cells was developed. The fertilised eggs are allowed to grow to the blastocyte stage at which time they are reimplanted in a pregnant female mouse and, eventually, are born as normal baby mice. This procedure allows direct treatment of the embryo with chemicals and an accurate study of the effect of such treatment on the developing embryo. It is limited in that treatment can only occur in early stages of embryo development.

In addition to laboratory testing of teratogenic agents, careful monitoring of birth defects in newborn infants was advised by Dr Peter Workman of the Mount Sinai School of Medicine and Dr Ernest Hook of the New York State Department of Health. In order to assess the geographical distribution or other patterns of congenital abnormalities, the use of new techniques for identifying birth defects and more thorough recording of such abnormalities were suggested. Dr Workman reported that infants with less obvious birth defects might be identified by unusual fingerprint patterns or characteristics such as atypical head size, which can reflect congenital abnormalities. Precise methods for detection and measurement of birth defects are necessary in order that correlations between the use of environmental agents and subsequent abnormalities in human populations may be made.

The body has a remarkable ability to survive the environmental insults with which it is faced through such defence systems as chromosomal repair and partially impenetrable cell membranes. However, as Dr Epstein cautioned, man's natural detoxification systems may become ineffective against the new types of synthetic chemicals as well as the increasing amounts of naturally occurring compounds introduced by man into the air, water, and soil.

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Towards a unified science

The influence of words on the study of religion

The terms which we use for classifying religious systems such as Christianity, Buddhism, Islam, Judaism, etc., are so firmly entrenched in our minds that we do not consider the possibility that they might not provide us with the best means of classifying religious behaviour. A Christian is considered to be one who worships a particular God. To this God is attributed some sort of reality, or identity, which differentiates him from other Gods. Thus the God worshipped by Christians is taken to be the same one previously worshipped by the Jews and in particular those of the Southern Kingdom of Judah and if one looks still further back, it is probable that he can be identified as the God of a tribe of Bedouin called the Kennites in the Sinai Desert.¹ However, it must be clear that this God meant something very different to the people who worshipped him. Thinking and perceiving involve building models and, as we have seen, an infinite number of models can be built to explain the same situation. We must therefore expect different people to perceive a given symbol in a variety of different ways in accordance with the different roles such a symbol plays in their general systemic model. In this respect it is particularly interesting to note the different meanings attached to the symbol of the moon by the ancient Egyptians in terms of their Pantheon. According to Henri Frankfort², the moon could symbolise very different things, such as, the eye of Horus, a manifestation of Osiris, the God Khonsu, Thot, the Scribe of the Gods, and the Goddess Nekhbet, according to the circumstances.

In the same way, "God" means something very different to different peoples. To a Japanese he is above all the supreme ancestor. To the early Christians he was undoubtedly a big anthropomorphic father. To the Jews

of the Old Testament he was a strict, cruel and jealous supertribal chieftain. To the educated Christian of today, he is an undefinable and abstract force. If people refer to their God by the same name, and generally use the same terminology in describing their religious practices, the tendency will be to classify them all as belonging to the same religion. It is clear, however, that this would not provide one with any information that would be of use save in a strictly theological context. What is more interesting than the name given to a God or to the religion of his adepts is the psychological function fulfilled by his worship, and the sociological effects of worshipping him in this manner. It is in these functional terms that religions should be classified.

Thus if we examine the different groups that describe their religion as Buddhist we find that they have very little in common. Hinayana Buddhism still represents today the closest approach to the Buddhist message as it was originally preached. When Buddhism spread to Japan it had to be modified totally for it to correspond to the psychological requirements of the Japanese feudal state. Thus there developed a religion known as Zen Bushido which was very similar to the traditional religion of the Japanese, but which maintained a Buddhist terminology. Another form of Buddhism is Anidism, a sort of Messianic cult that fulfils the requirements of an oppressed and downtrodden proletariat particularly well. Tantric Buddhism is again totally different; it has particular mystical magical and sexual practices which render it behaviourally very similar to the cults of Attis and Cybele during the third and fourth centuries of the Roman Empire. Tantrism is a form that Buddhism has taken in Mongolia and Tibet.

What do the different cultures have in common?

Behaviourally the answer is—very

little; but if one applies the subjective classifications which they themselves apply, quite a lot. They all consider themselves Buddhists, and when the great Buddhist Council meets in Rangoon each one of these diverse cultures is represented.

What we have said about Buddhism can just as easily be said about Christianity. The different religious sects that call themselves Christians have little in common save their terminology. The Anglicanism of the educated Englishman is behaviourally as distinct from the revivalism of the West Indian Holy Rollers or the Catholicism of the Sicilian peasants as it is from Chinese ancestor worship and Mahometan Sufism. Everywhere we find Christian religions fulfilling totally different psychological and social functions.

Thus Catholicism has been, particularly in the last century, the religion of the establishment in those countries officially labelled Catholic. It has embodied the doctrines justifying the status quo, and has served as a strong force against social change.

Clearly this was not the role of early Catholicism, which was first developed in the Roman Empire as the religion of the starving city proletariat and the mass of alienated slaves.

In the kingdom of Ruanda, Catholicism was adopted for the purpose of providing a doctrine to hold together the Hutu revolutionaries against abusive Tutsi rule. Here Catholicism is again playing a different role as a Messianic cult more akin to its original one than present-day Catholicism.

In Burma we find the Karen and Shan minorities being converted to Protestantism to affirm their national existence against the Burman Buddhist majority.

In the 10th century certain tribes in west Mongolia were converted to Nestorian Christianity as a means of distinguishing themselves from their

compatriots of the Central Plains and from the Muslim Arabs who were pressing them in the south.

However, perhaps one of the most illustrative cases is that of the conversion of the Chinese to Christianity in the 16th century when the Jesuits began to preach the gospel in China³.

To begin with they had absolutely no success with the educated Confucian Chinese who were particularly shocked by some of the basic dogmas of the Christian religion which just did not fit into their scheme of things. The notion of original sin they found absurd and even immoral; the low social status of Christ himself they also found unimpressive. After a period of open hostility, the Jesuits solved the problem by adapting the gospel to the Chinese requirements. A new gospel was written which made no mention of original sin. Christ suddenly became the son of a Prince, instead of a carpenter, and certain Confucian maxims were introduced into the New Testament. As a result, quite a large number of Chinese were converted to the new religion.

Let us consider what in fact occurred. Is it legitimate to say that the Chinese

were converted to a new religion? The answer is "Yes" if by religion we mean a terminological system; and "No" if we mean a behavioural pattern, since it is clear that Confucian ideas of morality survived this conversion with only minor terminological modifications.

The question is why did they elect to be converted in the first place? In this case it is probably because they associated the Christian religion with certain characteristics of the Jesuits that they admired. For instance, the latter were very advanced in mathematics and technology, and it was due to them that the first imperial Artillery was built up which proved decisive in enabling the Chinese to stop the advance of the Russian troops in the Anour in the 17th century. The Jesuits' ambition appeared to be to obtain an important political influence in China so as to lead the Chinese Empire to attack the Turks. In this respect they were thwarted by the Pope, who hearing of their "heresy" from certain Italian merchants returning from China, ordered them to renounce it forthwith. New missionaries were sent to replace them, and when the latter presented the normal Christian

gospel, not only did conversion cease, but most of the Chinese converts reverted to their original religion.

To refer to middle class citizens of Baltimore, the proletariat of the Roman Empire, Sicilian peasants and Hutu revolutionaries as Catholics; to English country squires, and Karen and Shan revolutionaries as Protestants; to the 10th century west Mongolian tribes and the 17th century Chinese converts as Christians, conveys very little information about them.

The names they happened to give their Gods, and the terminology used to describe their religious practices, are irrelevant to a behavioural context in which religious movements must be classified teleonomically in accordance with their function at different levels of complexity, i.e. the individual adept, the family, community, and eco-system.

Edward Goldsmith

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Down to Earth



by Lawrence D. Hills

Valley of a thousand hopes

The Valley of a Thousand Hills, where soil erosion from over-grazing is vastly more important than pollution, is part of the Transkei Zulu Reserve. It is the home of the Valley Trust which is of still greater importance to the future of South Africa than heart transplants or arms supplies. Here two men of genius, one black, one white, work in partnership to bring hope not only to 35,000 Zulus in a land of drought and malnutrition, but to all who hunger under the sun on bare hillsides that fierce rains tear away.

Dr Halley Stott, a South African who qualified at Edinburgh, began a clinic to serve the medical needs of the reserve in 1951, but found that almost every health problem arose from the Zulu abandonment of their native diet for white sugar, white flour and sifted maize meal. One of his first enterprises was a co-operative mill where the Zulus could grind their own maize to whole-meal, gaining a 317 per cent increase in thiamin, 300 per cent more riboflavin, 100 per cent more niacin, 40 per cent extra fat, 31 per cent more iron, 25 per cent more calcium and 19 per cent more phosphorus from the same yield, than if they had sold the grain and bought back the same weight of refined maize flour.

In 1956 he was joined by Mr R. T. Mazibuko, the son of a Zulu chief, with a missionary agricultural college training but the genius that can adapt and invent as well as the leadership and psychological skill to graft new methods on to rigid customs. One of the many examples of his persuasive ability was the overcoming of the Zulu prejudice against fish, based on the idea that it would turn the courage of their warriors to water.

There is an old Chinese proverb, "If you give a man a fish, you feed him for one day but if you teach him to fish you feed him for many days". If, like Dr Stott and Mr Mazibuko, you teach

him to build small earth dams to hold back the rains in ponds large enough for Tilapia (the delicious vegetarian fish tasting like chunky golden herrings) to breed, you add protein rich in tryptophane, the missing amino-acid to any maize-based diet. There is no refrigerator cheap enough to keep fish fresh for the hundreds of millions of people who live far from the sea in the tropics, but the little ponds of Africa should spread all over the world. The distant harvesting of the sea demands heavy capital investment and transport which pays tribute to industry at every handling, but harvesting the valleys between the Thousand Hills at a cost of their own labour only, has given the Zulus of the Transkei fresher fish than Londoners.

The greatest achievement of the Valley Trust, which describes itself as "a Socio-Medical project focussed upon promoting health", is not the YWCA Branch which resembles an all black Women's Institute run entirely by Zulus, or the YMCA its male equivalent. It is not even the "Food Preparation Unit" where cookery by methods that do least harm to the nutritional value of both native and introduced crops is taught in a rondavaal or native hut using traditional utensils and an open fire. It is the Mazibuko Trench, an invention as important as the Indore compost heap.

From the clinic at Botha's Hill, which had 1,519 visitors in 1969 (47 per cent of them nurses of all colours concerned with the nutritional aspects of health) there is a view across the valley of what could almost be rice terraces in Java. At the right season they are gay with lucerne flowers, for the Valley of a Thousand Hills has no stone to build retaining walls, and the strong web of lucerne roots firmly holds the soil provided the safe angle of slope is not exceeded. In addition to the stroke of genius that used a crop cut for cattle fodder to replace walling stone, Mr Mazibuko and his wife (an SRN Sister at the Clinic) have persevered at chewing the foliage, which is extremely rich in Vitamins A and C, until it has become a popular "salad".

Behind each root-held terrace slope is a trench, cut down into the hillside with native hoes which looked to me like spades set at right angles on hoe shafts, designed for bare feet, unlike our spades and forks, and made from smelted iron as assegais were for centuries before white men came to Africa.

The trenches are about six feet wide and four deep, and filled first with a sprinkling of topsoil on the bottom, then with a foot thick layer of cut grass, millet and maize stems, and all domestic wastes especially feathers and chicken bones from the deep litter poultry units that provide manure for other uses. Everything goes in, even worn out clothing, for Zulus have no plastics or tins and everything they use will decay. On this layer is piled a foot of soil, then a further foot of material and so on until the trench is filled.

On the final capping, heaped high enough to allow for sinkage, Sunn Hemp (*Crotalaria juncea*) is sown and this legume sends its long roots down through the layers where its powerful nodule bacteria release quantities of nitrogen as the foliage is cut for cattle feed. This provides the activator for the underground compost heap and when the rains come, instead of tearing the soil away in gullies or at best growing only a single crop, the water soaks into the trenchful of organic matter where it stays soaked into the sponge of humus for year round production.

The second crop is madumbe, a kind of taro with edible leaves that taste like the expensive potted meat "Gentleman's Relish", and highly nutritious roots, and this is followed by maize, millet, carrots, pumpkins and many native vegetables that crop right through the dry season. An experiment designed and recorded by the University of Natal on 36 replicated plots has established that the system is far ahead of chemical fertilisers without the underground compost, and though these in addition would increase yields by 10 per cent, the original system gains by using nothing imported. It needs only knowledge and persuasiveness to start the Zulus reclaiming their present portion of their own land.

The Mazibuko Trench would work as well in South America, India or anywhere that men must farm dry steep hillsides and eroded valleys. It needs research to find the best local or introduced legumes to hold the slopes and provide nitrogen from the first crop, and the modifications necessary to fit local climate, tools and prejudices. It also needs money to pay for a succession of men like Mr Mazibuko from all the dry and hungry countries of the world, to go to the Valley of a Thousand Hills to learn, and then go home to teach.

Ecotechnics

by Arthur J. Puffett

The water resource alternative

The Water Resources Board (WRB) and the United Kingdom Atomic Energy Authority (UKAEA) have approval to sponsor jointly a one million gallons a day freeze desalination plant to be built by Simon Engineering Ltd at a site near Ipswich, Suffolk. Simon began research and development work on the process in 1962 and since 1965 have worked in collaboration with the UKAEA as part of the national desalination research and development programme. The cost of the Ipswich

plant and a two-year programme of research and development is estimated at £2 million.

Sea water will be abstracted from the River Deben estuary at the rate of four million gallons per day (mgd) from the period three hours before to three hours after high tide and will be pumped to a one million gallon reservoir near the existing Ipswich CBC Bucklesham treatment works. After settlement at the reservoir, water will be taken at a continuous rate of 2 mgd to the plant which is to be erected next to the treatment works. The reject brine stream will be discharged at a constant rate of 1 mgd to the estuary.

The freeze desalination process depends on the fact that ice formed from brine is itself free of salt and operates as follows: a refrigerant, in this case liquid butane, is pumped into a crystalliser containing sea water in which the butane evaporates and ice crystals are formed. A slurry of ice and brine leaves the crystalliser and is

pumped to the base of a wash column. The mixture of ice and brine rises, and the brine drains away. After washing with recirculated product water, the ice crystals are removed at the top of the column and passed to a melter. Gaseous butane from the crystalliser is compressed and fed into the melter, where the ice is converted to water and the butane condenses. The liquid butane is separated and returned to the crystalliser and the product water is passed through a debutanising process.

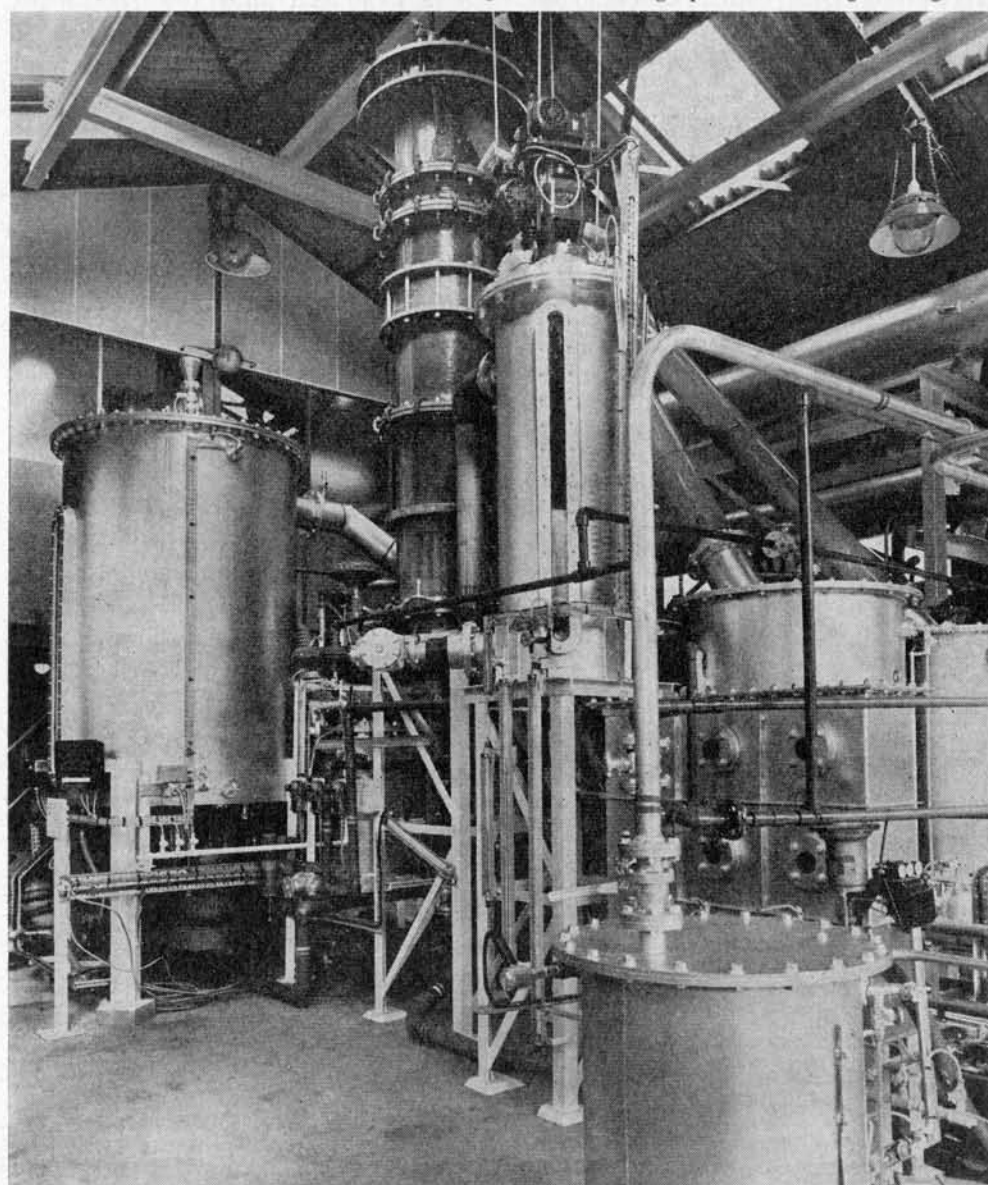
Simon Engineering have worked on the freeze process since 1962 as part of their own research and development programme and initially operated a 100 gallons a day experimental unit. An appraisal of desalination processes by the United Kingdom Atomic Energy Authority in 1965, showed that the freeze process had many potential advantages and a programme of theoretical and experimental studies was therefore initiated. A crystalliser and wash column, two critical parts of the plant, equivalent to a capacity of 700 g/d were constructed at Harwell and were run on a closed water cycle. The object of this work was to determine the factors affecting ice crystal formation and wash column operation. Other experimental work indicated that butane was likely to be economically removable from the product water to render the water suitable for the public supply.

In July 1966 the UKAEA awarded Simon a study contract for the design of a 5 mgd freeze desalination plant, and the result of this was sufficiently encouraging for the research effort to be intensified. Simon and UKAEA entered into a collaborative research and development agreement and Simon have built an experimental plant of 10,000 g/d capacity at Stockport. The experimental plant is so designed that the main process units (crystalliser, wash column, melter and decanter) can be studied independently.

The 1 mgd plant at Ipswich is the next step in the further development of the process. The plant will provide a demonstration of the integrated performance of the main plant items in open cycle operation.

The WRB Report on desalination published in 1969 (HMSO), indicated that desalination plants operated at base load were unlikely to be competitive with conventional supply. The use of desalination plants at low load factor in conjunction with existing reservoir

10,000 gallon a day freeze desalination plant Photograph: Simon Engineering Ltd



supplies has been shown to provide additional water to meet periods of severe drought at costs much below base load operation. More recent studies have also indicated that desalination plants operating at higher load factors can provide cheaper water in areas where reservoir construction is expensive and the projected water demand growth rate is low.

In 1969 the UKAEA advised the WRB that the cost estimates contained in the Simon 5 mgd design study for the freeze process were likely to be substantiated by further work and that the successful operation of the 10,000 g/d experimental plant gave sufficient confidence to move to a size of 0.5 or 1 mgd. Accordingly the Board's staff made a preliminary assessment of the potential for the process in this country.

One situation was identified (Ipswich) where a new source of water was required and Ministerial authority to construct a conventional reservoir scheme (Tattingstone) was shortly to be sought. Water from the Tattingstone scheme will be expensive; and it was calculated that, on the basis of discounted costs over 21 years, a freeze plant operated at a high load factor would be cheaper for all the probable ranges of growth in demand, discount rate and power cost. In these circumstances the possibilities of the freeze desalination process could not be ignored.

The main objectives of the programme are:

(i) To demonstrate that the freeze desalination process can be made to operate successfully and reliably under UK conditions;

(ii) to demonstrate that the product water can be brought to the requisite standards for potability with minimal post-treatment;

(iii) to provide design, construction and operational experience and cost data for evaluating the process as a reliable and economic water resource;

(iv) to yield the maximum technical data in terms of individual unit performance, integrated unit operation and plant control;

(v) to establish the effects of variation in temperature salinity, suspended solids and bacteriological contamination of the feed on the plant operation and on the product water;

(vi) to investigate any ecological effects of discharging concentrated brine to an estuary.

In the next issue of The Ecologist

Alternatives to catastrophe by Jay W. Forrester. The first part of an important article by the Professor of Management at the Massachusetts Institute of Technology. Subtitled "Understanding the counterintuitive behaviour of social systems", the article discusses a system of analysing natural resource shortage, pollution, overpopulation, and their effects, so that they can be dealt with successfully.

Avalon reclaimed by L. B. Powell. How the peat bogs of the Somerset Levels are being reclaimed.

Insects—key conservationists by M. W. Service. An introduction to the ecological role of insects.

Violence and social disorganisation by J. P. Scott and Richard F. Gottier. Social disorganisation is here shown to be a major cause of violence.

This month's contributors

Dr F. N. Steele read Glass Technology at Sheffield University, obtaining her degree in 1963. She went on to take a PhD in the same subject. After two years of scientific editorial work, she joined the Scientific Civil Service and is currently working as an administrator.

Helen Turner graduated in English at St Anne's College, Oxford, and has lived in Oxford for the past nine years. She is a free-lance journalist, specialising in consumer and environmental topics, and she is married to Gerard Turner, founder and Secretary of the Oxford Civic Society.

Coming events

8-9 July—Conservation in Action. Civic Trust Conference at the Royal Festival Hall, London. Full details from the Civic Trust, 17 Carlton House Terrace, London SW1 (Tel: 01-930 0914).

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Feedback

Technology no problem-solver

Technology cannot solve the problems of the world's expanding populations and their growing consumption of diminishing resources, said Professor Sir Bernard Flowers FRS, chairman of the Science Research Council, when he opened the Technological Congress of the Institution of Electrical Engineers.

He estimated that potential world resources could support between 30 and 40 billion people at bare subsistence level. If the standard of living were that of the United States today, then the maximum world population could be only 7 billion. Already we had reached about a tenth of the former figure, and a half of the latter.

Sir Bernard went on to say that if we failed to make the transition to fast breeder reactors by the end of the century it would be one of the great disasters of human history. He conceded that breeders could never be entirely safe, but suggested that tolerable exposure levels could be arrived at if reactors were sited away from cities and the consequent increase in cancer kept below hazards from life in general. *Times*, 19.5.71

Ladybird, ladybird . . .

2.5 million ladybirds are being imported by gardening clubs in New Mexico so that aphides can be controlled naturally rather than with insecticides. They will sell at 83p for a half-pint—or 4,000 ladybirds, enough, it is estimated, for the average garden. *Daily Telegraph*, 26.4.71

Weather-expert walruses

Charts of the migration of walruses are used by Soviet airmen to predict changes in Arctic weather and ice conditions.

The walruses have a good nose for

such changes. Often herds will appear at a spot which seems most unsuitable, yet they are invariably proved right. Even when they select tremendous packs of ice, within a few days of their appearance the sea in that area becomes ice-free.

Similarly, for no apparent reason the walruses will abandon a favourite site, ideal for breeding and with plenty of food. Again they prove to be right, when sudden strong winds carry huge ice-floes to the formerly ice-free area.

Novosti Bulletin, 21.4.71

Solent a cess-tank

The Solent is in danger of becoming "an open cess-tank polluted by oils, chemicals, sewage and plastic cups and worse. It is impossible for local authorities acting individually to overcome this problem", stated Mr Judd, MP for Portsmouth West, in the House of Commons. The Secretary of State for the Environment replied that the Royal Commission on Environmental Pollution were going to visit the area, and the Hampshire County Council were considering a main drainage scheme. *Times*, 20.5.71

China clay to whiten souls

The china clay industry has abandoned its plans to pump millions of tons of waste into the sea off Cornwall. It will also gradually reduce discharges into the Rivers St Blazey, Crinnis and St Austell (known as the "White River" because of the large quantities of micaceous waste poured into it) until they are eliminated by 1974.

The industry is to use the waste to fill in existing pits, a measure it had condemned as impossible when the pipeline to the sea was first mooted. It will be no more expensive, and is made possible by a technical advance which recovers 30 per cent more clay from the parent material than before.

Daily Telegraph, 20.5.71

The shrinking shrimp

Two factories in the Morecambe Bay area have closed and 100 shrimp pickers and processors along the North-west coast been laid off because the spring shrimp harvest has failed completely. Last autumn's catch was poor, and this year the whitebait (second to the shrimp in importance for the Lancashire coast) have also failed to appear. Similar shrimp failures have been reported for North Wales.

Although pollution is on everybody's lips, marine biologists and fisheries officials are puzzled since they know of no new pollution and claim the shrimps are accustomed to "normal waste".

Guardian, 13.5.71

Baikal National Park

The taiga around Lake Baikal in Siberia is being turned into the biggest national park in the Soviet Union, and from this year its territory will be protected by the state. The park project has been devised by Leningrad scientists. 25 million acres of forest on which 336 rivers feeding Lake Baikal depend will be taken under state protection.

The scientists plan to establish a big Baikal reserve in the estuary of the River Selenga, the main waterway which brings fresh water into the lake. The reserve will be for sable, marten, black squirrel, roe and musk deer.

Eleven reserves with a total area exceeding 1,250,000 acres will be established on the recommendations of game biologists. Larch, pine, elm and other varieties of trees are planned to be planted in steppe and forest-steppe areas.

Some 2,500 miles of roads will be built in the vicinity of the lake in the next 10 years. Camping sites and hotels for tourists will also be built.

Novosti Bulletin, 11.5.71

8 Temporary reprieve for elms

A group of elm trees in the Kungstradgatan, Stockholm's inner city park, has been given a temporary reprieve. The elms were to have fallen to an underground station, but militant conservationists have persuaded the government to stay its hand.

"The choice between some trees and an underground station is not a difficult choice—the trees must go of course", said Dr Sven Aamark of the Interior Ministry. "It is a pity that the elms must be chopped, but they can be replaced with other trees at a later date".

1,500 people of all age groups and political persuasions thought differently. They had given their telephone numbers to a group called "Alternative City" so that they could be alerted at any time day or night to come to the defence of the trees. For five days they prevented workmen from cutting them down, in spite of a heavy police guard. After fierce fighting between police and protestors, the city council announced that the decision on whether the elms should stay or go had been postponed until the autumn. *Times*, 13.5.71 & 18.5.71

9 Bathing banned

Bathing from the Swiss side of Lake Lugano has been banned for the whole summer because it is so polluted. It is just as bad on the Italian side, but there the authorities are taking no action. According to the Office for Water Protection in Bern, Lake Maggiore is almost as seriously polluted as Lugano. Lakes Constance, Geneva, Bienne, Luzern, Neuchatel, Thun, Zug and Zurich are also polluted to such an extent that bathing can no longer be recommended.

Daily Telegraph, 12.5.71

10 X-ray danger

Unnecessary X-ray examinations represent a "10,000-fold greater exposure" than nuclear reactors, states Dr Leonard A. Sagan of the Palo Alto Medical Clinic in California. 90 per cent of exposure to man-made radiation is due to diagnostic and therapeutic X-rays. While the average nuclear power station exposes the population within 50 miles of it to almost 0.01 millirems, X-rays now account for about 100 millirems. Yet

X-rays are not considered when "permissible" doses are determined.

At the moment the risk of cancer and leukemia from X-rays has been played down as doctors have argued that it is borne by the patient alone and can easily be compared with the likely benefits. In Dr Sagan's view, however, such an argument is untenable, since "the genetic effects of such exposure are shared by the progeny of the entire interbreeding population of which the patient is a member".

Dr Sagan recommends that X-rays are used only when they are absolutely essential. *AMA Journal*, 22.4.71

11 Environmental factors cause most cancers

"There is evidence," reports Professor John Higginson, director of the International Cancer Research Centre, "that 80 per cent of human cancers are directly or indirectly caused by environmental factors, and are thus theoretically preventable."

Guardian, 19.5.71

12 Protein from effluent

A new process, invented by an English biochemist, Dr Roy Grant, enables almost all the protein in meat factory wastes to be recovered.

While in New Zealand, Dr Grant learned that the average meat factory there uses some 2 million gallons of water a day and discharges as effluent the protein equivalent of 330 sheep carcasses a day.

Dr Gould's process not only recovers 96 per cent of the protein in these wastes but also renders the residue into clear and reusable water.

The process uses a special ion exchange resin, the structure of which has openings large enough to admit protein molecules. Some of the protein is recovered from a flotation tank into which the effluent is first pumped. More is then removed by filtration or the use of a centrifuge, after which the effluent is passed through the resin which recovers the remainder. The water is then reused elsewhere in the factory, and the protein dried and processed for stock feed.

A particular advantage of this process is that it can be applied with equal success to fish processing factories and tanneries.

Guardian, 28.5.71

13 Concorde disturbs birds

The effects of the boom from Concorde's supersonic tests on the birds of the island of Skomer are dramatic to say the least, as can be appreciated from this report:

"Every bird in sight, numbering more than a thousand, rose screaming to a height of about 100 feet. This general pattern of panic was observed among herring gulls, lesser and greater black-backs, kittiwakes, oystercatchers and small land birds. For at least 10 minutes pandemonium reigned; then the first birds began to settle down and after 15 minutes most were again sitting rather uneasily on the cliffs.

"The effect of a sonic boom on auks with eggs or chicks on narrow ledges can be imagined. Those eggs and chicks not kicked into the sea within seconds of the boom would be exposed to predation by the more adaptable and stolid gulls which would recover from panic sooner than the auks."

Nature in Wales, March 1971

14 Soviet pipeline breaks

The 800-mile line from Russia's Mangyshlak oil fields on the north-east shore of the Caspian Sea to the Kuibyshev refineries on the Volga River has broken between the cities of Guryev and Uralsk on the West bank of the Ural River. According to *Pravda* the steel pipeline was unable to withstand the strain between the low temperature outside and the high inside temperature from the heated oil.

According to a report from the Smithsonian Institution's Center for Short-lived Phenomena, "maintenance crews were able to contain the spilled oil behind temporary banks of earth thrown up by bulldozers and other earth-moving equipment. (It was feared that) the embankments of frozen ground mixed with snow would give way as spring approached. Oil was already beginning to seep (out in an area) roughly halfway between Guryev and Uralsk. Water from the melting of snow was expected to carry the oil into the Ural River... This break in one of the Soviet Union's biggest pipelines threatens the sturgeon fishing grounds of the Caspian Sea, a source of caviar, and the fertile bottom lands of nearby collective and state farms." *Sierra Club National News Report*, 23.4.71

Ecology action

Schweppervescence lasts the whole bottle through (once)...

It was a lovely demo. The sun shone, the police were friendly and talked about gardening. It seemed as if it was the beginning of something good. Nobody felt like hitting people or burning things down. There was a dustpan and brush in case anyone broke a bottle. Two poets read an improvised poem, and the Schweppesmen peeped out from behind the curtains. It was lovely.

Did it achieve anything? A few dozen people carrying half a small lorryload of bottles across London on a Sunday is not an amazing achievement. In the battle against the monsters it was the tiniest of skirmishes. Nevertheless it was a portent of things to come—or rather it could be. Will it happen again? This depends partly on Friends of the Earth, the organisers, but partly on public reaction, on the number of people who write to *The Ecologist* or FoE and offer their support. If it is to happen again it needs five times as many people and twenty times as many bottles.

The first demo attracted a good deal of publicity—a photo of the bottles outside Schweppes House even reached

the *Frankfurter Allgemeine*. But this was because the bottles made a good photo and the idea was new and fresh and fun. If the next demo is not much larger and more impressive than the first one, it will be in danger of falling flat, for it will not be a new idea any more.

Yet if one realises how tiny the resources of the organisers were, how slender the logistics (if that is what you call a costermonger's barrow), how little the planning, it seems amazing that it worked as well as it did. It would not take very much to do it all again, bigger and better, as they say.

Meanwhile, what of the boys at Schweppes House? Some of them must be thinking quite hard. Schweppes is a company whose success has depended very much on clever and original publicity. It was an inspired choice for a conservationist attack, even if it was also obvious—Schweppes clever slogans can work as well against as for them. The Schweppes people must be well aware of the success of the campaign against Coca-Cola's non-returnable bottles in the US. Will they decide it is politic to jump on the conservationist bandwagon too?

There is another point about the Schweppes demo, with political implications of some importance. As we marched past Speakers' Corner a girl shouted bitterly: "People in Vietnam and South Africa are dying, and you messing about with that rubbish." It was fair comment. But which is likely to be more effective, trying to stop the Vietnam war by breaking into the US Embassy, or trying to persuade Schweppes in a civilised manner to change its mind about bottles?

The Schweppes campaign may appear trivial, but at least it stands a good chance of winning. In a sense it is more revolutionary than the antiquated antics of the good old new left. The strength of the Viet Cong, for example, lies in the support, or at least acquiescence, of a large proportion of the rural population of Vietnam. Similarly, the strength of conservation is that there is a little bit of a conservationist in us all, even in the directors of Schweppes perhaps. People to whom sentiments like "Capitalism must be destroyed" are nonsense, or monstrous, or unattainably utopian, will accept that it is daft to throw away perfectly good bottles after using them only once.

Nor is conservation just about protecting hedgerows and the Duke of Edinburgh. It is a serious political issue—the political issue of our time. The Biafran war, for example, was almost certainly about two of the things that preoccupy conservationists most: oil and overpopulation. The Schweppes affair is piffling compared with Biafra or Vietnam, but if there is another demo, if it is successful, and if Schweppes are persuaded to change their policy, then it will be a small but significant victory. It will mean that an organisation of sorts will have been created. It will show ordinary people that it is possible to win victories over the monsters if you know where and how to attack them.

Michael Denny





Looking ahead

FUTURE SHOCK by Alvin Toffler. Bodley Head, £2.50. **THE ECOLOGICAL CONTEXT** by John McHale, Studio Vista, £3.15. **LIVING THE GOOD LIFE** by Helen and Scott Nearing. Schocken Books, New York, \$4.95.

When a stable culture, involving a relatively small number of individuals, is confronted by a mass culture that is more aggressive, more vigorous and more economically and technologically powerful, the stable culture is liable to collapse. The members of that culture may become disoriented, their traditional way of life destroyed by a civilisation they cannot comprehend. The malaise is called "cultural shock" and it is common enough in those parts of the world where primitive peoples have met western civilisation head-on.

Mr Toffler believes the speed of technological innovation may produce a similar disorientation in the industrialised countries. In effect, the future is arriving too quickly. There is barely time to adapt to one major change before the next is upon us, and the process is accelerating. He has coined the term "future shock" to describe it.

The idea is interesting and worth exploring. Provided one accepts that the foreseeable future will be created by technologists, Mr. Toffler's handling of it is perceptive and responsible. Too little attention has been paid, he says, to change. Much is written about the future, but very little about the ways in which the future becomes the present. It is an omission he spends more than 400 pages remedying.

The trouble is that he believes the propaganda. We are all told of the problems associated with advancing technology so we assume technology must be advancing. I suppose there are places where this is true, but examples of the impact of this advancement on

the lives of most people are not easy to find. Mr Toffler has studied developments in the recent past, he has consulted research scientists about the applications of their work that will become feasible in the next few years, he has put two and two together and, hey presto! Future shock.

It is true that if progress is to be measured by the rate of consumption of resources, then more progress has been made in the last century than during the whole of human history prior to about 1800. Half of the total energy consumed by man has been consumed in the last hundred years. Yet the very rate of this advance suggests at least the possibility of a rather different future. What happens when the energy runs out? It is strange that in so lengthy a book he never stops to consider how his mighty juggernaut is to be powered.

He misunderstands and dismisses too lightly those who seek alternative ways of life. They would be more useful, he says, if instead of communal farms that attempt to recreate the past, they established communal computer companies that created the future. He misses the point, which is to escape from the computer companies and to survive the crash of our technological civilisation. They may be wrong, but their vision of the future has more authoritative backing than Mr Toffler's electronic wonderland.

Perhaps he should read *The Ecological Context*. Mr McHale deals with energy: indeed, he devotes a whole chapter to it, packed with facts and figures, tables and histograms, well digested and powerfully presented. He concludes that "Coal may not supply the world energy needs at the year 2000 level for more than 150 to 200 years". And, "Oil reserve estimates are roughly forty times the world total consumption figures for 1960". If this sounds comforting, remember that 40 years takes us only to the year 2000.

Mr McHale discusses population and food, materials, pollution and many other aspects of the global environment, all of them complete with supporting statistics and projections. He considers world production and consumption of major items, country by country, relating them to the hopes and needs of the developing world. At times a touch of bitterness is unavoidable, as when he comments: "Questions as to how, at what monetary cost, and by whom supported, are increasingly irrelevant as we begin to spend more materials, energies, and human lives in our present global conflicts than have been even fractionally used on behalf of human advancement".

His solution is "ecological redesign". "We need to reconceptualise our global man-made environment within more comprehensive and coherent schemes." He ends with a list of questions whose answers might tell us where the limits of population growth and technological and industrial development lie.

The Ecological Context is what it says it is: a serious study of western civilisation in terms of its ecological impact. It is sure to become an invaluable work of reference and a dampener to the frenzy of what Francis Arnold has called the technomaniacs.

There are alternatives, of course. The number of people turning their backs on modern society and seeking new life styles of their own is increasing daily. Helen and Scott Nearing have some claim to being the prototypes of the modern "drop-out". Forty years ago (Scott is now over 90) they left the city and the university where Scott was a lecturer in economics, to live in a remote part of Vermont. Their aim was to establish a stable economic base for themselves. This meant near self-sufficiency and over the years they built their house and outbuildings from stone, wood and cement, with their own

labour and that of their friends; they grew almost all of their food and such money as they needed they earned by processing maple syrup and sugar from their trees. This freed them to write, talk and teach. Twenty years later they wrote a book describing their experiences. The book sold steadily but slowly until last autumn, when it was re-issued. Its success was instant and the Nearings, who now live in an even more remote corner of Maine, were celebrities. *Living the Good Life* is a practical handbook for those who would follow in their homesteading footsteps. The fact that it has run through three printings since last September indicates its popularity. It also indicates the size of the revolt against established attitudes and values. *Living the Good Life* applies more to American conditions than those in Britain, where it is much more difficult to acquire land and where there is little wilderness left. Nevertheless it is well worth reading as a story of the success of two individualists who set out to build their own lives in their own way, lives based on thrift and respect for the natural environment.

The future must be faced. It will not

go away. The Nearings have faced it and the future they made so long ago makes more sense in Mr McHale's world than in Mr Toffler's; but then, it is more likely that we will have to come to terms with a world of rising hopes and falling resources. It may be more difficult than Mr. Toffler realises.

Michael Allaby

Dynamic Ecology

THE BIOSPHERE, A *Scientific American* Book: W. H. Freeman & Co, 1971, £3.00 (cloth) £1.40 (paper).

This book contains 11 articles, written by different authors each eminent within his field, which first appeared in the *Scientific American* in September, 1970. Most, but not all, of these articles have a commendable clarity of style which, when blended with the excellent presentation we expect from *Scientific American*, results in a publication which many will wish to own.

The first article, by Professor Evelyn Hutchinson, sets the scene by describing the evolution of the biosphere (that part of the earth in which life exists)

and the environmental constraints under which organisms first developed about 3 billion years ago, initially using "organic" molecules which had accumulated on the earth's surface and later by the evolution of mechanisms which enabled some of them to make their own organic molecules.

After a contribution on the energy balance of the earth, which describes the fate of solar energy and the ways in which such energy influences world climate, there are six articles concerned with aspects of the cycling of energy and materials (carbon, oxygen, nitrogen, water and minerals) within the biosphere.

The final three articles deal with the ways in which, historically, man has exploited the biosphere to provide food, energy and materials in an attempt to satisfy his needs, a satisfaction which can never be achieved on a permanent basis by the human race as a whole with the current rates of exploitation of developed countries even at present population levels.

As a teacher I shall find *The Biosphere* a useful source-book for aspects of ecology and resource management courses: it collects together a lot of in-

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formation which is otherwise scattered or dealt with in a more superficial manner in general texts. But *The Biosphere* is much more than this—it describes the basic processes essential to life as we know it and puts man's activities in relation to these processes into a historical and global perspective. It highlights those problems, such as possible man-induced changes in climate, whose prediction and solution needs a far greater understanding of the basic processes involved. It also shows the scale on which the rate of fundamental processes, like the fixation of nitrogen, are being influenced by industrial and agricultural activities. Above all it demonstrates the urgent need for man to develop a new temporal dimension to his morality.

Although the book has certain deficiencies, my only major criticism is that the title is too comprehensive for the contributions that follow. There are other aspects of the organisation of the biosphere which are not dealt with and surely a little more could have been said about those materials, many of them man-made, which build up in ecosystems sometimes with such catastrophic results?

R. G. Edwards

Butterflies

A FIELD GUIDE TO THE BUTTERFLIES OF BRITAIN AND EUROPE, by L. G. Higgins and N. D. Riley. Collins, £2.10.

Indispensable for anyone at all interested in butterflies, this book gives concise descriptions of all the species (and many subspecies) to be found in Britain and continental Europe outside Russia, together with details of range, flight-months, habitat, distribution, variations, and similar species. Of particular value are the distribution maps—one for practically every species listed—which enable the reader to check which butterflies he is likely to find wherever he may be. The more than 780 illustrations in colour by Brian Hargreaves are outstanding.

It is a pity that such a fine and useful book is marred by no mention of the effects on butterfly populations of pollution, habitat destruction, or indeed the predations of lepidopterists—while some space is devoted to the techniques of catching and killing butterflies and the relative merits of various pins for sticking them with. The anatomy of

these lovely insects is well enough known, and now that their colours have been so exactly recorded by the exquisite paintings of Mr Hargreaves, there is no longer any reason, other than acquisitiveness, for collecting them. It is surely time butterfly lovers were conservationists as well.

Robert Allen

Classified Advertisements

CONSERVATION AND THE BALANCE OF NATURE is the title of a one week course at Rhyd-y-creuau, The Drapers' Field Centre, Bettws-y-coed, N. Wales, 7-14 August 1971. Sponsored by the Soil Association and the Field Studies Council. The course includes a visit to the Rio Tinto smelter on Anglesey. Cost £20 plus £3 Soil Association membership subscription for non-members who wish to attend. Send all applications, with £4 deposit, to The Warden, at the address above.

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Letters



Common Market v Environment

Sir,

The concern expressed by Brian Johnson in his article "Common Market v Environment" is well taken. But I would suggest that even if Britain does not join the EEC the problems outlined will still remain, only without any of the possible advantages. There could be a danger the politicians would demand growth parallel with Europe, either to prove to them that we can do it anyway, or because of the old arguments of being left behind. Academic arguments may be of value in creating a climate of opinion but will have little practical effect while the old order of economic thinking prevails. It would I feel be more practical to move politicians towards an acceptance of environmental management rather than away from growth.

Politically we may be an island, ecologically we are part of an environment extending far beyond the 12-mile territorial limit. Since the environment knows no political barriers, environmental management, or conservation, cannot stop at such barriers. Generally, political barriers have a strong economic component. The closer the economies of the two countries usually the closer the two countries become, politically and socially, and the weaker the barriers between them become.

If Britain formalised her position outside the EEC as a competitor, it is logical to suppose that political barriers between Britain and member nations would become stronger. If the economies of the two diverged significantly contacts could be reduced. For example a wide difference in relative earnings could prevent the lower paid from travelling in Europe. Socially this would be undesirable. Also if political barriers were strong, agreements would be difficult to come to. This could ser-

iously inhibit environmental management. The North Sea would soon suffer from a lack of pollution and fishing agreements. Migrant species also could suffer if Britain fails to carry the environmental revolution into Europe.

I contend that we can only effectively carry this revolution to Europe by being closely linked with Europe. The type of agreements necessary to preserve our environment are only likely to be made in time by the close co-operation between the governments of Europe. To say that the European environment is not our concern is to fail to understand the nature and complexity of our environment. To shrink from the challenge that Europe offers is to admit weakness in one's cause. Environmental management is not a weak cause, it must become a way of life for all sophisticated societies. Britain, acting through the environmentally aware members of her population, can, and must, provide the momentum for such management, both in Europe and globally. It is pointless waiting for someone else to show the way or hope that they will. Geographically Britain is part of Europe, surely if Europe suffers environmental death Britain will be laid in the same coffin.

Yours sincerely,

Michael Shipley.

1A Southport Road, Chorley, Lancs.

More on PCBs

Sir,

Jeremy Bugler's conclusion that voluntary control of PCBs is not working (*The Ecologist*, May, p 28) is not justified by the facts. Monsanto, the sole manufacturer of PCBs in Britain, did not start its restrictions on sales until 1 March 1971 so significant levels of PCBs in sewage sludge can be expected to continue for some months.

Monsanto's policy has been to end "non-controllable" uses of PCBs (paints, sealants, adhesives) and to persuade customers for "controllable" uses (sealed systems inside transformers, capacitors, etc.) to apply rigorous care. The whole programme, which has been applied in the United States and Canada from 1 September 1970, is sophisticated and well-planned. For example, Monsanto has arranged for a waste disposal company to collect used PCB fluids and incinerate them at high

enough pressures to destroy them; the bill goes to Monsanto.

On one level, Monsanto's action is an attempt to save at least one section of a lucrative market. But on another it shows a high degree of environmental responsibility which is to my knowledge unique among manufacturers of pollutants, and it is unfair to write off their policy as a failure before it has had a chance to work. One difficulty is that PCBs for non-controllable applications have been marketed by Monsanto via literally dozens of wholesalers and agents. It will inevitably take some time for stocks in hand to cease reaching the smallest customers—and it is these people who probably cause the main environmental leakages.

If levels of PCBs in Glasgow sewage sludge have not dropped off significantly by mid-1972, it will be time enough to suggest that tougher measures should be taken.

Yours faithfully,

Jon Tinker.

Mill Green, Bampton, Oxford.

Environmental deposits

Sir,

No doubt the idea has been thought of before, but it occurs to me that the Government could actively encourage the re-cycling of materials by a device which could be called an "environmental deposit". For instance, at the moment, much government money is being spent (through the medium of local government) on dumping glass, tins and newsprint. If instead the government taxed the manufacturer on each bottle, tin or newspaper it produced with the proviso that it got the money back if it could show it had retrieved the used product, the government would acquire a useful short-term source of funds and effectively encourage recycling. The manufacturer would of course pass on the deposit charge to the wholesaler who would do the same thing to the retailer, and finally the customer. The customer would have to claim back his deposit as would the retailer and wholesaler. If not all the used products returned to the manufacturer it would not be out of pocket as it would not have to totally refund its wholesalers, and so on. The deposit would have to be made big enough to ensure co-operation from customer, re-

tailer, etc. The housewife would go shopping, with a basket full of empties, cash them in, buy new products and return. Delivery vans would be used to full capacity on the return run from retailer to wholesaler, etc.

This sort of scheme would of course cause squawks of horror from industry initially, but if the government calculates the cost of dumping potentially recyclable material, it may find it cheaper to instead demand this deposit and then pay it back with interest (on production of returned products by industry). The amount of newsprint that could be recycled must be staggering. Unless we want endless forests of conifers, this might be a way of tackling the problem.

Yours sincerely,

James Graham.

19 Pembroke Square, W8.

East Anglian Conservation

Sir,

Having read Graham Searle's excellent column in past editions of *The Ecologist* about Student Action espec-

ially with regard to local conservation groups at universities, I am writing to inform you that the UEA Conservation Corps became active as of the end of last term. We are hoping to go out every Sunday during term time and are planning one or two weekend residential tasks. We carry out voluntary conservation tasks on both Norfolk Naturalists Trust Reserves and National Nature Reserves (working in with the Nature Conservancy) in both Norfolk and parts of Suffolk. Enquiries will be gratefully received at the address below.

Yours sincerely,

J. D. Box.

School of Biology, University of East Anglia, Norfolk.

London's third airport

Sir,

The siting of the new airport at Foulness will cause an ecocatastrophe throughout Essex and North Kent—not merely affecting the wildlife populations of the Maplin Sands and Foulness Island, but also those of Cliffe and

Halstow Marshes in North Kent: which will undoubtedly be built over with industrial works, in conjunction with the new deep-water port at Maplin.

It is not only the coastal areas that will be affected but also the inland area, between Foulness and London, which will be covered by the link roads and railways bringing the passengers from the coast to the city.

It seems to me to be hypocritical that the purpose of putting the airport at the coast is to reduce the noise levels for the people living near to the airport; and then to say that up to half a million people will be working within the docks/airport complex together with a new expansion programme for Southend!

Foulness will take 25 years to build; 32 years ago the first jet aircraft flew (in 1939). Will there not be evolution of the present aircraft into the VTOLs by the time the airport is finished—thus making it obsolete? Is there any need for a third London Airport?

Yours sincerely,

A Man of Kent.

Robinites, Charterhouse, Godalming, Surrey.



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If you would like to help us, please write to the Hon. Secretary: Miss J. Fenton, c/o The Hawk Trust, Newent, Gloucestershire.

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