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Dangers of chemical and biological warfare ■ New myths for old

The costs of urbanisation ■ Tanzanian way to self-reliance



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by Robin Williams

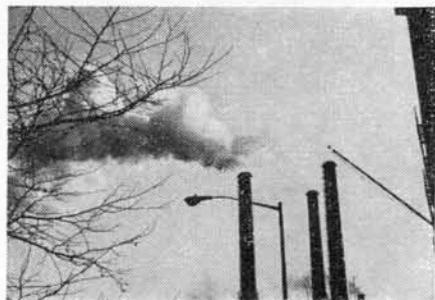
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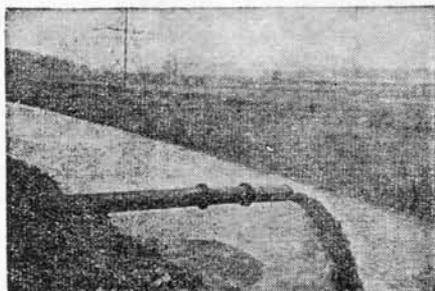
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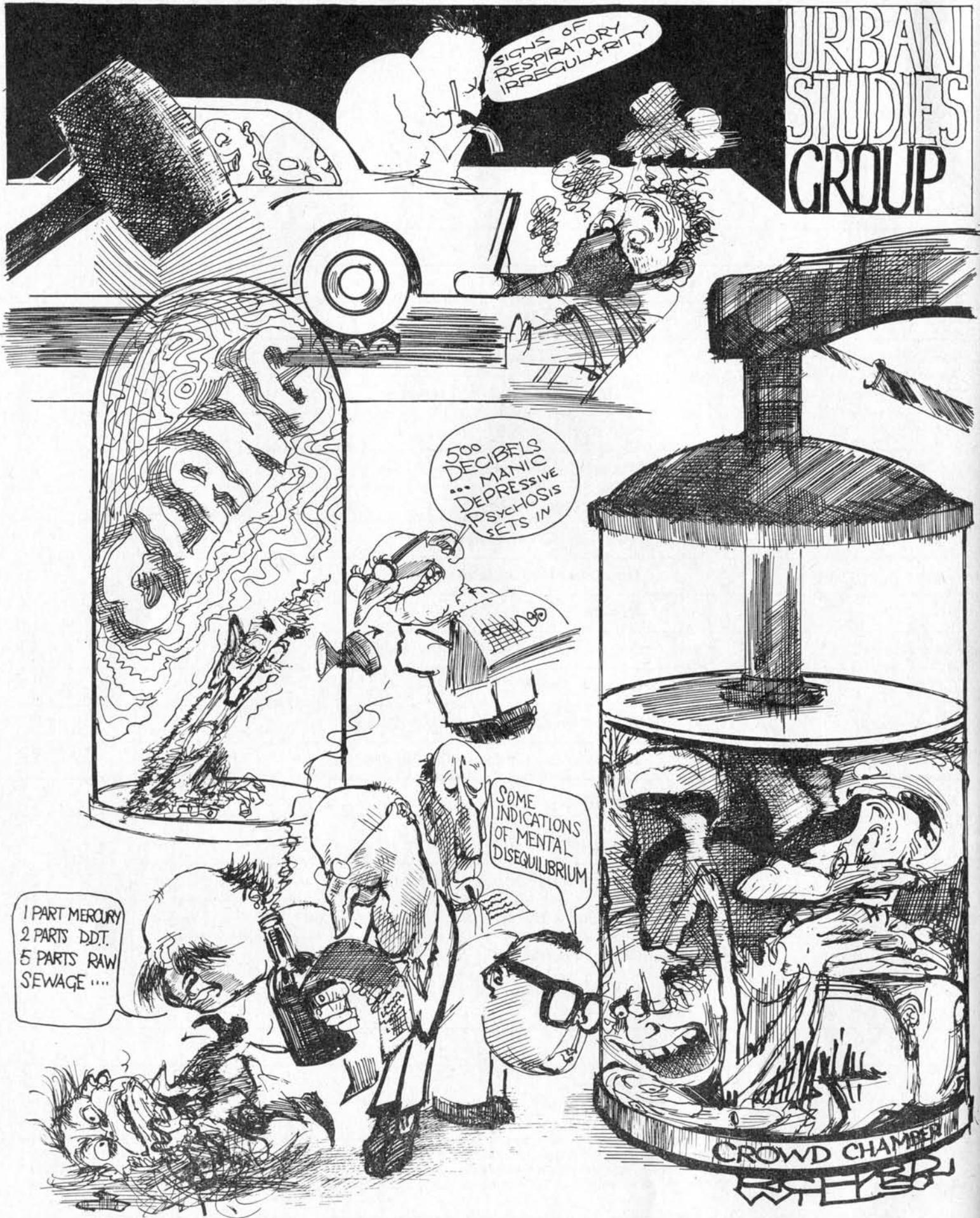
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URBAN STUDIES GROUP



“Scientific research is being conducted into certain aspects of urban stress.”

Editorial

Michael Allaby

Deus ex Machina

Is one of the main purposes of scientific research to provide employment for scientific research workers? The suggestion is heretical, but a review of the results of much contemporary research makes one wonder. A report that appeared in *Archives of Surgery*, in February, 1968, announced the discovery that bleeding dogs to the point of haemorrhagic shock will cause death unless treatment is given immediately. *Science* reported on February 10, 1967, that infant monkeys had been reared from birth in an apparatus that prevented them from seeing any part of their own bodies. After 35 days the covers were removed sufficiently to determine the reaction of the animal to the sight of one hand. Mice have been struck blows on the head to see whether concussion was accompanied by brain damage.

The list of experiments of this kind, pointless and cruel, is a long one and they are opposed on both counts by a large number of scientists and laymen. Because they involve animals, our natural revulsion at cruelty for which we can see no justification often obscures a deeper issue such experiments raise. Will they contribute to the body of knowledge that constitutes science? Sir Macfarlane Burnett, in his new book, *Dominant Mammal*, suggests that although there are more scientists working now than at any time in our history, the "frontiers of knowledge" may have been extended to their limit. He says, "I believe that 99 per cent of the scientific generalisations that bear on human affairs have already been made" and, "I can see no likelihood that the application of science to medicine will ever provide a means of curing cancer, of preventing or curing serious auto-immune disease".

Nevertheless, science and its application have contributed to the material well-being of large numbers of people and because, in the physical sciences at any rate, it is possible to achieve

almost any feat provided sufficient funds and resources can be diverted to the project, it is easy to believe that there is no problem facing man that cannot be solved simply by improved technology based on further research. Science has been popularised and publicised until it has been invested with magical powers that it does not possess. To regard the scientist and technologist as omnipotent does them no service, for they will become scapegoats when they fail to deliver the goods.

The sad truth is that the answer to the problems that face us are well known and the politicians' cry for more research masks an unwillingness to face unpleasant facts and a moral and intellectual bankruptcy that prevents them from applying solutions. If we are consuming resources too quickly, the answer is to consume less. No research is needed to tell us this and no technological wizard will appear to create something out of nothing. If we are poisoning ourselves, the answer is to stop poisoning ourselves; if we are compelling people to live in conditions that drive them to patterns of behaviour that are antisocial or symptomatic of mental illness, then the answer is to permit them to live in a more healthy environment. Scientists and technologists may help us to modify our way of life, to alleviate the symptoms of our distress and may gain us a little time. They will not solve the problems for us, for they are solved already.

Nowhere is the blind faith in a technological "deus ex machina" more evident than in the race between population and the capacity of the planet to provide food. There is no end to the fanciful suggestions that are offered as solutions to the problem that in reality can be solved only by more equitable distribution of existing food and the money with which to buy it, while we bring populations into balance with sustainable food output. In order to increase the efficiency of animal husbandry in Europe, for example, livestock was driven into indoor units. Then it was discovered that animals produce wastes. Simultaneously with this discovery came a second: there is nowhere to put these wastes. Rather than return the animals to the land from which they came and which needs their dung and urine, research workers turned their attention to ways of reducing the volume of their excrement. One way might be to feed them plastic

pellets. At the same time, the profitability of the industry will increase if smaller hens can be bred. They will occupy less space but, with careful selection, they will continue to lay large eggs.

Sometimes modern research is plainly absurd, at other times it offers the possibility of a temporary amelioration of a situation that man has caused for himself. Increasingly, technology is working to remedy the effects of past technology. The danger is that the new technology may prove just as harmful as the old.

The reason is clear. Man's problems today are those of his relationship with the planet on which he lives; they are ecological problems. The ecology of any system and of the planet most of all, is infinitely complex and it seems arrogant to assume that we will ever understand the whole of it. Yet individual problems appear to us singly: we need more food, we need less pollution, we need to conserve resources. We may not see that they are interrelated and that our attempts to apply a solution to any one of them involves manipulating the global environment. In such a situation, piecemeal solutions are bound to increase the very disequilibria we aim to correct. We cannot intensify food production without increasing pollution and the rate at which resources are consumed; we cannot control pollution without consuming still more resources and affecting the distribution of goods; we cannot reduce consumption of resources without lowering incomes and standards of living as our population continues to increase.

There is another science, a science that integrates knowledges and that assembles data to formulate concepts, a science that can be used to examine man and his environment as a whole. This science will continue to hold a fascination, even without the opportunity to make profound discoveries about man and the universe, and this fascination will grow as more and more scientific effort is directed towards the monitoring of our effect on the planet and the application of practical solutions to our problems.

Science will not provide these solutions; for them we must rely mainly on common sense. Nor will science provide us with a means to evade the problems. It is no use waiting for the "deus ex machina". He will not come.

The Dangers of Chemical and Biological Warfare (CBW)

by Judith Nottingham

The research, development and stockpiling of chemical and biological weapons has gradually developed over the last fifty years. Today it plays an important role in the overall "defence" systems of the Western world. In the past five years, public opinion in Europe and America has become increasingly informed about the possible consequences should CB weapons ever be used.

Practical experience of such use in Vietnam has rendered huge tracts of land in that country uncultivable for decades to come, and its effects upon the population vary from incapacitation to death, including an increased incidence of deformed births.

What is not so widely realised, except by those who have been directly affected in some way, is the danger which these weapons present by their very existence wherever they are researched, manufactured or stored. These dangers differ according to the stage of development of the individual weapons and of the CBW system as a whole. We will consider the dangers which arise at the following stages:

1. Research and Development.
2. Testing.
3. Mass production.

4. Stockpiling.

5. Disposal of obsolete weapons.

1. The research and development stage

As far as we know at present, the USA, Britain, Canada, Australia and West Germany are the main countries involved in one way or another with C&B research and development. By far the greatest level of involvement is in the USA, which has two major government centres devoted to such activities, these are Edgewood Arsenal in New Jersey, which concentrates on chemicals, and Fort Detrick in Maryland which concentrates on biologicals. Between them they cover over 12,000 acres of land and employ over 6,000 people.

The equivalent British centres are housed in one establishment at Porton Down in Wiltshire. This covers over 10 square miles of land and employs probably more than 500 people.

In addition to these official centres, governments farm out research contracts to private firms and university departments. Very often those working on such contracts, especially in the universities, are unaware of the ultimate use to which their findings will be put.

The greatest dangers at this stage are to those actually involved in the research. Several examples of deaths in both Britain and America managed to escape official censorship and reach public attention. In September 1959, Ralph Powell, a technician at Fort Detrick, died of pneumonic plague.

Three years later in August 1962, a research scientist at Porton, Mr Geoffrey Bacon, died of the same disease. In both cases the men sought medical attention through the usual channels and were mixing freely with other people before they died. In the case of Mr Bacon, he was admitted to the local hospital for treatment, thus putting a lot more people at risk, none of whom would have resistance to a disease which is not endemic to their country. In neither case could the affected men help the doctors in the diagnosis of the disease because they were forbidden under any circumstances to reveal the nature of their work. As a result of this secrecy two men died and many more were endangered. There is no way of telling how many others have suffered a similar fate.

Working on chemicals is no less dangerous, although it is less likely to have repercussions on the public in general. Again, information on the subject is difficult to obtain or verify because of the Official Secrets Act in Britain and its equivalent in the USA. However, it is known that at least one person is suffering permanent disability as a result of research closely connected with nerve gas. Dr Mary Whittaker worked on insecticides in 1937 and developed symptoms similar to the effects of nerve gas, which have persisted and become a permanent handicap to her. Those insecticides were in fact compounds very closely related to the nerve gases. Dr Whittaker is pur-

suing her work now at Kings College, London, helped by money from Porton. It is impossible to say how many of those who research into nerve gases at Porton or Edgewood have developed similar symptoms.

We must now consider the other potential dangers of research into CBW. Most research at some stage uses animals. In the case of biological weapons the escape of one of these animals could cause a massive epidemic. This may seem fanciful but it has occurred at least once, in June 1959. On this occasion an Indian rhesus monkey escaped while being transported from Porton to some other institution. There was panic and the order was to shoot it on sight. The authorities later denied that there was any danger at all.

Other dangers could arise from, for example, fire or explosion in one of these research establishments. This might release some disease or some new chemical weapons on the unsuspecting and unprotected public. So far two explosions have occurred at Porton. There is also the problem of how to dispose of any waste materials resulting from the work. If the decontamination systems were to fail, the air and water could be lethally polluted for miles around. All these things must be considered in any discussion of dangers arising from research into CBW.

2. The stage of testing

Once a weapon has been developed it has to be tested. There is a large testing area at the Canadian centre near Suffield, Alberta. Australia tests weapons at its centre near Innisfail. Britain has access to both these testing grounds under the terms of a quadri-lateral agreement on CBW, involving Britain, Canada, Australia, and the USA. Britain also undertakes limited testing at Porton and possibly at other Army ranges like that near Otterburn in Northumberland.

However, as in research and development it is the USA which has the most facilities. The main testing ground in America is the Dugway Proving Ground near Utah. It covers some 1,800 square miles and employs about 900 people. There are other proving grounds at Elgin, Florida and China Lake, California.

Dangers arising from testing these weapons is again greatest to those

actually involved. Human volunteers are accepted by both the USA and Britain. In the USA the majority of these are believed to be Army non-combatants. Many deaths have occurred as a result of these tests and also temporary and permanent incapacitation. For instance, on 6 May 1953 the British Government was forced to admit that LAC Ronald Maddison had died as a result of a trial involving lethal gas at Porton. No other deaths have been admitted although one William Cockayne who was involved with a trial involving nerve gas at Porton suffered permanent disability as a result. He has been unable to find work for the last fifteen years and the Government have refused any compensation because they will not admit that nerve gas was the cause.

There is no reason to suppose that similar accidents have not occurred in the USA. However, other accidents endangering the public at large have also occurred near Dugway. In March 1968, some 6,000 sheep died as a result of a cloud of nerve gas which drifted outside the Proving Ground limits. It would seem that this occurred again in January 1971, killing 1,200 sheep. The Army have denied responsibility for this, blaming the deaths on a "poisonous weed". They denied responsibility also in the first case but were later forced to retract their denial. The local hospital in Tooele Valley, Utah has treated a number of people suffering from exposure to nerve gas.

The dangers of testing by both Britain and America are not confined only to the areas around official centres. In Britain, the island of Gruinard off the North West coast of Scotland was used to test the disease anthrax as a potential weapon. It is estimated that the island will remain contaminated and uninhabitable for at least a hundred years. Britain has also used areas of the Bahamas for tests, while the USA uses some Pacific islands under her control as well as areas in Alaska, Panama and Greenland. It seems that Britain and America have continued to exploit their "colonies" since the Second World War. In the days of the Empire Britain used her possessions in this way. For example, the use of tear gases to quell civil disturbance was experimented with in India. America is con-

tinuing the tradition by her experiments in Vietnam.

In short, we can say that testing is an inherently dangerous process in which at least some of those involved will be affected in some way and possibly killed. In addition, innocent people who happen to get in the way may suffer injury either to their own health or to their property, especially if the latter is in the form of livestock.

3. The stage of mass production

When the weapons have been tested and are deemed suitable for use they enter the stage of mass production and are packed into bombs, missiles, bullets, etc. which will disseminate them. This means there is a need for full-scale factories, either Government owned or working under government contract. In Britain, production of lethal gases and tear gases is conducted at Nancekuke in Cornwall. These are then packed into the necessary weapons by a private firm, Schermuly, in Surrey. The British Government denies that Nancekuke has produced any lethal gases for the last few years and claims that when it did so they were purely for experimental purposes. This remains to be seen. The very existence of Nancekuke was denied until 1968/9.

America does not conceal the existence of her numerous factories. Rocky Mountain Arsenal in Colorado manufactures many lethal gases and anti-crop weapons and also packs them into the requisite munitions. Pine Bluff Arsenal, Arkansas, manufactures toxic chemicals and also biological weapons which are likewise packed into the appropriate munitions on the premises. Weldon Spring Army Chemical Plant, Missouri, manufactures herbicides, defoliants and anti-crop weapons.

The dangers which arise from such activities are many. First, as in the previous stages, there is danger to those working in these factories, whatever their function. Three people who worked at Nancekuke are known to have died as a result, Tony Bigwood, Rob Banks, and Walter Banfield. Two others are permanently incapacitated, Trevor Martin and Tom Griffiths, and have been unable to work for some nine years. As in the case of Cockayne, the Government refused any kind of help.

However, other dangers exist similar to those of the research stage. Fire or

explosion could release all kinds of lethal compounds into the environment. The problem of disposing of waste materials also arises although on a much more acute level than at the research stage. The example of Rocky Mountain Arsenal will serve to illustrate this point. Waste products were originally dumped into settling ponds in the fond hope that they would sink. As a result thousands of ducks and geese were killed and many cattle, sheep and people became very ill. To solve this problem, deep wells were drilled into which the waste products were poured. A month later the area began to experience earth tremors. Suggestions have been made that the earth tremor in Cornwall in 1965 may have had something to do with Nancekuke, but this has yet to be proved.

In the case of Britain, there is an additional problem caused by the division of the process between Nancekuke and Schermuly. Because of this, dangerous chemicals have to be transported from one place to the other. These chemicals are known to be carried in special lorries by the ordinary roads. There is little comfort to be had from the annually rising road accidents, and the fact that one of the men who died, Tony Bigwood, was a lorry driver. This puts at risk not only those in the area of these two establishments but any one travelling on the roads which link them.

4. Stockpiling

It would seem that the problem of stockpiling does not arise to any great extent in Britain because we rely on NATO and our American allies to supply us with what might be necessary in the event of war. However, America has many stores of these weapons. All the manufacturing plants maintain stockpiles in addition to which the USA has a large store of these weapons on Okinawa (Japan). There is no way of knowing where else stores may be held around the world until some accident occurs to draw our attention to them. It was as a result of the injury of 23 servicemen in Okinawa last year that the existence of this stockpile became known.

These stockpiles constitute a hazard to the people who live anywhere near them. Often the weapons are stored so long that their containers begin to deteriorate and the explosives in them become unstable. The effect of a whole

stockpile of nerve gas bombs or missiles exploding would be felt for hundreds of square miles. One only has to remember that a minute drop of nerve gas absorbed through the skin can kill a man—after giving him convulsions and paralysing him—to understand the potential hazards of these stockpiles. The worst aspect of this is that the location of many of these stores is probably still unknown to the people living near them. It is reasonable to believe, for instance, that NATO has several such stockpiles—somewhere.

5. Disposal

After weapons have been stored for any length of time they either begin to deteriorate or become obsolete or, as in the case of Okinawa, they become bad for public relations and the subject of civil disturbances. In any of these instances they have to be disposed of. Britain faced this problem first with the capture of German stocks of nerve gas and mustard gas in the Second World War. The problem was solved by dumping them in the sea—the Baltic, the North Sea, the Atlantic, and the Bay of Biscay. The British Government have admitted to the location of one of these dumps, 25 miles north-east of the Danish Island of Bornholm. The admission was made necessary after some of the containers corroded and began to leak, or were moved from the original position by the tides, and set free quantities of mustard gas into the sea. This is a gas which causes burning and blistering of the skin and sometimes blindness, as several Danish and German fishermen have found to their cost, to say nothing of several million fish. Children playing with seaweed on the Schleswig-Holstein coastline also developed burns and blisters. We can only imagine the result had it been the nerve gas containers which corroded. Most likely no animal life would remain in the Baltic.

We have said that one location is admitted by the British. However, a Norwegian salvage firm claims to know the location of at least 26 more dumps in the North Sea, the Skagerrak and the Bay of Biscay.

British dumping activities did not end in 1946. It seems that waste products or obsolete weapons from Porton were dumped off the Irish coast in the 1950's, both in the Irish sea and in the Atlantic, to say nothing

of other dumps in the vicinity of the Hebrides.

At the end of 1969 a large number of seals mysteriously died off the Cornish coast. Their symptoms resembled the effects of nerve gas but the authorities insisted that death was through natural causes. However, those who handled the seals are still not convinced. The theory was put forward at the time that the cause was something to do with Nancekuke. This is of course a possibility, but there is an alternative explanation. The deaths of the seals were preceded by the equally mysterious death of sea birds along the West coast of Britain, beginning in the north. This could quite well have been the result of a leakage from one of the dumps in the Hebrides. The current would slowly bring the gas southward.

Unfortunately, all this, like the location of many of these dumps, must remain mere speculation, until the British Government feels courageous enough to admit to dumping large quantities of lethal chemicals in the seas around Europe, and reveal every location.

Pollution of the other side of the Atlantic is the province of the USA, and the American Government has not done too badly until now. To our knowledge they have dumped some 50,000 nerve gas rockets off New Jersey and 67 tons of nerve gas near the Bahamas.

The danger which these weapons present at their final destination is not the only one. In order to reach this destination they have to be transported there. In the case of America they are sent by rail, often passing through many industrial and metropolitan areas with a high density of population. A train crash could wipe out every member of this population. In the case of Britain we have no knowledge about their transportation but presumably it is either by road or rail.

The research development and stockpiling of these weapons is a matter of high level military policy in Britain and America. It is not a subject upon which we can vote because very often even the politicians are kept in ignorance. In spite of this, CBW constitutes a perpetual danger to the ordinary citizens of these countries. It is not enemy attacks which we should fear but our own "defence systems"—the ordinary people have no protection against either.

“TANZANIAN WAY”

to self reliance

by

Jimoh Omo-Fadaka

Tanzania does not want to turn into a western society if this means the constant pursuit of materialistic goals and the social divisions produced by the differential accumulation of wealth. It does not want to turn into a country where the capital city swells up like an infected gland, attracting to itself manpower which cannot be employed. Nor does it want to become a Marxist state. In Tanzania the emphasis is on development based on traditional rural culture.

Tanganyika was a German colony from 1885 until the First World War. With the defeat of Germany, Tanganyika became a League of Nations Mandate administered by Britain. Independence was achieved on 9 December 1961. The country became a Republic a year later on 9 December 1962, with Dr Julius Nyerere elected as President on a universal adult suffrage.

A significant event occurred in January 1964, which profoundly affected Tanganyika's future. This was the overthrow of the Zanzibar National Party Government of the Sultan of Zanzibar and Pemba. Although Tanganyika had no hand, or even foreknowledge, of the revolution, it had direct interest in what followed.

The dominant element in the new Revolutionary Government of Zanzibar was the Afro-Shirazi Party with whom

the Tanganyika African National Union (TANU), the governing party in Tanganyika, had always had close connections. Both favoured a union of their two countries. Four months later, in May 1964, leaders of both countries agreed to form a United Republic of Tanganyika and Zanzibar, which was later officially named Tanzania.

Dr Nyerere became President of the Republic and the Zanzibar leader, Sheikh Abedi Karume, as first Vice-President, and Rashidi Karawa of Tanganyika as second Vice-President.

President Nyerere is not a dictator who relies on force to stay in power. One of the fascinating and important aspects of the country is the basic philosophy which underlines every act of the regime, and which has made Tanzania unique among the countries of Africa.

It is not a “developing” country, at least not in the sense that word is usually understood. Whereas Nigeria, Liberia, Ivory Coast, Kenya, Senegal—to give a few examples—all have common features in that they are pursuing the conventional growth patterns, which characterise industrial or (industrialising) economies, Tanzania is different from all of them. Tanzanians do not necessarily want to travel on that particular route, or if they do, they want to take it in their own way and at their own pace.

What permeates the country all the time is the absolutely dominant motive of self-reliance. Tanzanians want to do things themselves. Devotion to self-reliance is the key to Tanzania's plans for the future.

Their own approach is very precious to them, and teaching of the youth stresses a self-reliant socialism based on indigenous culture.

President Nyerere and his government have also recognised that a good many undesirable things come into a country on the back of aid. Non-alignment is the cornerstone of the foreign policy of the Government, and it is almost impossible to maintain such a posture if you are a major recipient of international assistance from either East or West.

Aid often creates a psychological dependence on getting still more aid. It saps initiative and enterprise; or again, aid may foster—as it has in so many countries—a type of development wholly inappropriate to the circumstances.

Industrial plants are constructed instead of improving basic water supplies. Aspirations are created which can never be fulfilled. The Western or Eastern “expert” generally wants to bring his whole cultural baggage with him and this can include myths about what happens and what is possible in his own country.

Overseas aid for Tanzania came mostly from the United Kingdom in the immediate post-war period, but this ceased when diplomatic relations were broken off by Tanzania in December 1965 over the Rhodesian question. The Chinese Government has given a £10 million interest-free long-term loan, and are helping to build the 314-mile TANZAM Railway linking Tanzania with Zambia and the East Coast. The Chinese are financing the railway which is expected to cost £169 million. Some assistance has also been received from the Nordic countries, Israel and others.

However, these loans are to be repaid not in kind but either by the export of Tanzania's agricultural products to these countries to the tune of the amount borrowed, or by the import

by Tanzania of the products of the donor countries. In effect, it is trade by barter. Tanzanians do not seem to want foreign money. All they want is to be shown how to make materials so that they can manage for themselves. It is hoped eventually that the country will become virtually independent of external aid or assistance.

What permeates the country all the time is the absolutely dominant motive of self-reliance. Tanzanians want to do things themselves. Devotion to self-reliance is the key to Tanzania's plans for the future.

It is all tied up with the ARUSHA DECLARATION. In February 1967, Tanzania officially adopted policies of Socialism and Self-Reliance, after TANU issued the DECLARATION. This has three main parts:

- (1) A definition of Socialism as requiring human equality, an absence of exploitation, and the public control of the major means of production.

Following this DECLARATION all foreign banks, insurance, import-export and wholesale businesses were nationalised, and the Government took a majority control in a number of important manufacturing enterprises. Nationalisation was extended to private schools and hospitals. Thus all foreign investments were virtually eliminated.

Price controls were introduced on essential commodities such as cloth and basic foodstuffs.

There have been shortages, of course, due to inexperience. Nationalising virtually overnight such a major chunk of the economy is a massive undertaking. For almost everyone it has been frustrating. Controls are very irksome and in Tanzania the controls are of a most stringent nature.

For some, particularly those who owned businesses and who now find the best they can do is work for the Government at a subsistence wage, the process has been cruel. But the sufferings of the middle class, poignant as they may be, are not the whole story.

What President Nyerere has done is to shut off the supply of inessential consumer goods; thus luxury items like cars which formerly absorbed so much of the country's scarce foreign ex-

change. Instead he has freed resources for the import of essential commodities, like medicines and high priority investment items.

In theory, this policy should lead to improvements in the living standards of all sectors of the population.

The National Income per head is just over £20 per annum. The figure includes estimates of the production from subsistence agriculture and is therefore not to be taken too literally. But it indicates the life of extreme simplicity of the mass of the people. No one looks hungry or unhappy. Men and women wear simple dresses.

- (2) The policy of self-reliance with development emphasis being moved to the rural areas, and to the use of men not money. This is the policy of agricultural development through farming co-operatives and self-help villages (UJAMAA).

The policy of basing Tanzania's development on the principles of UJAMAA has been justified by the President in terms of its relevance to Tanzanian conditions and history—to relate development to the nature of the traditional society.

In his policy pamphlet on "Socialism and Rural Development", the President treats of traditional African Society, as one living according to the principles of UJAMAA. The three basic principles are mutual respect between the members of the society; common ownership of property and the obligation to work. The strategy then is to build on these three principles of traditional society.

Aid often creates a psychological dependence on getting still more aid. It saps initiative and enterprise; or again, aid may foster—as it has in so many countries—a type of development wholly inappropriate to the circumstances.

As the President noted recently, he said: "We have got rid of the foreign government, but we have not yet rid ourselves of the individualistic social attitudes which they represented and taught." He further developed the argument by pointing out that: "The land is the only basis for Tanzania's development; we have no other. Therefore if our rural life is not based on

the principles of Socialism, our country will not be Socialist."

The achievement of rural Socialism then is the only path Tanzania, or any other African country, can follow.

The vast majority of the people in Tanzania live by consuming the products of their own farms, although some farmers are introducing cash crops on to their land. Only to a comparatively minor extent do they leave the land for paid employment.

The total number of Tanzanians working for wages is about half a million in a country with a population of about 12.3 million. Of these half a million, nearly half work in agriculture, mostly on plantations of sisal, coffee or tea. Agriculture is by far the most important factor in the economy of Tanzania. Its products are also the main exports. Sisal was one of the few products which rested in the hands of non-Africans until the 1967 nationalisation exercise. Coffee and cotton, as well as most of the other cash crops, are grown by the farmers.

The objective of rural Socialism is to create a Socialist agricultural base in order to mobilise a surplus for internal consumption over which Tanzanians will have control. *As an overall alternative, industrialisation lies in the future as far as primary emphasis is concerned.*

- (3) New rules which prevent any TANU or Government leader from holding shares in private companies; receiving rent for houses; receiving two salaries; or employing labour in a revenue earning capacity, have recently been passed. Buildings which are not owner-occupied and rented, and valued at more than £5,833, were acquired by the Government with compensation paid to the owners. The aim is to stamp out capitalist practices.

Perhaps the best way to describe what Tanzania wants to be is to describe what she does *not* want to be.

Tanzania does *not* want to turn into a Western Society if this means the constant pursuit of materialistic goals and the social divisions produced by the differential accumulation of wealth.

It does *not* want to turn into a country where the capital city swells up like an infected gland, attracting to itself manpower which cannot conceivably be employed in any productive capacity. In other words, Tanzania wants to avoid the horrors of rampant

urbanisation as they are found in industrialised countries, Asia, Latin America and other parts of Africa.

It wants, incidentally, to avoid the pollution and environmental problems that go hand in hand with it.

On the other hand, it does *not* want to be a Soviet style Communist Society either. President Nyerere has said that Marxism has no relevance to African conditions because it is a product of the 19th century industrial Europe. The Soviet bloc is no more capable of solving the problems of underdeveloped countries than its imperialist Western rivals. Hence the Tanzanian emphasis on development based on traditional culture.

What President Nyerere has done is to shut off the supply of inessential consumer goods; thus luxury items like cars which formerly absorbed so much of the country's scarce foreign exchange. Instead he has freed resources for the import of essential commodities, like medicines and high priority investment items.

Through this means it is expected to create jobs for everybody (there is no unemployment in Tanzania); to encourage the small farmer to refine his coffee, tea or sisal, and build his own dam for irrigation; to bring to local craftsmen the small scale machinery developed years ago and now so often replaced by highly sophisticated capital intensive factory machines. The President is still, for the most part, ploughing a lone furrow among African leaders when he insists that moral criteria should be paramount in the consideration of economic objectives; that Man is an end himself and not a means to an end.

Tanzania's strategy is very fairly simple. It starts with the idea that Dar es Salaam, the capital, with a population of about 300,000, is not Tanzania. The country's population is about 12.3 million (1967 census) with an area of 363,688 square miles.

The Government wants to take development to the countryside in a planned systematic way. This is where over 80 per cent of the population live. The approach is threefold: AGRICULTURE,

CULTURE, EDUCATION, AND HEALTH.

The basic form of organisation through which this transformation is to take place is the UJAMAA Village, and it is my purpose to make a brief examination of the nature of the Ujamaa village in practice.

First I shall look at the organisation of selected Ujamaa villages. Secondly, I shall look at the place of Ujamaa villages within the overall agricultural context.

There are about 120 different ethnic groups in Tanzania. The majority are classified as Bantu, but there are also peoples of Nilotic and Hamitic origins. The largest ethnic group is the SUKUMA, being 13 per cent of the total population, but no one ethnic group is in a position to dominate the rest. Tanzania has one great advantage over most African countries in that Swahili is almost universally understood and spoken. It is also the lingua franca for international conferences in East and Central Africa.

The Ujamaa Villages—there are now about 1,480 of them—are based on the 120 different ethnic groups. All these factors together have reduced the potential dangers of ethnic quarrels, although there are minor conflicts at local levels on such questions as cattle and land.

The vast majority of the people in Tanzania live by consuming the products of their own farms, although some farmers are introducing cash crops on to their land. Only to a comparatively minor extent do they leave the land for paid employment.

The Ujamaa villages are run completely on communal lines. The Ujamaa village of MBAMBARA in Tanga region offers an ideal model of the envisaged Ujamaa development. This village, started in 1964 by a group of TANU Youth League (TYL) members, mainly sisal workers from nearby sisal estates, cleared new land, founded a settlement and planted sisal at a time when the price was very high. They had seen the vast profits which were being made out of their labour by the private sisal owners, so opted for a settlement where they would get some of the

benefits of the higher prices themselves. By the time the sisal was ready to be harvested three years later, the prices had fallen to less than half the level of 1964. The villages stuck to their task and managed eventually to get some return for their effort. They were fortunate in having much personal support from the President.

Two examples of Presidential support can be cited here. When the village found that they could not get transport for their sisal leaf to be processed on the neighbouring sisal estate, they were given a lorry by the President. When they had trouble getting the same sisal estate, even after nationalisation, to process their leaf, the President issued an order to the estate that they were obliged to help Ujamaa villages and therefore process the sisal.

The villagers grew food crops for their consumption, and widened the scope of their agricultural activities by keeping chickens and fish and by moving into the sphere of vegetable and fruit production. Recently the village bought some cattle.

All the work in the village is now done communally. Each member is given a specific task to do each day and incurs a penalty if the job is not done properly. This generally means that he has to repeat the task, or to finish the work out of normal hours. The move towards communal activity in the village was itself revealing.

Originally only sisal was cultivated and harvested communally. The work allocation on the village SHAMBA usually meant that each member was required to do four hours' work there, and the rest of the day was available for members to work on their own private plots. Eventually, the difficulties in selling sisal were such that it became necessary to think in terms of communalising food crop production since this had become the peasants' major economic activity. Through effective leadership and with the hindsight of experience, members began to learn the value of co-operative activity based on a work discipline inherited from their time on the sisal estates, more particularly the ability to raise the levels and quality of production.

It is still possible for farmers in the village to cultivate privately. But it is not made easy for them to do so because they have a full and equal day's work to do on the communal SHAMBAS.

Private exchange still occurs. Individuals own chickens and they sell their eggs to other villagers. Individuals own banana trees from the days when these trees were individually planted and they still sell their bananas locally. As far as the egg market is concerned, the new supply of eggs from the communally owned chickens will be sufficient for the whole village and will satiate the market, thus denying a market to the individual egg producers.

New houses are being built communally which means that houses in the village will no longer be able to be sold, as in the past, when individuals leave the village.

The villagers started a school themselves and this is now a Government School. They also have built a dispensary, a concrete-based grain store, a well, a dam and a co-operative shop. The villagers now run their own adult education classes, during the evenings after the day's work.

Cash income, largely from the sale of sisal, is earned by the village, and is not automatically distributed to members. It may be that the members decide to invest most of the surplus they produce in development projects, such as a grain store, or a cattle herd or a poultry house, these being some of the projects they have carried through from generating a surplus. Not all the earlier development was internally financed, however, and the village has received gifts. In the early years when the villages concentrated on sisal they received gifts of food; the dam was built with gifts of cement from the District Council. The lorry was, as we have seen, a gift from the President. But at the present time, the village is self-sufficient, self-financing and self-regulating.

The democratic organisation of this village also acts as a model. The early history of MBAMBARA was one of bad management and a misuse of funds. The satisfactory resolution of this state of affairs was achieved through a political struggle in which members threw out the old leadership and substituted new ones.

Thus the principle has been established that the general meeting of the village is the democratic control agency. The annual general meeting elects the Chairman (who automatically becomes the Manager), a Secretary, a Treasurer and an Executive Committee, which itself divides into work, educa-

tion, health and shop committees. If found unsatisfactory in their work, any of these elected members can be unseated at a general meeting. These meetings can take place as often as twice a week.

The RUVUMA DEVELOPMENT ASSOCIATION (RDA)—an association of 15 Ujamaa villages—was spearheaded by a village settlement at LITOWA in Songea district, in the RUVUMA region on Tanzania's southern borders in the Association, which links together the 15 Ujamaa vilages in the region. It was started in 1960 by a group of TYL members. It acts as a servicing body for all the villages.

If men and women are to remain happily on the land, they must have farms of their own. Given population pressures, even in Tanzania, these are bound to be small farms, perhaps not much more than an acre or two per family. There is nothing intrinsically bad about this—indeed the story of the Green Revolution to date is that some of the highest per acre yields have been achieved on the smallest farms.

After 10 years it has become a settlement with houses, a school, a dispensary, a nursery school and piped water. It also provides, for example, a grain mill, a timber mill and a workshop. Apart from the usual agricultural activities certain "cottage industry" type enterprises were developed such as wool spinning and weaving, and brickmaking. As with MBAMBARA, the group has the overall aim of building a self-reliant community.

One of the most important developments is in the field of education. Here the principle of EDUCATION FOR SELF-RELIANCE, as set out in the Presidential document carrying that title has been established in reality. The education given at the Litowa School is designed to enable the pupils to continue to work in the rural areas. Adult education classes have also been established so that people may employ what they have learnt in improving their agricultural practices.

The development of a cadre of

better educated activists into the Social and Economic Revolutionary Army (SERA) which, together with representatives of the villages, comprises the RDA, is a further step in experimenting with ways of spreading the ideology and practice of Ujamaa. The members of SERA are more technically qualified and constitute a leadership which is, however, limited in its potential élitism by the fact that its representation on the RDA could not outnumber representatives from the villages. The villages themselves have representatives who are democratically elected and who are subject to democratic dismissal.

The emphasis on self-reliance has led many to understand that each village or set of villages has to develop Ujamaa forms, and that the will to do so must come from the peasant farmers themselves. The Government encourages the "spontaneous" development from below in which the peasants make their own decisions with little or no government interferences while welcoming at the same time assistance from Government and the Party.

However, in some cases Government intervention has been inevitable as in DODOMA region where the Government switched from the "spontaneous" development approach to what it called the "FRONTAL APPROACH". Here it was difficult to convince the 300,000 Wagogo ethnic group who live a nomadic life to set up an Ujamaa way of living. In June this year, the Wagogos decided voluntarily to opt for Ujamaa, and they are now being resettled in 80 Ujamaa villages in their region. But before then, there were criticisms of the Government in the way it was handling the issue.

The Dodoma experience and the criticisms evinced of both Government and Party by student volunteers who lived and worked in some Dodoma villages during their vacations (criticisms which were reported and voiced in the Government-owned *Standard* and the Party's *Nationalist* newspapers) started a furious debate. The students' view of dictatorial Party, administrative bureaucracies and authoritarian intervention in this instance was sharply challenged by people within the Government and Party machines.

However, the fact that this debate took place openly in the columns of Government and Party newspapers

alike, is an indication of the extent to which free and open debate can help define the lines of struggle and identify opposing interests. On balance what is required (and the Government is aware of this) from the Party, is that it can provide from within its ranks advanced sections of the peasantry, coming out of the areas where Ujamaa is being built; teaching and working with peasants in the process. What is not required is the wholesale importation of officials from outside the area, even if from the Regional Headquarters, instructing the peasants as to their task, but taking no physically active part in it themselves.

On balance, the emphasis on self-reliance and Ujamaa living has led many to understand that each village or set of villages has to have as little contact as possible with the world outside in terms of exchange relations. This is designed to re-orientate the country's agricultural production away from world markets dominated by capitalism, and towards first the internal market which is still underdeveloped, and then towards other countries with which Tanzania can enter into barter agreements, with

guaranteed "prices".

The population in the Ujamaa villages at present is about 10 per cent of the total rural population. Secondly the villages probably constitute only 15 per cent of the whole population. Thus the numbers of people living in the rural areas according to principles of Ujamaa is still very small.

This is not to belittle the achievement to date, but to leave the reader under no illusion as to the task facing the ruling party, Government, and most important, the people as a whole. But decolonisation of every aspect of Tanzanian life is going on at a slow but sure speed.

The Green Revolution has reached Tanzania, just as it has reached some other parts of Africa. There is every chance that the "Tanzanian Way" to development (which in any case emphasises agricultural rather than industrial development) will permit a genuine transformation of agricultural production, while at the same time avoiding some of the social and political pitfalls to which the Green Revolution has proved susceptible.

The new techniques and the new technology requires healthy literate

farmers. If the poorer countries are not to see a process of large-scale mechanisation with all its consequences, it also requires farmers with the spirit of collaboration.

If men and women are to remain happily on the land, they must have farms of their own. Given population pressures, even in Tanzania, these are bound to be small farms, perhaps not much more than an acre or two per family. There is nothing intrinsically bad about this—indeed the story of the Green Revolution to date is that some of the highest per acre yields have been achieved on the smallest farms.

But it does mean that certain farming operations will need to be conducted on a co-operative basis. If the "Tanzanian Way" can achieve a revolution in the *mental attitude* of the present farmer, permitting through co-operative action the creation of a type of farming pattern that is both small-scale yet technically efficient, it could lead to the evolution of Tanzania's own post-colonial culture, its own technology, to replace the cold, inhuman western import.

It could also prove to be a tool that can change the world.

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QUOTES

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New Myths for Old

by

Gerald Foley

“Deaths occurring after 30 days are recorded as serious injuries” runs an explanatory note to a table of road casualties published by the Royal Society for the Prevention of Accidents. Last year the score for the motor vehicle was 7,500 deaths and 356,000 injuries, of which some 100,000 were serious, though not necessarily fatal. The total bill was reckoned to be 250 million in hard cash. But of course this did not include anything for psychological damage or long-term social costs.

The annual death roll caused by motor vehicles has shown a surprising constancy over the years. Since 1926 it has never dropped below the 4,500 it reached in 1948. In 1930 it was 7,305, within a couple of dozen of what it was in 1969. The average is about 6,500 a year. It gives a total killed in the last 45 years of about 300,000. The corresponding figure of injured is well over 8 million.

We can play around with the road casualty figures in any number of ways to try to get a perspective on the collective insanity which allows us to accept them with such complacency. For instance, we knock up the total death roll to date in Northern Ireland in just ten days on our roads. People are deluded by the mass publicity given to holiday weekend death counts: these are often less than an ordinary weekend. We kill 900 children a year with our motor vehicles. We seriously injure

200 children a day. That is a lot of human misery. There is a special poignancy in the broken body of a child.

No one has yet made a call to bring back hanging for murder by motor car. No one has suggested the cat for the maniac who ploughs into a crowd of children scampering home from school. But three child murders in a week will bring the media into a state of hysteria and the police into panic finger-printing of every male in the north of England.

Our behaviour with respect to the car is quite irrational.

Imagine if our bathrooms had been designed by one of the Gothic horror writers. Poe, for instance. The shaving mirror would smash at random intervals into slivers of glass which rip the shaver's face apart. The bath itself would suddenly fold in upon the bather to crush him, or knives would emerge from its sides to amputate, flay, shred, pierce. Or the WC pedestal would twist

to snap a spine or spew flaming oil to envelope a trapped pelvis.

The analogy is not picked frivolously. The car is as familiar a place for most of us as the bathroom. The injuries the car inflicts on us, 20 dead and 250 seriously injured every day, are those described. But if our bathrooms behaved in such a way there are few who would dare enter them. It is not conceivable that if a million people owned such horror machines in 1930 that the number would have increased to 5½ million in 1960 and would have grown to 11½ million in 1970. Nor is it conceivable that any government would stay in power which not only refused to deal with the manufacturers of such monstrosities but actually encouraged their activities and subsidised their excesses.

Perhaps we should accept it then and let the people continue to kill and maim themselves. Mr Peter Wilks,

Chairman of the British Leyland safety engineers study group sees it as an ethical problem. He is quoted by the AA magazine *Drive* as saying, "It is downright immoral for manufacturers and purchasers to spend money on protecting people who are too lazy or unprepared to buckle on a safety belt". Oh, dear! We are getting tangled up in the inalienable rights of the motorists again.

Has anyone the right to suicide and murder in our society? Of course not. We do not allow people to dish out heroin. We do not allow pubs to serve alcohol to those under 18. We do not even allow people to dish out pornography. It is strange how the ire of the Longfords is reserved for back-street pornographers who might corrupt us with the sight of human genitals unadorned. In contrast to these alley rats and their dirty books, look at the lords of our motor industry. We know with complete certainty that the weapons they put in the hands of the public will this year kill, maim or injure 350,000 of our people. They will do the same next year and the year after until we put a stop to them. How about a well-publicised trip to the death-dealing factories of Oxford and Dagenham and a retreat in revulsion from the gleaming chrome and steel by which 900 children will die this year?

There is no question that modern technology could not produce a car infinitely more safe than it does today. There is no reason why speed limits higher than those at which cars are safe to those both inside and outside them should be tolerated. Our building regulations are framed with meticulous care to ensure buildings are built with the requisite fire resistance, structural strength and other characteristics necessary to prevent them being a danger to those inside and outside them. And a hefty safety factor is added for good measure. When the quite exceptional circumstances of a major gas explosion killed four people in Ronan Point four years ago there was panic in the building industry and a rushed amendment to the Building Regulations to ensure it would never happen again. But when 10 people were killed in the recent M6 pile-up nothing whatsoever was done.

A safe car costs too much. A slow car will not sell enough. It is as simple as that.

Marx was right when he talked of the opium of the people. If you want to

kill them, fool them first. Fill them up with myth and magic and you can do what you like with them. The new mythology of Our Car is about us everywhere. Admen sing its praises, make poems, make pictures in its honour. No garish plaster madonna was ever as vulgar as a gleaming Marina backlit in the sunset across a Highland loch, a plastic blonde on the bonnet and a promise of joy eternal. Was there ever a pyramid built as uncaring of human values, homes, gardens, livelihoods as the soaring flyovers, dual carriageways and concrete monuments of Our Car? Planners will tell us with their arcane words that it is for our good, the will of Our Car, irresistible traffic demand, the good life upon us, the fruits of progress, priests all of them in the cult, perhaps even believing what they say. Look at the way the atheist Nader is treated. "Nader simply has no argument," said a DoE spokesman referring to Nader's strictures on the lack of safety in British cars. Such faith in the face of the facts must surely move motorways. "Britain should not panic into a hysteria of legislation to control exhaust fumes from cars," said Lord Stokes a few months ago. Why ever not if the case against them is proven? We were quick enough to act against the poor Scientologists with their personality testing and little black boxes. But Our Car is above the law, as befits the deified. The Under-Secretary of State for the Environment was there to reassure the good Lord Stokes. "We are getting gusts of environmental panic," he said and implied they would pass. He did not mention we were also getting gusts of lead alkyl, carbon monoxide and all the rest, not to mention the blood of the 20 dead and the 250 seriously injured spattered all over the roads of Britain every day. No doubt Moloch's acolytes made similar soothing noises whenever they felt a gust of panic from the mothers of children selected for immolation. Perhaps they even believed they were doing a grand job.

In Dublin there is an elusive commodity called "the crack". It is hard to define, harder still to find. It is there when the lights are dim, the Guinness smooth and creamy, the conversation a coruscating continuum of wit and wisdom, the night eternal and the women warm and willing. I have sought it for years now. It is always where I

am not, where I should have been the night before where I cannot be the night to come. I believe in "the crack". Some day I will find it but I must bide my time. Too many want it now. Too many believe it can be obtained with the aid of a Toledo, Stag, Rapier, Scimitar, Jaguar, a litany of symbols of potency. The promises are there. The worst worry will be to explain away the stiletto heel marks in the roof fabric above the back seat. The will to believe is in all of us. The powers to deceive us are not shy to take advantage of it. No religion has ever got anywhere without promising heaven sometime, now or hereafter. The believers in Our Car are promised life eternal as soon as the Motor Show is over.

Few are immune to its blandishments. Even Buchanan, once the bright hope of those who believe there is more to city planning than smashing them apart to receive cars, stands now as "Man of the Year" for the International Road Federation. And we know where Road Federations stand: on the right hand side of the altar of the car and for inalienable right of man to be subjected to so much hogwash that he believes eventually that what is good for the motor industry is good for him too.

The car has not delivered the goods. We are as far away as ever from "the crack". Our towns sprawl, our lungs ache, our children are maimed and orphaned. The fabric of our cities is in tatters, our beauty spots become a desolation of asphalt. The super-tankers bringing oil plough up the Channel spilling and despoiling.

Derision is all there is left to us. If we are innocent enough to use our eyes and our intellects we will see what is being done to us. It took a small child to see the emperor's new clothes and the laughter of the crowd to end the story.

Let us end with a prayer to our Lords Stokes and Ford and all the rest. May they deliver us this day our transports of joy. May our roads be straight, unjammed our ways. May we be forgiven our accidents as we forgive their mechanical faults. And when our journey on life's great expressway is o'er may we enter the mansions of the celestial Motor Show where there is "crack" and parking space for all.

In the name of the bonnet and of the chassis and the 12 cylinder die-cast aluminium engine. Amen.

The Man who Invented Conservation

by W. M. S. Russell

The conservation movement was born officially in 1908 at a Conference of State Governors called at the White House by President Theodore Roosevelt. The concern about man's environment was stimulated by a book, *Man and Nature*, published in 1864, which explored man's effect on his surroundings. In this article W. M. S. Russell traces the history of the book and the work of its author, by profession a diplomat, George Perkins Marsh.

"The earth is fast becoming an unfit home for its noblest inhabitant, and another era of equal human crime and human improvidence... would reduce it to such a condition of impoverished productiveness, of shattered surface, of climatic excess, as to threaten the depravation, barbarism, and perhaps even extinction of the species". In the last few years, warnings of this kind have become rather common, though still too little heeded. But this particular warning, supported by an impressive mass of detailed evidence, was published more than a century ago, in 1864, in a book called *Man and Nature; or Physical Geography as Modified by Human Action*. It was the first book to explore, on an ample scale and in a systematic way, the effects of man on his surroundings. Lewis Mumford has called it "the fountainhead of the conservation movement". The very term "conservation", in its modern sense, first appeared in a later edition of this same book. The author was an American diplomat called George Perkins Marsh.

The man who invented conservation was born in 1801 in the frontier village of Woodstock in Vermont, then the newest State of the American Union. He was the fifth of eight children born to a prominent local lawyer. After graduating at the head of his class from nearby Dartmouth College, he tried teaching, law and business in turn, with no great success. Public life suited him better. He represented Vermont in Congress in 1843-8, earned the respect

of all parties as an honest moderate, and in 1848 made a memorable speech in favour of ending the Mexican War.

While in Congress, Marsh took a prominent part in the establishment of a great scientific research organisation, the Smithsonian Institution (1846), and became a lifelong friend of its chief scientist, Spencer F. Baird. Back in Vermont, he was Railroad Commissioner in 1858, and his report was, in the words of modern historian David Lowenthal, "a devastating exposé of corporate irresponsibility and financial skulduggery". But his main public service was abroad as a diplomat, where he used his position to give generous help not only to Americans but to European political refugees. Professor Zachary Taylor made him American Minister to Turkey (1850-53). With enthusiastic urging from the Railroad Managers of Vermont (who wanted him safely abroad), President Lincoln made him Minister Plenipotentiary to the new Kingdom of Italy (1861). He served there for 21 years (still a record term for an American diplomat) till his death in 1882. During his overseas service, he travelled extensively in Europe and the near East, accompanied by his invalid but indomitable second wife, Caroline, who survived him and wrote an unfinished biography.

Seeing the world as a whole

The study of the relations of man and nature requires a unified grasp of all fields of human knowledge, as Edward Goldsmith has often argued. So it is

not surprising to find that Marsh had very wide interests and versatile gifts. In Lowenthal's words, "seeing the world as a whole, he sensed how all its components meshed as he could never have done in a minutely detailed study of one aspect of them". His wide circle of friends and correspondents included scientists such as Agassiz and Lyell, and poets such as the Brownings and Matthew Arnold. He was interested in geology and meteorology, botany and zoology, and sent Baird keg after keg of specimens for the Smithsonian from the Old World. He made at least one archaeological find, an ancient flood control device in the city of Petra. He had the finest collection of prints and engravings in the United States. He was concerned with the history of technology, and a do-it-yourself enthusiast: "his friends", wrote his wife, "still possess specimens of his work in wood, glass, steel and brass, that would do no discredit to a skilled craftsman". "If you live much longer", a friend wrote him in 1857, "you will be obliged to invent trades, for you will have exhausted the present category". A fluent reader in twenty languages, Marsh was best known to contemporaries for his books on linguistics. When his publisher received the manuscript of *Man and Nature* in 1863, he at first advised Marsh to forget it, and instead to write a textbook "in the department of English languages and literature of which you are the acknowledged head".

Marsh once modestly called himself

"a student of nature (though not a naturalist)". When he was four-and-a-half years old, his father took him for a drive, showed him how to distinguish different trees, and, stopping the horse on the top of a steep hill, told him "that such a point was called a *watershed*". Marsh never forgot that day. The mystery of rainfall fascinated him: all his life, he liked to take his hat off in a shower and feel the rain on his head. His business activities gave him a more practical experience of sheep-farming, road-building, quarrying and lumbering. In 1847, at an Agricultural Fair, he spoke about the dangers of deforestation and the resulting erosion on the hillsides of Vermont. In 1857, as Fish Commissioner, he made an ecological analysis of the decline of fisheries in the State, including the effects of urban and industrial water pollution. His travels in the Old World gave him copious new material, as when, in the hills of Turkey and the deserts of Palestine, he saw traces of ancient cultivation in lands now turned by human activity into barren wastes. In 1860, he wrote to Baird that he was working on "a little volume showing that... man in fact made the earth". Four years later, *Man and Nature* was published.

"The object of the present volume", wrote Marsh in his Preface, "is: to indicate the character and, approximately, the extent of the changes produced by human action in the physical conditions of the globe we inhabit; to point out the dangers of imprudence and the necessity of caution in all operations which, on a large scale, interfere with the spontaneous arrangements of the organic or the inorganic world; to suggest the possibility and the importance of the restoration of disturbed harmonies and the material improvement of waste and exhausted regions; and, incidentally, to illustrate the doctrine, that man is, in both kind and degree, a power of a higher order than any of the other forms of animated life, which, like him, are nourished at the table of bounteous nature". This was a completely new enterprise. In the first edition of his great book *Principles of Geology* (1830-33), Charles Lyell had shown that changes in past geological epochs could be explained by forces still to be observed. He thus laid the foundations of modern geology. But, since man has only been active extremely recently,

Lyell was inclined to discount his effect on the earth as relatively insignificant, not much greater than that of other animals. Marsh wrote his book to show that, on the contrary, man has had a unique and often dangerously destructive effect on the earth. He had the satisfaction of convincing Lyell, who wrote him to this effect in 1865.

The destructiveness of man

Marsh was no back-to-nature sentimentalist. He had a Puritan faith in the destiny of man to control nature: "wherever he fails to make himself her master", he wrote in 1860, "he can but be her slave". He had a Yankee confidence in human technology: "nothing in the way of mechanical achievement seems impossible". But this made his realistic and richly documented warnings all the more impressive. When writing of the actual and potential destructiveness of human activity, he pulled no punches. "We are", he wrote, "even now, breaking up the floor and wainscoting and doors and window frames of dwelling, for fuel to warm our bodies and seethe our pottage".

As this metaphor shows, he was primarily concerned with man's destruction of vegetation, and especially of forests. In his day, this emphasis was undoubtedly the right one, for up to then man's greatest devastations had been produced by the cutting, burning and overgrazing of vegetation, leading to land deterioration, soil erosion, the formation of deserts, the silting-up of coastlines. Marsh could document this chain of events in many parts of the world, showing above all how the destruction of forests upset the natural cycle of water distribution. Water and trees, his childhood loves, occupy the forefront of his book. But many other subjects are discussed, including the effects of all kinds of human constructions on land and water, the results of wars, the changes in plant and animal life brought about by human action in promoting some plant and animal species (e.g. by some forms of agriculture), destroying others (e.g. by water pollution), and moving others from one part of the world to another. Through a mass of varied subject-matter, he pursues a theme nobody had stated so generally before: that natural forces undisturbed by man tend to form a *balance* that changes only gradually; that man in many ways disturbs

this balance; that he must strive to restore or recreate balance, for instance by forest conservation and restoration. Above all, there is that "necessity of caution". "It is time", he wrote, "for some abatement in the restless love of change".

The birth of conservation

Man and Nature sold more than a thousand copies within a few months. There were two further English-language editions, in 1874 and, posthumously, in 1885; Marsh was revising the third edition on the day of his death. By that time his work had had considerable influence. He was quoted in the British House of Commons in connection with deforestation in India; he helped compile irrigation laws in France, Italy, Spain and the State of California. In the year the first edition was published, the first American park reserve (Yosemite) was established, and in 1873 a National Forestry Commission was set up as a direct result of the book. Not only Lyell, but the whole scientific world soon accepted Marsh's main point that man was now a major factor in the ecology of earth. Yet his practical warnings were repeatedly forgotten, to be re-discovered at critical moments in the history of conservation. In 1907 the third edition was reprinted. Next year, in 1908, President Theodore Roosevelt called a Conference of State Governors at the White House, to discuss what he and his advisers then called Conservation, and the Conservation Movement was officially born. In the 1930's, when catastrophic soil erosion in the American Middle West brought ecological problems back into the news, Lewis Mumford reminded the world of Marsh's work. In 1955, the Wenner-Gren Foundation invited 70 scientists and historians to Princeton to celebrate a "Marsh Festival", which issued in a major book called *Man's Role in Changing the Face of the Earth*. It seems that the conservation movement again and again returns for inspiration to its "fountainhead". We can only hope that mankind will finally absorb the message of Marsh and those who have followed him, and develop measures of population control and conservation in time to avert "the depravation, barbarism, and perhaps even extinction of the species", and realise Marsh's hopes of "the restoration of disturbed harmonies" all over the world.

We need these Soil Tillers

by

Cleeland Bean

The role of the earthworm in maintaining soil structure and fertility has been challenged by those who believe there is no agricultural or horticultural problem that cannot be solved chemically. This underrates the value of an animal which may be the best ally of the farmer and gardener and which is sensitive to many agrochemicals and modern techniques of husbandry.

One particular animal which receives rough treatment from farmers and gardeners is the common earthworm, and in terms of conservation or ecology it would seem that we should be paying closer attention to its important function as a useful soil turner on agricultural land. The amazing actions of *Lumbricus terrestris* when observed among fertile earth layers have been demonstrated by British and American biologists who know that a lack of worms will produce hard, unmanageable ground blankets where good growing conditions are absent.

But long ago Darwin had calculated that on an acre of land worms will pass 10 tons of soil through their bodies every year. Professor Brian Hackett who leads a research team at Newcastle-upon-Tyne University points out that on an acre of fine arable land the total weight of worms below ground will be greater than the number of cows above it. He recognises how earthworms form vital links in a balance of nature where strong bonds exist between the humblest animals and their micro-habitats.

Worms share an environment with many other soil-dwelling creatures including insect larvae, spiders, centipedes, woodlice, springtails, mites, false scorpions, millipedes, harvestmen and beetles etc. Each species reacts upon the other, and more so when earthworms provide them with suitable hiding places in fertile soil layers made rich by leaf mould. Decaying leaves attract many worms whose underground tunnels on

an acre of land can cover 75,000 miles in a year.

During the same period investigations have shown that the animals will cast up to the surface anything from 20 to 400 tons of rich soil. Their burrows enable life-giving air, water and mineral supplies, to reach deep underground where plant roots, tree roots, seeds and useful soil bacteria require nourishing food articles. It may surprise us to know that we have at least 37 earthworm species in the British Isles, and they are all useful for producing healthy plants.

Studies show that these denizens can push aside stones weighing up to 2 ounces, and this is more than twelve times the weight of an average worm. The depth at which worms have been found is another aspect of soil aeration in relation to seed development and the root growth of trees and plants. Some specimens can thrive at levels as deep as 25 feet, while many others will be found at the 8-foot mark. Depth distribution depends of course upon the type of soil, and on newly tilled land Russian scientists find that worms will be quite numerous within the 20-inch depth level. Smaller specimens occur nearer the surface with an earth layer of 8 to 12 inches above them.

But as might be expected worms in general are not so numerous in sandy or clayey land formations; here too they will be much smaller. However, it is possible to attract earthworms by treating poorer soils with suitable vegetable

humus or organic materials. Some people quicken this process by mixing liberal quantities of manure, hay, dead leaves, kitchen scraps and hedge clippings, etc. with the top earth layers. Other gardeners have added lawn cuttings, decayed fruit, eggshells, pea pods, meal and even old newspapers.

Such work would be fully supported by the Soil Association whose members warn us about the menacing effects of soil erosion which could become widespread in Britain if we are not more careful concerning our efforts to squeeze the last ounce of goodness from agricultural land by the wholesale use of toxic chemicals. We must realise that earth is a living substance, and that an indiscriminate chemical spraying policy cannot be expected to produce good results.

Under such conditions our useful earthworm populations can be wiped out, and sterile soil layers will upset the balance of nature which ought to exist between bacteria, insect species, seed development and water action. Although the ancient Egyptians did not have the benefit of modern scientific knowledge we must give them credit for acknowledging the value of earthworms. Indeed it was Cleopatra who brought in laws or regulations whereby worms were to be protected as useful tillers of the fruitful Nile Valley.

Enlightened farmers and gardeners will agree that Cleopatra had the right idea, especially when they realise how worms can produce better crop, grass and fruit yields. For example, well tested land experiments in California have shown that when the ground enclosing orange groves was liberally supplied by earthworms the trees gave bigger and better fruit compared with other groves where worms were less plentiful. This reaction is what we would expect, and it backs up the US Department of Agriculture whose field biologists have found that on an acre of good land earthworms can convert 700 pounds of digested soil into surface castings each day. Better still is the

estimated number of 2,500,000 worms in every acre of rich farmland.

It is understandable then why conservationists are worried about the destruction of these creatures by toxic chemicals. They regard *Lumbricus terrestris* as nature's ploughman whose actions provide nourishing plant foods in the form of vital nitrogen, potash and phosphate supplies. These natural chemical changes occur as worms bore their way through soil while eating it at the same time.

In some respects our soil tillers resemble birds in that they have crops or temporary food storage chambers for receiving ingested materials. Later the food passes into a gizzard-like structure where it is ground up into finer compounds. This is the reason why worms need to take in small stones which become the grinding tools for producing suitable digestive juices. Food ingestion is caused by a sucking action which draws the soil through a bulbous pharynx into a narrow gullet. Eating movements are possible owing to the powerful muscular fibres which encircle the worm's body as well as extending along its length.

Earthworms perform valuable work by pulling leaves and other vegetable matter into their burrows; very often leaves are used as convenient tunnel plugs. The animals are able to digest plant materials by secreting digestive juices which dissolve the starch content of rotting foliage or stems. Obviously then, worms will be numerous where trees and hedgerows abound, and where leaf mould is readily available.

Tests reveal that soil which passes through a worm's body emerges with a reduced acid content, and the mineral salts contained therein are rendered more suitable for absorption by root systems. American scientists have also found that worm castings will contain seven times more phosphate, eleven extra additions of potash and at least five times more nitrogen compared with uneaten material. Some experts have calculated that on an acre of land the worm populations would take from twelve to thirty years to pass the top four inches of soil through their bodies.

Such results make us realise how these lowly creatures form important ecological links in the balance of nature. Without them the ground becomes infertile, and away back in 1777 Gilbert White of Selborne arrived at similar conclusions when he made the following

comments. Earthworms, though in appearance a small and despicable link in the chain of Nature, yet, if lost, would make a lamentable chasm. For to say nothing of half the birds, and some quadrupeds, which are almost entirely supported by them, worms seem to be the great promoters of vegetation, which would proceed but lamely without them, by boring, perforating, and loosening the soil, and rendering it pervious to rains and the fibres of plants by drawing straws and stalks of leaves and twigs into it; and, most of all, by throwing up such infinite numbers of lumps of earth called worm-casts, which, being their excrement, is a fine manure for grain and grass.

Today farmers and gardeners who use brine preparations against worms or indiscriminately handle deadly spraying agents or pesticides are unlikely to produce good growth yields. For example, simple tests on grass plots have shown that in those areas where worms had been deliberately eliminated the ground became hard, and stunted grass clumps were separated from each other by bald earth patches. But where worms abounded the grass grew as a luscious, deep carpet.

Things could hardly be otherwise, especially if the surface soil layers contain organic substances in the form of humus. According to field biologists your ground will be healthy if at least 12 worms can be found in a sod which measures a foot square and seven to eight inches deep. At this rate an acre will contain more than 500,000 animals. On the other hand, poor quality land is indicated if a sod turns up seven or eight worms. Rich leaf and vegetable mould will quickly attract *Lumbricus terrestris* which has an average lifespan of 15 years. During this period a single specimen would be able to produce approximately 40,000 offspring.

With such facts at hand we can understand why the Soil Association is concerned about the possible effects of widespread soil erosion caused by toxic chemicals. Unfortunately, however, a dearth of earthworms seems to be the aim of the official agricultural authorities whose approved list of farming and gardening chemicals includes powerful toxic agents for eliminating these creatures from turf, lawns, and grassy areas in general. We note that chlor-dane, a persistent organochlorine, is specially recommended as an earthworm killer, in spite of the fact that this

chemical among many others is described as being harmful to livestock and fish.

Even more lethal is lead arsenate which also comes under the description as a useful earthworm destroyer, and in official circles earthworms are usually lumped together with extremely harmful pests like leatherjackets and wireworms, etc. Surely then it is time for this false comparison to be discarded. The fact that lead arsenate is highly dangerous to bees, fish and livestock makes it an equally dangerous chemical substance for wild birds which prey on earthworms. Yet another recommended worm-killer is the carbonate insecticide and growth regulator known by the name of carbaryl.

The terrible effects of chlorinated hydro-carbons upon earthworms was first noted in Louisiana during 1958. At this period serial spraying operations with insecticides involving dieldrin heptachlor and DDT compounds imposed an eighty per cent destruction rate upon the local earthworm population. Even the anglers complained that their specially prepared beds were wiped out. But today we are still using many garden chemicals which include DDT and dieldrin compounds.

How could we expect worms to survive in soil where humus is absent, and where highly toxic hydrocarbons can remain at dangerous concentration levels for three to ten years? The Henry Doubleday Research Association in conjunction with the Cumberland Worm Farm at Kirklington has recognised this problem regarding their efforts to turn waste colliery heaps into fertile areas where grass, plants and trees would thrive. For such purposes non-toxic humus materials would be necessary as a suitable top soil for primary plant growth, and the worms could then begin to perform their useful tasks.

But it is worth mentioning that the herbicide known as paraquat has apparently no effect on earthworms. This particular weed killer is on the approved government list for gardeners and farmers, and its contact with the soil produces no harmful residues. So if we wish to preserve local earthworm populations we must not use toxic fertilisers, dangerous herbicides or concentrated insecticides. Only under such conditions can conservationists preserve the balance of nature in terms of fertile land development.

An Education for Ecologists

by

E. L. Jones

Anyone reading the hotter of the environmental magazines—say, *Playboy*—might think that Northwestern University, where I teach, is the place for environmental studies. Northwestern might appear as “where it’s at” in the current American idiom. This would not be strictly true, either if one is expecting long-haired hippies protesting against pollution by big business or if one is hoping to find a co-ordinated programme of environmental education already in being. Nevertheless, it is interesting to see how the image evolved and how the university is really striving to create a study programme of that kind.

Playboy's Press last year brought out a paperback called *Project Survival* and subtitled “our environmental crisis exposed by Dr Paul Ehrlich, Sir Julian Huxley . . . *et al.*” That is in keeping with the times, even to the lurid cover with a blonde wearing a gasmask. The text is quite serious, although it should not be confused with another *Project Survival*, edited by R. C. Gesteland and J. B. Putnam, published by Northwestern University last year and inspired by the same event, the environmental “teach-out” of 10,000 people held at the university on 23rd January, 1970. The *Playboy* Press book opens with a chapter called “Project Survival” by the magazine's assistant editor, Geoffrey Norman. He reports the Northwestern Project Survival “teach-out” as the precursor of the national Earth Day in April, 1970. The local event was a massive feat of organisation, publicity, all-night participation and crisis talk. There were enough big-name environmentalists and politicians speaking to bring it into the limelight.

Why Northwestern University, traditionally a little staid? The driving force was a student body, supported by many professors, called NSBE: Northwestern Students for a Better Environment. This had mushroomed from a few students concerned about the quality of Lake Michigan, which borders the campus, to a committee of committees, staffing their own office and library, collecting and spreading information on environmental problems within the University and outside in the prosperous suburban city of Evanston, and all up the richer

and richer North Shore suburbs of Chicago. For all its wealth and the serenity of its suburban avenues, this is an area under stress, in the Lake with its shoals of alewives dead along the beaches and on land with the urbanisation of suburbia.

The air above is cleaner than in Chicago, but noise and black oil streams behind the airliners incessantly coming and going from O'Hare airport. The trees which line the streets are contracting Dutch elm disease (the penalty for mono-cultural tree-planting) and spraying against it has killed off too many robins. The last corner of farmland is being developed and the Killdeer Plovers calling over the bulldozers this Spring will be the last with a chance of nesting. There is a splendid wildlife preserve 25 minutes drive north-west of the campus, in the Erickson Forest Preserve and Skokie lagoons. Migratory birds swarm there, Snow Geese and Hooded Mergansers in the autumn, Blue-gray Gnatcatchers and innumerable bright warblers in the spring. But the birds flit through while human visitors trample around like elephants. The pressure of picnicking and walking parties is intense and they leave litter ankle-deep. Worse, in this lung for northern Chicago, the lagoons are seriously contaminated with metal wastes and sewage.

Eco-Curricula

The university has supported NSBE's activities and sought to set up teaching programmes in environmental subjects. Like other American universities it is

for the moment short of ready cash and can offer few new courses. The challenge was to hammer out a curriculum from courses already on offer. Basically the bachelor's degree requires about 20 per cent of courses taken to be in a student's “major”—his honours subject in English terms. The remainder are not completely free, since there are obligatory courses in science and arts subjects which makes the “two cultures” problem less severe than in England. Yet there are still many options, great freedom to experiment with unfamiliar subjects. Out of this slack in the system, but without using it all up, we sought to devise the equivalent of a “minor” in environmental studies which might be taken with any “major”. Whether the scheme will pass all further committee stages, or in what precise form, it is still too early to say, but I feel that the structure which the undergraduate curriculum committee proposed was sound and is worth consideration in other places.

The plan was to arrange existing courses (to minimise the cost to the university) in a set which if satisfactorily completed would warrant granting a certificate in environmental studies. The certificate label was used because formally there are no “minors” at Northwestern. A student with the certificate would have had some training, officially recognised, in this field as well as more intensively in his major, and ought to be better-placed to compete for graduate scholarships or jobs in, for example, government environ-

mental agencies for which his major alone might not be a self-evident qualification. In short, the student gets a bargaining advantage. Educationally he will have had an ordered sequence of courses which he would have found it difficult to select for himself from the multitude on offer.

At this point a practical problem arose. Although the Northwestern system, like many in America, forces the student out of the narrow arts or science rut which is still too common in English universities, the tendency remains for natural scientists to take their optional courses in their major field or closely-allied sciences. Likewise, social scientists and students of the humanities tend to huddle in *their* small corners. We were, and are, training people who have a declared interest in environmental problems so that, if they are natural scientists, they have scant formal acquaintance with the decision-making social sciences of economics, politics, anthropology and sociology. In consequence they are apt to suggest technical remedies for perceived environmental disorders with little regard to context or cost. Those who come from the arts end of the

campus cannot even start to evaluate a "scientific" case for or against some technical device or procedure. At the undergraduate level this will never be fully overcome. We cannot train polymaths. But if we cannot properly temper the wind to the shorn lamb, we can see that he grows some protective fleece by requiring him to do some work in both natural and social sciences related to environmental problems.

Avoiding hysteria

The Northwestern students seem anxious for the certificate proposal to be adopted. Many of them are sincerely concerned about environmental problems and are already trying to select their courses with that interest in mind. Some are a little over-excited about quick solutions to a supposed global environmental crisis, fed by hysterical journalism, but not many. In my own course on the economic history of the environment I can introduce without fear of riot or inattention such views as those of Matthew Crenson, who thinks that air pollution may not be worse than it was decades ago and that the clean air campaign is merely symptomatic of rising expectations and mis-

placed priorities of social welfare, or Lloyd Rozeboom's urging that because it is the most effective way of controlling malaria, DDT should not be banned as it has been in several states and some European countries.

Can similar training in environmental studies be introduced into undergraduate education in English universities? It can. Money is tighter even than in the United States, the structure of bachelor's degrees is altogether less flexible, and the propensity to innovate is lower, so that change will not come easily. But novelties seep into English education in odd ways, often from levels below the universities, and there has already been much more experimentation even at university level than one could reasonably have anticipated a decade ago. The ecological problems of a crowded island are as severe, in their own way, as in the rumbustious continent of North America. People with joint natural science and social science training are needed to tackle them. Natural scientists alone, or classics-trained civil servants, are just not professional enough for the job. If there is a will to down departmental barriers, there must be a way.

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The Costs of Urbanisation

by

Kenneth E. F. Watt

The advantages of urbanisation are well known and to many people it must seem that the services and amenities that life in or close to a large city can bring will outweigh less tangible losses. More recently, however, evidence has begun to accumulate to suggest that the social costs of urbanisation may be much higher than we imagined. Malibu, a small town in California, must decide whether to "improve" its road system. In this article Professor Kenneth E. F. Watt discusses the likely consequences of this first step towards urbanisation in the light of research in which he is engaged at the University of California at Davis, where his team is studying the feasibility of building a mathematical model of California as a model of the human ecosystem.

In the past, whenever a village or town was about to grow into a city, it was in effect taking a leap into the unknown, because too little scientific work had been done on the dynamics of human society to know all the consequences of such growth. Therefore, it was meaningless to even discuss whether or not growth would be a good thing, because not enough was known to make a systematic cost benefit analysis of the consequences of growth, as opposed to no growth. However, this is no longer the case. A great deal of scientific attention is now being devoted to the analysis of data on the dynamics of cities and towns, and it is no longer always necessary to guess about the future consequences of present decisions. Now we are in a position to predict with considerable accuracy the

consequences of growing or not growing, or building freeways, or rapid transit systems, or not building freeways or rapid transit systems. In the following presentation, we will consider a number of specific questions that might be raised about the future of Malibu (a small city on the California coast, near Los Angeles), and answer these on the basis of the best scientific information now available. The points considered do not just have implications for Malibu; they apply to any small urban area confronted with the problem of whether growth would be a good thing.

Transportation

A question that arises immediately in the case of Malibu or any other small urban centre, is the advisability of improving the road system, by adding to the number of roads, widening streets, or building freeways. In Malibu this is a particularly contentious issue, because a freeway must be built at the base of the hills, adjacent to the ocean, or some distance out in the ocean, say half or three quarters of a mile, on a causeway, or through the hills, parallel to the beach. In the first case, some of the beach may be covered, and in the second and third cases, the scenic qualities of Malibu will be impaired. On the other hand, it can be argued that a freeway is necessary to ease traffic congestion, which can impair the movement of firetrucks at the height of the fire season (the Malibu hills are full of dry timberland, easily inflamed), perhaps causing tragedy. A central scientific problem here is, do freeways in fact ease traffic congestion in urban areas? A great deal is known about this point.

First, there is no doubt that freeways lead to an increase in the population. This point can be made simply by looking at serial photographs of expanding urban areas. The photographs show that the cities grow outwards along the sides of the freeways. However, it can be argued that if free-

ways grow faster in land area than the population, there will never be any congestion. This matter has been dealt with by Professor R. J. Smeed, one of the world's leading traffic systems analysts. In an article in the *Town Planning Review* (1964, Vol. 35, pp. 113-158), he shows that it is hardly correct to regard freeways as a solution to congestion, if we take the long view. In fact, the typical history proceeds more as in the following scenario.

- Step 1. Freeways are built to ease congestion.
- Step 2. Because of this, the population increases.
- Step 3. By now congestion has become really bad, so a great deal more freeway is built to alleviate congestion.
- Step 4. Because of the additional freeway, population builds up still more, and the number of square feet of roadway required per person becomes even higher.

Without belabouring this point further, I leave it to your imagination to picture the beautiful Malibu hills if it were ever necessary to build the roads to accommodate 10 times, or 100 times the number of people they have now (about 20,000). The key point is that the construction of a freeway will not serve just to eliminate congestion for the people now living in Malibu; it will also serve as an extremely potent attraction to other people to move in.

Taxes

All through history, an argument for developing an area has been that through broadening the tax base, there would be more people to share the costs of an urban area, and the tax rate would go down. In fact there is no evidence to support this view at all, either from theory or from analysis of the financial data on all urban areas in California.

We can argue this issue first, with

respect to education taxes, and second with respect to other services.

My group, the Environmental Systems Group in the Ecology Institute, University of California at Davis, is building a mathematical model of the State of California under a grant from the Ford Foundation and additional financial support from various federal agencies, to determine how the state operates and will operate in the future under additional population growth. One of the most interesting features of the model is what it teaches us about the effect of population growth on tax rates. What the model shows is that in rapidly growing populations an unusually high proportion of young people will be in school and will be supported by education taxes, this means that a high rate of population growth leads to an imbalance in the ratio of tax consumers to tax producers which crushes the middle class tax payer. This is exactly why we have so much tension in our society currently surrounding the financial burden of our educational institutions. In the case of Malibu, since it is a relatively undeveloped area immediately adjacent to one of the world's largest cities, any beginning of urbanisation there will lead to explosive population growth, a great increase in the proportion of young people in school, and a crushing local tax burden because of the high cost of school taxes per property owner. Does Malibu want this?

Our computer simulation studies have shown exactly what happens to the tax rate if the rate of population increase rises above 0.0 per cent per

year. In a stable population, with present day life expectancy, and no growth in numbers of people, there are about 23 students in tax-consuming ages for every 70 people in tax-producing years of life, or a ratio of 23/70, or 0.33 (33 in 100). By analysing the way in which the demographic characteristics of the California population change under different rates of population growth, the computer can show us the exact effect of different rates of population growth rates on taxes. The computer output is summarised below.

Given these figures, the amount of tension and conflict now developing in California over the budgets for educational institutions is scarcely surprising. The culprit is all of us; we thought we could each have as many children as we wanted, and have a good life too. It turns out that these two goals are incompatible. In the case of Malibu, the warning should be plain as to the significance of a sudden increase in urbanisation. The data show that any increase in urbanisation comes at a price, and the faster the rate of population growth, the steeper the price.

Another social phenomenon that has a great impact on taxes is crime and violence: the more crime and violence there is per person, the greater will be tax costs of police protection per capita. A number of organisations have shown, using FBI Uniform Crime Reports, that an increase in population density has a startling effect on the incidence of crime. Table 1 is taken from figures compiled by R. L. Kyllonen in GENERAL SYSTEMS.

Volume 12, 1967, pp. 137-145. These summary statistics were obtained by pooling the data for United States cities into six categories on the basis of city size classes.

The people of Malibu should decide if this type of accommodation to population growth and urbanisation is worth the obvious social costs. However, this is not the whole story. As an urban area increases in density, it is not only necessary to suffer under a higher incidence of crime, but it also costs more in tax dollars to pay for the police protection necessary to protect the average citizen. It is possible to work out precise estimates of this cost using the financial statistics on California cities published each year by the office of the State Controller. Table 2 should destroy any notion that increasing the size of an urban area leads to lower tax costs per capita for police or any other social services.

These figures scarcely lend support to the notion that one can cut taxes by increasing the number of citizens living in an urban area. On the contrary, increasing population size increases total taxes, and each component of those taxes.

Public health

Another question that might be raised about the urbanisation of Malibu is the impact on public health. Is a large urban area a more or less healthy place to live than a small area? There are at least two broad groups of diseases for which well-known mechanisms lead to higher incidence in dense urban areas: infectious diseases and pollution diseases. Most people understand that the greater the number of people with whom one comes in contact the greater the probability of contracting an infectious disease. At higher densities, there is an increased probability of encountering an individual who is currently an infective carrier of the disease. Thus, as one might expect, the Gallup Poll has discovered that a greater proportion of the population contracts influenza in large than in small cities during an influenza epidemic.

Much more important in California at the moment are the pollution diseases, emphysema and lung cancer. How does increased urbanisation affect the probability of death due to one of these diseases? This is not a simple question, because a great many factors

Table 1: The Relationship Between City Size, Population Density, and Crime Rates in United States Cities

Population size of Cities in 1960	Average number of people per square mile	Number of Crimes per 100,000 per year			
		Murder	Rape	Robbery	Assault
Over 250,000	7100	6.8	15.2	117.6	154.1
100,000 to 250,000	4271	5.6	7.6	56.5	83.3
50,000 to 100,000	3910	3.3	5.5	36.6	58.9
25,000 to 50,000	2810	2.9	4.7	22.6	39.9
10,000 to 25,000	2530	2.4	4.0	15.7	35.2
Under 10,000	1700	2.7	3.3	12.8	28.9

Table 2: The Relationship between Municipal Tax Revenues for California Cities in the Year ending June 30, 1967, and urban population size

Average city size in June 30, 1967	Number of cities in size class	Total local tax revenues per person	Cost of police protection per capita
2,779,500	1	\$126.59	\$22.39
713,600	2	234.22	19.93
385,900	3	141.29	18.19
179,831	4	102.85	17.08
131,340	5	107.53	14.93
96,929	10	83.92	13.87

seem to have an effect on the proportion of the population that dies because of these diseases, including smoking, climate, soil type, prevailing wind systems and topography of the area, in addition to the concentration and chemical composition of air pollution. From the point of view of Malibu, one fact is worth mentioning: the rate of increase in incidence of the pollution diseases seems to be greater than the state average in counties that are urbanising rapidly.

Some people may argue that there is no need to fear pollution in Malibu because it is adjacent to the ocean, and offshore breezes will blow the pollution off Malibu out to sea. This would come as good news to the county public health officers of other oceanside counties, but unfortunately they know it is not true.

The same patterns show up in the case of lung cancer death rates. That is, as the pollution builds up in counties which have been previously relatively unpolluted we notice corresponding buildups in the death rates for lung cancer as well as emphysema. To further indicate that these death rate changes may be caused by air pollution rather than some other factor, we have noticed that the level to which the death rate rises is proportionate to the pollution concentrating in the county.

I have said nothing about a variety of problems which we are just beginning to understand, such as the effect of urbanisation on temperature, fog, rainfall, and variability from year to year in rainfall. Scientific conservatism dictates that we do not alarm the citizenry until all the facts are in, but early information in many areas (such as the effect of smog on the weather) is alarming. I think it is safe to say that all responsible scientists expect smog to have very large effects on the weather at sometime in the future the only disagreement being over when this happens: two or three decades, or eight or nine.

The citizens of Malibu are confronted by a clear choice. If they opt for a freeway and intensive urbanisation, with all the well-known advantages conferred by these developments, they must accept that there are social costs and that these may be high.

This article is reprinted from Zero Population Growth by permission of the editor.

Coming events

7-11 February—Clean Air and Anti-pollution Exhibition, Lancaster Hall, Belle Vue, Manchester. Also conference on "Clean Air and Industry" organised by the National Society for Clean Air, 134-137 North Street, Brighton BN1 1RG. Tel: Brighton 26313.

16 February—"Developments in Education for Environmental Health". A one-day symposium arranged by the School of Biological Sciences. Further information from B. N. Kliger, Department of Biology and Cell Science, Thames Polytechnic, Wellington Street, London SE18.

February (end of month, date as yet unknown)—"Technology on Trial" International Conference on the growing problems arising from the impact of technological, demographic and economic development on the conditions of the biosphere. Organised by Unione Democratica Diregenti di Azienda in connection with the Club of Rome. Further details: contact the Unione Democratica, Palazzo Ruspoli, Via Della Fontanella di Borghese, 56, 00186, Roma.

29 March—"Non-Renewable Resources" the fourth in a series of six public lectures on population, resources and environment entitled **DOWN TO EARTH** held by the Conservation Society at Overseas House, Park Place, St James Street, London, S.W.1. Admission 10p at the door, or 50p for the series (also at the door). Lecture starts at 7 p.m. (doors open at 6 p.m.).

11-13 April—Phosphorus in Fresh Water and The Marine Environment. Conference at Botany Lecture Theatre, University College, London WC1/6BT. Enquiries: Prof. K. J. Ives, University College, London.

12-13 April—"The Profitable Management of Waste Materials and Environmental Control". Two-day course at Cabot House, Ashley Down, Bristol. For further details contact H. K. Compton, Bristol Polytechnic, Felixstowe, Bristol.

1-3 May—Offshore Technology Conference at Houston, Texas. Enquiries: R. D. Sherman, Exhibition Consultants Ltd., 11 Manchester Square, London, W.1. Tel: 01-486 1951.

31 May—"The Biosphere Cycles", the 5th of a series of lectures on population, resources and environment called **DOWN TO EARTH** held by the Conservation Society at Overseas House, Park Place, St. James Street, S.W.1. Admission 10p at the door, or 50p for the series (also at the door). Commencement 7 p.m.

2-8 June—"L'Homme, L'Air et L'Eau" (Man, Air and Water). International Symposium and Exhibition organised within the framework of the International Week for Environment under the patronage of Mr Jacques Chaban-Delmas, Prime Minister. Enquiries: R. D. Sherman, Exhibition Consultants Ltd., 11 Manchester Square, London, W.1. Tel: 01-486 1951.

5-16 June—**ONLY ONE EARTH**—United Nations Conference on the Human Environment. Stockholm. For further information: Palaise des Nations, Geneva. Tel: 34 60 11.

Classified Adverts

MAN REQUIRES POSITION as scientific correspondent for chemical or related journal. Would like to work from home address (has young children). Has NNC in chemistry, eight years experience in industrial chemistry, GCE 'O' level passes include English Language and Literature. Typing experience. Age 26. Apply 42 Springfield Garden, Ilkeston, Derbys.

GRADUATE, 22, degree in Civil Engineering but disillusioned with choice of profession, deeply interested in all aspects of ecology/conservation, seeks any job in this field. Box E146, *The Ecologist*.

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VILLAGE HOLIDAY IN TURKEY. Ideal for families, nature lovers, vegetarians who appreciate clean air, walking, riding, swimming, etc. Easy access to major historic towns (Istanbul, Bursa) as well as proximity to famous Spa. Accommodation in simple but homely family pensions with balconies and panoramic views. Bookings per week (not July and August). British subject on the spot to interpret and give general help. Apply Box 12A, *The Ecologist*.

MALE CHEMISTRY GRADUATE, 27, with 1 year's chemistry research plus 4 years' computer/O.R. experience seeks renewed motivation from working in conservation, ecology, pollution control, etc. Box E147, *The Ecologist*.

A Blueprint for survival statement of support

In the Statement of Support, which appeared with the Blueprint for Survival in our January number, Professor V. C. Wynne-Edwards, FRS, was described as Chairman of the Natural Environment Research Council. Prof. Wynne-Edwards' period of office as Chairman of NERC ended on the 30th September, 1971, and his support for the Blueprint does not involve or commit NERC in any way. We wish to apologise to NERC and to Prof. Wynn-Edwards for our inaccuracy.

Reports

Our Conscience, 'The Hawk Trust'

During this century, with considerable legacies from the end of the last, we have managed to decimate many formerly common species of hawks and falcons. It started with all out warfare on these and other predators to preserve game birds so as to produce the fantastic bags in the early 1900's, and has been completed with the help of toxic chemicals applied in agriculture. Sparrowhawks, peregrines and many others are now rarities. Much has been done to try and counter this trend by the application of more stringent rules to the testing of chemicals, the removal of those pesticides which have been found to be persistent and dangerous, together with the more sensible and realistic attitude of modern landowners and gamekeepers.

Nevertheless, for some species, the tendency is for the decline in population to continue, while others are recovering but slowly. The Hawk Trust was founded to try and see what could be done to build up these fascinating birds to a level where their continued existence is secure once more.

The official aim of the Trust is to try and conserve our native species. Their object is to take immediate, positive action by breeding the birds in captivity for release in suitable areas in the wild. By such action it is hoped to halt the decline, and perhaps even increase the natural stock, and help our native hawks regain some of their former territories. Besides this aim, the members hope to increase the general interest in birds of prey, initiate research into their mode of life and publish such information in periodic reports.

The Trust has already started its breeding programme and has released several broods of kestrels in open country on Dartmoor and in Gloucestershire. The first breeding aviaries run by the Trust are on ground kindly lent by the Falconry Centre at Newent. The Falconry Centre is a privately run venture which Mr and Mrs Philip Glasier and Martin Jones opened a few years ago to display birds of prey, and show the history of Falconry and the birds in action. People visiting this fascinating

place showed a keen interest in our native hawks and gradually the idea of the Hawk Trust evolved, nothing to do with the Centre but arising from it, in a sense.

Philip Glasier was persuaded to become Chairman of the Trust, and he it was who so kindly loaned the ground, and gave much encouragement in the early, struggling days. Now the Trust have a number of aviaries on this ground, erected and looked after by members. Plans are ambitious. It is hoped to instal and breed from pairs of peregrines, red kites, buzzards, merlins and kestrels. There is much to be

learned about birds of prey and their special breeding needs, and it is hoped that considerable scientific knowledge will be gained, to be written up in due course by the Trust.

Membership is growing at a reasonable pace but, as time is so crucial, every effort is being made to attract people to the Trust at an accelerated rate, through film shows, lectures and an increasingly vigorous programme of events.

One such most successful venture was a recent Open Day held at Cheltenham Racecourse one weekend in April. Several hundred people attended, to-



Red-thighed falconet, the smallest bird at the Cheltenham Open Day

Reports

gether with television cameras and many members of the Press. While it was emphasised that the Trust was interested in conservation and breeding birds for release in the wild, to promote public interest and give excitement to the proceedings a programme of events was arranged which included demonstration flights by trained hawks and falcons.

In the Enclosure, the lawn was used as a centre piece to display a number of birds on blocks and perches. These ranged from the lordly peregrine to the tiny red-thighed falconet—a bird little larger than a sparrow. Among the displayed birds was a lugger falcon, common buzzard, Harris's hawk, goshawks, and kestrels. Other falcons were being carried among the crowds and shown to people in a small exhibition which had been laid on inside.

During the day, a number of outdoor events attracted the crowds down to the open spaces in front of the Stands. The most unusual event was a demonstration bloodhound trail which had a girl "victim" laying a trail round the course and being unfailingly traced by the hounds. This was followed by a number of demonstration flights given by various hawks and falcons.

Unfortunately, no flights were given by peregrines, which are undoubtedly the most spectacular, but some lugger falcons—natives of India and somewhat similar to peregrines—gave some remarkably fine flights at a lure. They waited-on overhead when released and then stooped most spectacularly down at the whirling lure; as it was twitched away they towered up again and then dropped once more. It was virtually impossible to follow their dashing flight as they crossed the light or swept behind the Stands.

A goshawk gave a quite different display; being flown at an artificial hare being dragged across the field in front of the fascinated crowd. The way in which it flew low across the field and pitched right on the lure with both feet extended, impressed everyone. It all happened in a moment. The final outdoor demonstration was by a Harris' hawk which flew from lure to lure between its owners as they walked slowly

down the front of the crowd. This bird is large and broad-winged, similar to our native buzzard.

Inside, a film was shown free several times in the day. It was most appropriate, showing the raising of an orphan golden eagle and its successful release to the wild. Many people came out of the film show and made straight for the Trust's membership stand. Some joined on the spot while others took literature away, and have since become members. The exhibits in the room showed just how worthwhile the whole project is. The significance of releasing birds to the wild becomes more apparent when it is shown that only 60 pairs of peregrines exist in Britain today: every bird that can be bred will have a measurable effect.

For those who wish to join, the Hon. Secretary is Miss Jane Fenton, c/o The Falconry Centre, Newent, Gloucestershire. She will be delighted to send full details of membership, which costs £3 a year. As well as helping the cause, this will bring tangible benefits to the member in the form of meetings, film shows, expeditions to see wild birds, and an active part in an enthusiastic and growing band with a common interest.

Robin Williams

Deep sea lettuce

Japan, being a maritime nation depending on the sea for much of its food supply, has more reason than most countries for disliking sea pollution. In one isolated respect it has cause to be grateful for sea pollution. The subject material is laver, or sea lettuce.

Sea lettuce is one of many vegetables derived from the sea and used to supplement the diet of fish and crustaceans consumed by Japanese. It is a seaside vegetable which needs alternate wetting and drying to develop and thrive. It could be simply picked off the beach but this is not a profitable procedure and all manner of other vegetables get mixed up with the genuine lettuce. Hence, the inventive Japanese rigged up nets on bamboo poles, dipping into shallows where the rise and fall of tides did the daily wetting and drying. Suitable shallows became scarce and the nets were taken further out, with a small army of workers to load the lettuce into boats daily, row it ashore to be sun-dried, then take it back into the sea for wetting again.

Japanese beaches have been particularly subjected to pollution and the main depository appears to be the very shallows needed for lettuce. Hence, the nets had to be taken further out, which meant that it became a gigantic task to gather, row, dry, row and redeposit. The nets had to be taken into very deep water to escape the accumulated oil and other unwelcome contamination.

What happens now is that the nets are positioned in water forty metres deep, held up by an air-inflated frame. When drying has to be done all the workers have to do is pump up the frame, do a bit of fishing and then let it down again.

First reports are enthusiastic. Because the water is deeper there is more available area (ten times as much in fact) and the yield is higher. Most important, the gentle lifting and falling is less savage than the previous manhandling and the delicate little lettuce buds are not damaged. Also, because the location is well off-shore there is almost no inclusion of undesirable vegetation.

It has not yet been decided what happens when the forty metre depth line becomes polluted, or whether the Japanese government intends to extend its lettuce beds rights into international waters.

Allen Jones

Severe penalties for German polluters

Prison sentences of up to ten years or fines up to DM. 100,000 (nearly twelve thousand pounds) are in store for people in the Federal Republic of Germany who break the tough new laws on pollution control. In addition, the list of legislative safeguards for the environment is being increased all the time. The draft of a law to offer protection from noise and air pollution (trickier legal subjects than water pollution) has already been passed by the Cabinet in Bonn and sent on to Parliament. The Federal Government has thus become the first European body to present really far-reaching legislation to protect citizens from harmful environmental influences.

The new law is already fifty-nine paragraphs long. It requires everybody... from industrialists to the users of lawn-mowers... to avoid, do away with, or prevent environmental damage. This basic law is meant to apply

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to manufacturing plants, machines, and furnaces as well as cars, planes, trains, and ships. So-called "major polluters" must submit to a severe approval system. In future, however, even medium-sized and small firms will be checked up on. Machinery, tools, and fuel can only be imported if they comply with the new regulations.

The Bill also foresees the introduction of a general atmospheric surveillance system and the intensive monitoring of air pollution in "stress areas". The local government of the Federal States will be given the right to temporarily close down factories during smog emergencies, to limit the consumption of certain fuels and to temporarily stop all automobile traffic. Furthermore, all planning measures will take into consideration the fact that residential areas must remain free of detrimental environmental influences.

The Bill is the last of four in an immediate programme announced by

by the Federal government last year to provide all-round environmental protection. One law which has already been passed foresees a drastic drop in the lead additives in petrol. The German automobile industry is already planning its future models with this in mind. Particularly interesting to Britain is the fact that the German government has called on its European partners to take immediate measures along the same lines. It considers this is the only way to combat the insidious trend whereby polluting industries emigrate to neighbouring countries with less severe environmental restrictions.

Richard Warner

The spread of the fox in the London area

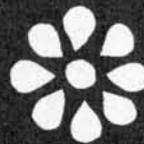
The fox has, during the past twenty-five years, become a numerous resident throughout the whole of the suburban area of London. There is already some justification for the statement that there are more foxes within a twenty mile radius of St Pauls than there are in the rest of South Eastern England. Foxes have proved to be most successful animals and have

learned to live very well off man. They have adapted themselves to suburban life far better than many other mammals, the parallels in the United Kingdom being the grey squirrel, the house mouse and the rat. This adaptation is also shown by the coyote in America, especially in Los Angeles where it has become a successful animal of the suburbs, and is often to be seen using the freeway verges.

Although the fox may have become established in the suburbs only in recent years there are quite a few records of them from earlier times occurring well inside the built-up area. In 1945 Richard Fitter considered that the few isolated records of animals in places like Dulwich and Brixton probably referred to released pets, but now it seems likely that they were genuine invaders from the countryside. At that time the fox was recorded from the following innermost localities: Hampstead, Mill Hill, Epping Forest, Purley, Richmond Park and Elmstead Woods.

At the turn of the decade in 1950 several observers, including some Masters of Foxhounds recorded that the fox had apparently become more suburban and could now be found

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Reports

regularly around places like Epsom, Esher and Weybridge. Figures from the Ministry of Agriculture, Fisheries and Food for the period show that the fox was increasing in the Kent sector of London, where 103 were killed in 1948, 129 in 1949 and 196 in 1950.

In the mid 1950's two main factors drew attention to the fox. The first was the advent of myxomatosis with the corresponding drop in the staple diet of country foxes: rabbits; and the second was the founding of the Mammal Society in 1954.

By the early 1960's, the fox could be found regularly within ten miles of the city centre at Blackheath, Walthamstow, Wimbledon and Norbury; while the occasional animal was recorded from even nearer the heart of the city. The position now in 1971 is that the fox has probably occupied all of the available areas with sufficient open space for its ecological needs. Foxes are common and breed regularly in Dulwich and Peckham and even New Cross. As many as seven have been shot in one drive on Streatham Common. They are seen regularly in places such as Wandsworth, Hammer-smith, Kilburn, Highbury and Hackney. The fox has turned town-dweller within a quarter of a century.

Any open space in London, especially if it is relatively undisturbed is likely to have its resident foxes. Railway embankments, cemeteries, sewage farms and even industrial sites are all used besides the more normal localities such as small woods and commons. Railway banks, especially in the Kent area, provide excellent undisturbed sites. Certain places, the bank near Petts Wood station is an example, have become well known as localities where whole families of foxes will sit and watch the London commuters go by. Cemeteries such as those at Highgate, Beckenham and Putney are all regularly inhabited by families of foxes; while large industrial sites provide an abundance of food in the shape of small rodents and human waste. In Middlesex in particular foxes are known to breed amongst the piles of metal in an enormous scrap yard, where attempts to destroy them are of necessity limited.

The food of suburban foxes is of interest especially when compared with that of their country cousins. It has been shown that before the advent of myxomatosis rabbits made up some 65 per cent of country foxes' diet. After myxomatosis analysis of research material shows that the percentage of short-tailed voles taken rose from 4 to 41 per cent while that of birds rose from 12 to 27 per cent. It has also been shown that country foxes scavenge, visiting garbage dumps and service camps to do this. In the suburbs there are no statistics available but from numerous records it is clear that city foxes live on rats and mice and the products of considerable scavenging. The arrival of foxes in suburban areas often heralds a dramatic fall in the number of rats. Foxes living in the outer suburbs like Epsom and Esher would be able to find numerous country foods, such as voles or fruit, as well as scavenging from some well-stocked dustbins.

Foxes undoubtedly take poultry, and even one trapped in Brixton had killed ten Brixton chickens. Ornamental ducks and geese are not infrequently taken from park lakes and even from private gardens. There is much less evidence to show that foxes kill large numbers of household pets. Rabbits and guinea pigs no doubt occasionally get carried off but cat killing is quite rare. It is unlikely that a fit cat would fall victim to a fox, and there are records of cats chasing foxes away. Old fat cats and kittens may not fare so well. The fox also eats carrion and numerous cats and birds, killed by cars,

lie as carrion often on some suburban fox's beat.

The suburban fox is an opportunist taking the easiest available meal. Such meals have even included chickens, pre-packed, oven ready and wrapped in cellophane, sneaked from an early morning delivery van.

London has its fox-lovers and its fox-haters. Some feed and protect them, whilst others, often after losing pets or poultry, or fearing quite unnecessarily for their children, have cause to destroy them. As recently as 1969 a family of fox cubs spent some time playing with a five year old girl and her ball in a Surrey garden. The vixen sat quietly by watching the proceedings.

Until recently complaints were dealt with by the Ministry of Agriculture, Fisheries and Food but are now the responsibility of the local authority. Periodic shoots are conducted on local parks and commons while earths are gassed. Other foxes soon appear and replace those destroyed, a vixen having been seen to bring out the bodies of the previous family from a gassed earth, before producing her own cubs.

Numerous people feed foxes in their gardens, sometimes deliberately, others by accident, simply by putting food out for the birds. Foxes have become so tame in some places that they will come for food if called.

It is apparent that the fox has begun to benefit by the spread of the suburbs. Its routes of access are the same as man's; it uses railway banks, footpaths and roads. The suburbs are a safe retreat from the Hunt which is unable to operate in such enclosed areas. There is plenty of cover and numerous breeding sites, and above all there is an abundance of food. Already foxes have penetrated many of our smaller towns and cities such as Bristol, Southampton and Norwich.

The spread of the fox into the suburbs appears to be a new phenomenon. What caused it is impossible to say with certainty. It seems likely that foxes were already moving into the suburbs during the war years, and the hard winter of 1947, followed by myxomatosis in 1953; and another severe winter in 1962/3 all simply acted as catalysts in speeding up such a movement. There is no doubt that despite efforts to control it, the fox still flourishes in the London suburbs.

Ian Beames





Friends of the Earth Newsletter

National Parks

The ten National Parks are in the news. Twenty-two years after the National Parks Act became law, national conservation and amenity societies are pressing for a new financial and administrative deal for the parks and public alarm at the threat of mineral exploitation in the parks is growing.

Section 1 of the 1949 National Parks and Access to the Countryside Act set out the reasons for establishing the parks, i.e. '(a) for the preservation and enhancement of natural beauty in England and Wales and particularly in the areas designated under this Act as National Parks or as areas of outstanding natural beauty; (b) for encouraging the provision of improvement, for persons resorting to National Parks, of facilities for the enjoyment thereof and for the enjoyment of the opportunities for open air recreation and the study of nature afforded thereby.'

This was further strengthened in Section 5 in reference to 'their natural beauty and the opportunities they afford for open air recreation, having regard both to their character and to their position in relation to centres of population.'

So we see that, superficially at least, Parliament recognised the need for protection of these areas for public enjoyment as a national entity and provided for this in statute. However, these good intentions failed in most cases to become observable successes when it came to administration of the various Parks.

The administrative structure of the Parks has caused the problem. Four of them (the Brecon Beacons, Exmoor, Snowdonia and the Yorkshire Dales), lying in more than one county are run by separate planning committees of the

county councils concerned. Above, in a supervisory but powerless position, is a joint advisory committee. Four more Parks (Dartmoor, Northumberland, North Yorkshire Moors and the Pembrokeshire Coast) lie entirely in one county and are run by a single planning sub-committee of that county council. The two remaining Parks (the Peak and the Lake District) have planning authorities (Joint Boards) of their own which are independent of the county councils.

The seats on these committees and boards are filled by members recommended by the county councils and the Secretary of State for the Environment on a 2:1 basis respectively. The Peak District Park is the only one to employ its own staff. All the others are run by county officials on a part-time basis.

Similar difficulties are experienced with the allocation of finance in running the Parks. The Peak and the Lake District Boards have financial independence through a power to precept on the county councils for the necessary funds, although this is limited in the case of the Lake District.

Thus we have the anomalous situation of local authorities running a national concept, a complete negation of the original and oft repeated and recommended ideal of an independent

planning authority with its own staff for each Park. The need for this independence was emphasised in the Redcliffe-Maud proposals of the Royal Commission on Local Government in England in 1969; in the White Paper, Reform of Local Government in England, in 1970; and again, in June 1971, in a report by Sir Jack Longland of the Countryside Commission. There it was shown that only the Peak Park, and to a lesser extent the Lake District, had been able, due to their financial and administrative independence, to attack cohesively the problems associated with the Parks. However the Department of the Environment rejected the proposals in this report.

Now the Countryside Commission has made an agreement with the county councils to relieve the multiplicity of committees in the Parks and provide a National Park Officer for each park. However the Parks will still be financed out of the county council budgets and their staff, not necessarily full time, will be employees of the county council. Mr Peter Walker, Secretary of State for the Environment, intends implementing this agreement.

A look at some statistics regarding Park administration may be in order at this point. In the financial year 1970-71 the total expenditure of all ten parks was just under £900,000¹—less than a quarter of what the G.L.C. spends on its parks and open spaces in a single year. Yet these are the open spaces of the whole nation. The Peak District and Lakes spent 44 per cent of this amount which gives some idea of the power of financial independence and the paltry amount being spent on each of the other Parks. In the face of this the estimated income from tourism in the Snowdonia National Park to Merionethshire is £6 million per year.

Fourth European Marine Biology Symposium

D. J. CRISP, FRS

This volume, resulting from the Symposium, gives up-to-date specialist information on the behaviour and structure of the animals that attach themselves to rocks, pilings, ships' hulls etc. The biology of these animals becomes important in the consideration of ship fouling and mariculture.

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County councils have not realised the potential available in a National Park and the need for positive and comprehensive planning. Indeed just being able to cope with the rapidly increasing number of visitors requires a full time application. Exmoor currently has 5 million people within a three and a half hour drive of the Park and estimates indicate that they will rise to about 19 million people within a decade.

In fact, the county councils have in general proved ineffective guardians of the national assets entrusted to them. Merioneth County Council is supporting the CEGB's proposals for vast water storage hydroelectric schemes in Snowdonia National Park; Cumberland County Council is in accord with the Department of the Environment in its plan for a dual carriageway beside Bassenthwaite Lake. The Dartmoor Park Committee has put half the National Park at risk of conifer afforestation through an agreement with the Forestry Commission.

Various local councils have glibly accepted the claims by large scale heavy industry of reducing local unemployment and allowing intrusion on Park space without any investigation as to the merits of such development. And so it goes on.

The compromise agreement between the CCA and the Countryside Commission will become part of the Local Government Bill now before Parliament and urgent and concerted action is needed to amend this Bill.

Such action is being spearheaded by a group of bodies who are arranging for the issue of national park administration to be fully debated. Organisations concerned are the Conservation Society, the Friends of the Earth, the Standing Committee on National Parks of the C.P.R.E. and C.P.R.W., the Ramblers' Association and the Youth Hostels Association, the Wolverhampton Civic Society and the Friends of the Lake District.

Amendments to be put down will be aimed to give the Parks independent

planning authorities as recommended by the Countryside Commission and the Royal Commission on Local Government.

National attention will be focused on February 24th, National Parks Day, when a London rally will be combined with regional meetings to bring home to the Government the concern expressed by people all over the country.

Parallel with the administrative issue is the current exploration in the Parks for minerals.

There again we see more confusion, this time in the field of planning law and its requirements coupled with unproductive National Park legislation and a distinct lack of co-operation, or even liaison, between the Department of the Environment and of Trade and Industry.

Reference

(1) Figures from National Park Authorities Statistics, 1970-71.

Better farming better food better health...

If we are to survive, the world's capacity to produce food must not be compromised by attempts to achieve yields so high that they cause accelerated erosion of our soils or pollution greater than the ecosphere can absorb. The Soil Association aims to improve the standard of our farming in order to conserve soils and promote greater ecological stability. It means improving the appearance of the countryside, improving the nutritive value of produce and so, incidentally, improving our own health.

If it is to succeed, the Association must be able to tell the public what is happening and what reforms are needed. This costs money and it calls for interested individuals through whom it can channel information.

The task is big and of vital importance to the future of food production. You can help. Become one of the Soil Association's members, committed to ensuring a safe future for our farms and our children.

The Soil Association assisted in the preparation of *A Blueprint for survival*. Members are entitled to subscribe to *The Ecologist* at a reduced rate.

Write now for further details to The Secretary, The Soil Association, Walnut Tree Manor, Haughley, Stowmarket, Suffolk IP14 3RS.



Towards a unified science

The mind

The mind is yet another postulate whose possession is supposed to distinguish man from other animals. Held to be of a spiritual or non-material nature, its interaction with the crude world of matter is clearly very puzzling, at least for those who insist on maintaining a dualism of this sort.

To explain this apparent paradox, philosophers have worked out various theories, the best known of which are the theory of psycho-physical parallelism, where the twin domains run side by side without actually interfering with each other; the theory of interaction, whereby there is constant interaction between them, as the name implies; and, thirdly, that of identity, whereby we assume that both refer to a third and ultimate reality.

The concept of "mind" is of use in a scientific context to the extent that it can serve as a variable of an objective model. We have seen that behaviour is explicable in terms of the inter-relationship between a cybernism and its environment.

If the term "mind" is to be made use of as a variable of a scientific model of behaviour, it can, I think, best be identified with a cybernism. Seen in this way, it refers to an organization of information providing an individual with a model of his relationship with his environment, i.e. the larger system of which he is part.

It is therefore nothing more than a particular type of control mechanism, which to be understood must be seen in the light of control mechanisms in general, such as the nucleus that mediates the behaviour of a cell, or the genes that control the ontogenetic process. As soon as we use the term 'mind' in this way, the dichotomy between mind and matter automatically disappears. To begin with, the environment, which is in interaction with the cybernism, itself contains

a hierarchical organisation of sub-cybernisms. More specifically, the body is made up of units such as cells, molecules, atoms, each of which has its own little "mind" in which information is also organised, from which instructions are also transmitted, and which also provides a model of its specific environment.

Perhaps the relationship between the mind and the body can be regarded as a form of transduction. Information expressed in the medium of the cybernism is transduced into the medium of the behavioural system. This is very much the same as saying that the environment is organised in accordance with instructions transmitted by and contained in the cybernism. Regarding it in this way also emphasises the essential fact that information is organised in the cybernism in that way *which will most favour the mediation of the optimum behaviour pattern.*

This point is perhaps best illustrated by the process of protein synthesis, involving the transduction of the information expressed in the medium of the genes into those enzymes that will determine the growth of the system during ontogeny.

The process was first described by Quick, Griffiths, and Orgel. An enzyme is a very large protein molecule. It consists of hundreds of amino-acid units, arranged in a chain in a very specific order. This does not occur haphazardly, but must be determined by a corresponding set of instructions. The latter are transmitted by the genes. Beadle, experimenting with a very simple form of life—neuro-spora—showed that proteins were in fact synthesised by the genes.

How this in fact was accomplished was eventually shown by Crick and Watson. It was revealed that the medium or language in terms of which information is organised in a gene made use of an "alphabet" of four different

nucleotids. Information organised in the protein molecules, on the other hand, makes use of an "alphabet" having twenty basic classifications. Crick showed how information is transmitted from one medium to the other. The four basic nucleotids could in fact be arranged in triplets, which would thereby produce twenty combinations corresponding to the twenty classifications used by the protein. Crick went further, and showed how this transduction was in fact achieved. RNA was synthesised in the nucleus. The amino-acids that were destined to become linked together in order to form proteins first attached themselves to the RNA nucleotids synthesised in the cytoplasm, and known as transfer RNA. In this way, each amino-acid molecule is given an identity that makes it recognisable to the RNA templates or models in the ribosomes. The transfer RNA fits perfectly onto the template RNA. In this way, transfer RNA links each amino-acid to its own specific triplet, and the enzyme has been manufactured.

The relationship between a gene and the protein that it synthesises must be functionally that existing between any cybernism and the behavioural process that it mediates. In each case, information organised in a cybernismic medium is transduced into that of a behavioural one. In other words, instructions are translated into action. If the "mind" is taken to refer to a "cybernism", the problem of the relationship between the "mind" and the body automatically disappears. If such an identification is not accepted, then the "mind", being indefinable in terms of the teleonomic variables of a scientific model, must have but a very low information value—and its postulation can serve no purpose in the understanding of behavioural processes.

Edward Goldsmith

Ecotechnics

by Arthur J. Puffett

Waste Materials for Construction

Recent years have seen much greater exploitation of non-virgin materials for use as constructional aggregates. The present-day demands of road-making and building programmes have stimulated a wider interest in these materials, generally the waste products of manufacturing processes, as a supplement to supplies of virgin rock and gravel.

A good example of how the extractive industry is tackling this reclamation is at the Tesseract Works of Tarmac Roadstone, which is currently extracting and processing blast-furnace slag at the rate of 1,200,000 tons a year. A stable material that can be converted relatively easily into suitable aggregates, the slag arises either in tips that are the historical relics of past ironmaking or as current tipping, initially in the molten form, from the local Clay Lane Blast Furnaces of the British Steel Corporation. After digging, it may be sold direct to users or crushed and screened to 1½ in down and then sold. Generally, two-thirds, some 800,000 tons, is supplied processed.

The tips can be quarried by more or less conventional methods and the

machinery operated by Tarmac includes crawler rippers, dump trucks, rubber-tyred tractor shovels, a face shovel and a crushing and screening plant fed by belt conveyors.

Two crawler rippers excavate the face and grade the loosened material down to a lower level. They operate in two different areas, recovering material for processing in one and material for direct sale in the other.

The crushing and screening plant is about half-a-mile from the face and excavated slag is transported by a fleet of dump trucks, four of 35 yd³ capacity and one of 20 yd³. At least three of these trucks are running between face and plant throughout the working day.

Material for processing is loaded into the trucks at the face by one of the biggest tractor shovels currently in service in the UK, a Yale 6 yd³ model 6000. One advantage of this large articulated machine, which works continuously for 10 hours a day, five days a week, is that its capability enables trucks to be turned round rapidly to keep the plant fully committed. It digs from the loose material graded down from the excavating level by the ripper and loads directly into the trucks, usually taking about six passes in three minutes to fill each truck to capacity. In a typical day, it handles 2,000 tons and loads 75 trucks, although on occasions its production reaches 2,800 tons daily.

In addition to the tonnage handled by this machine, which has been at Tesseract Works for two years, a further 1,000 tons of "hot" slag is extracted daily by a face shovel working at the

cooling pits. Slag from both sources is combined at the plant to ensure uniform temperatures during processing.

On arrival at the plant, the trucks discharge into two dump hoppers, which feed on to belt conveyors servicing a stockpile. An underground belt recovers slag from the pile as required for reduction and subsequent screening. From the screens, material may be delivered by conveyor to the road-sales station, into crushed storage to await collection, or to a coating plant. Suitable magnet protection is provided to safeguard machinery and ensure the product is iron free.

Slag that is to be sold direct, without reduction, is excavated by the second ripper and handled by two Yale model 300s, rigid-frame machines of 2¾ yd³ bucket capacity. These shovels, which also work a continuous 10-hour day, load road vehicles at the face itself.

Processed material is handled from stock to road vehicles by another articulated tractor shovel of 3½ yd³ capacity. A recent acquisition, this machine also feeds a belt conveyor used for loading bulk-carrier ships. To minimise demurrage and avoid problems with tides it is expected to maintain supply to the conveyor's dump hopper at about 250ton/h, an output that can necessitate one complete loading cycle—from stock to hopper and return—in every minute.

Approximately 8,000 tons, or about a third of Tarmac's weekly production, is transported from Tesseract by ships, some of it being delivered to Tarmac Roadstone plants in the southern part of the country, and some to export markets.



Down to Earth



by Lawrence D. Hills

The Fortunate Islands

Between 3000 and 4000 B.C. Southern Europe was invaded by Neolithic peoples. A small group of them settled in the Canary Islands, and founded one of the longest lasting stable states the world has yet achieved.

The Phoenicians, Greeks and Romans called the Canaries, "The Fortunate Islands" and left legends of them as a paradise of leisure, giants, sheep and Golden Apples of the Hesperides, which were the yellow fruit of *Arbutus canariensis* with a Vitamin C content that would give it magical qualities to ancient mariners with scurvy aboard and blown off-course to islands at the edge of the known world. The giants too were genuine, for the Guanches were descendants of the tall Cro-Magnon men and averaged well over six feet, though the later Berber stock arrivals from North Africa, driven across by the drying of the Sahara, were much shorter.

Their good fortunate lay not only in a climate that made winter fodder storage unnecessary and in a lack of carnivores. They were exploiting the release of leisure from a farming system used in Britain for the first three-quarters of our agricultural history. How much of that leisure stays with the men on the land depends on the superstructure of kings, craftsmen, statesmen, soldiers poets and priests that is piled on the shoulders of the man on the land. The architecture, sculpture and literature of the classic world depended on slavery, and to the galley slave or the free but poorly paid seaman, the Canary Islanders were living in paradise, for the farmers and farmworkers were enjoying more of the leisure they "grew" than in any other civilisation.

Their basic production unit was a flock of up to 600 mixed sheep and goats, the maximum that two men can handle with the help of dogs, but more often with stones flung with unerring

aim. Their invention of a whistling language enabled them to give orders (and gossip) across even seven miles of mountain valley. Their almost vertical "fields" were not only grass but included a range of shrubs, and the herdsmen spent much time weeding out undesirable species and sowing better goat food, especially pea tribe plants whose root bacteria maintained the nitrogen balance. Over-grazing by goats has made many deserts, but the Guanches farmed for 5,000 years and kept their islands green and fertile by perfect stock control.

Both sheep and goats were milked, supplying butter, cheese, and fresh and sour milk for "gofio", perhaps the world's first breakfast cereal, eaten from pointed-bottomed pots made to grip between the knees of a squatting man, with spoons fashioned from the natural plastic that is goat horn. The herd also provided the leggings and open-sided, knee-length shirts that warded off thorns and kept the wearers of both sexes cool. Their soft tanned leather was so light and lasting that they never developed weaving (the sheep had hair rather than wool), though they made fishing nets, mats, baskets and some startlingly modern looking "shopping bags".

The barley for the gofio and the beans that enriched their stews were grown in dry stone-walled enclosures to keep the goats out and the pigs in. After each crop the pigs were turned in to root up the weeds, tread in the straw and manure ready for harrowing with a stone-toothed harrow, drawn by manpower and planting the seeds with a sharpened digging stick thrust through a stone weight. Sheep were also folded at night on barley land, as in Britain, where the "golden hoof" was the only plough until the Bronze Age.

Wherever possible the Guanches lived in caves cut out of the soft tufa rock with stone tools whose marks still show under the emulsion wall paint above the calor gas stoves and battery radios of the modern Canary Islanders who find these oldest continuously inhabited dwellings in the world cool in summer and warm in winter with lack of mains electricity the only drawback because TV is not available. On flatter land they built round dry stone houses with timber and clay roofs that looked like half oranges, and enjoyed fireplaces with chimneys when the Saxons were still enduring smoke from a central fire

that sooted the rafters on its way to a hole in the roof.

The timber for the doors, the floor that made the roof space a storage room, the roof beams and rafters, and the notched log ladder that replaced stairs, were all made from the wood of the laurel, or the giant *Pinus canariensis* because these lasted longest. They took so much time to fell, split and smooth with stone tools that they were sacred in the frequent wars between the many "nations" of the islands. Fruit trees, flocks and herds, growing crops and women were also protected by powerful taboos, and their ritualised warfare had the status of a highly dangerous blood sport.

The system of land tenure was even more dangerous, but freehold property and inheritance would have swept away the efficiency of large flocks and well rested pastures in a patchwork of tiny fields. Instead every farm was a "territory" in the sense of that of a robin and many other birds and animals. The farmer held it for only as long as he could defend it in single combat at what were versions of a Highland Games, where putting the shot and tossing the caber survive from the contests that made sure that the strongest clansman gained tenancy of the most land for the period custom decreed. Those who survived unbeaten to the traditional age won the final prize of a seat on the Council of Elders which ensured the observance of the customary laws.

The favourite weapon was an "over" of cricketball-sized round stones hurled to kill against a defender with a shield, awaiting his "innings" to reply with equal fury. Farm workers were expected to compete for their jobs at supporting athletic events, but not to risk their lives, for this was the privilege of the tall "officer class" whose skulls often show skilled trepanning for head injuries. This was the art of the "Sacred Virgins" who were nearer Red Cross nurses and whose herbal knowledge may well have included a primitive "pill" to account for the remarkable stability of the population.

For perhaps 5,000 years these Neolithic conservationists did their duty by their land. For 90 years they maintained a heroic resistance with stone age weapons against steel. It was not until 1495 that they were finally subdued by the Spanish and a unique way of life passed into history.



Gulliver in Automobilia

Wherein the Author discovers the Vanity of Riches

We have it upon the Authority of Mr Milton, that "Riches grow in Hell". If this be so, then Automobilia may be accounted at least a Suburb, so to say, of the infernal City: for assuredly the Wealth of this Nation is very great, and constantly increases. So long has this Growth continued, that there is arisen among the Inhabitants a Belief that Nature has ordained it for a Law that Want be forever banished from their Kingdom: which laughable Illusion is among the lower Sort accorded the Respect Mankind ever grants to such Beliefs as are comfortable and not capable of easy Disproof; while those in Authority are little inclined to refute an Opinion so conducive to popular Complacency, provided only they may represent themselves as equal Partners in Nature's grand Design.

Preposterous as this Tenet must appear (being indeed based on no stronger Argument than that what was Yesterday, will be Tomorrow), they all adhere to it with the Zeal of Phanticks. To suggest to a Working Man that his Wages might be the same next Year as this were an Insult and a Threat: to a Merchant or the Owner of a Manufactory, any Check to the annual Increase of his Profits seems to presage immediate Bankruptcy. In the **Midst of Poverty** such Notions might be justifiable: a very little Loss may ruin a poor Man. But this insatiable Greed is strange among a People so bulwarked against Want: for they are like the Arctic Bear, that can live for Months upon his own Fat.

Perhaps my Readers may accuse me of carping from mere Jealousy of the good Fortune enjoyed by the Automobilians. For the Evils of Wealth are seldom so apparent as to induce the Poor to rejoice in their Station, or

the Rich to renounce theirs. I am no vile Puritan, to rail indiscriminately against all worldly Pleasures: but their Oeconomy shews Symptoms which lead me to view their Prosperity rather as the Flush of Fever than the Glow of Health. For first, they are but the Aristocrats of a World of Paupers: since much of their wealth is derived from the Toil of less polite Peoples, who, like Bees, must waste their Lives in Labour to garner the Sweets which others will enjoy. As Rome of old was said to wax fat upon the Harvests which made a Desert of Africa, so Automobilia in like Fashion can thrive only as a Parasite of Nations.

They use few Craftsmen, but employ instead curious Engines for the Production of all Manner of Goods: and so the Workshops and Manufactories are filled with Clangour as of a thousand Smiths beating upon their Anvils together; the Workmen are employed much like the Flunkeys of a Nobleman, to be *present* at all Times, yet seldom *busy* and to be wearied more with Boredom than with honest Toil. And so great is the Abundance of Goods poured forth by these mechanical Artificers, that, as in the old Tale of the Sorcerer's Apprentice, their Masters are hard put to it to stem the Flood thereof. Their Wealth grows faster than they can enjoy it: and they must at Whiles be bled of their Superfluities by Traffick with foreign Nations, or by Wars, or by such other Enterprizes as make a great Shew to little Advantage.

Yet these Engines cannot create Matter out of Nothing: they have a prodigious Appetite for the Products of the Earth, as Timber, Coal and all Manner of Minerals. So voracious are they that if their Feasting be not abated, the Table will ere long be quite bare: for the Earth herself cannot satisfy such Greed. Yet few care a Jot for this: of all our Lord's Precepts

that dearest to them is, Take no Thought for the Morrow.

They especially prize a certain bituminous Oil, which they draw from deep Wells. By its Combustion their Carriages are propelled: and moreover, their Alchemists can transmute this viscid and malodorous Essence into many rare and curious Forms, rendering it hard as Iron, clear as Glass, or strong and flexible as Linen or Leather. Such succedaneous Substances the Automobilians use daily, yet affect to despise: so that those who trade in them are often at Pains to fashion them in the Semblance of Wood, or Marble, or the Hides of Beasts; and thus to provide with great Effort and Ingenuity what Nature would freely give them if they husbanded her aright.

Nature, in Truth, has small Part in either their Desires or the Gratification thereof: their Manner of Life is such that it were scarce tolerable but for the strange Palliatives wherein much of their Wealth consists. Fate, so to say, has with one Hand lamed them, and with the other offered them Crutches; which, while necessary no doubt to a crippled Man, can scarce be judged preferable to a sound Pair of Legs. The Automobilians, could they but cast away their Props, would by and by learn to walk well without them: but this they fear to do, and are as much enslaved to the material Impedimenta of their Lives as ever Drunkard was to his Liquor. It may appear singular that a whole Nation should thus thwart the very Ends they most desire: yet we see the like Error in the Spartans of old, who to free themselves from Toil made the Helots their Slaves, and to keep them in Subjection laid themselves under the stern Laws of Lycurgus, whereby their latter State was far worse than their former.

Nicholas Gould



Environmental Studies

THE CONSTRUCTION OF AN "A" LEVEL SYLLABUS. Compiled by S. McB. Carson. Published by the National Foundation for Educational Research in England and Wales. £1.10.

This publication prompts us to consider what the educational system of this country should be doing about human ecology, whether it can do anything useful in time and whether the course proposed in this book makes a useful contribution.

We should try to reach all pupils in all types of school and the way to do this is to incorporate the matter of human ecology, though not necessarily the name, into the normal curriculum taken by all pupils. This can be done by introducing a new subject into a curriculum that is often already too crowded and fragmented, or by humanising and broadening existing subjects. The latter is surely preferable since human ecology then becomes part of the normal frame of reference for most subjects and is accepted as an entirely natural way of looking at things and not as something special tacked on.

One way of doing this is shown by the new "Nuffield" course in Secondary Science, designed for pupils who are unlikely to take "O" level examinations. This, if supported by corresponding changes in history and geography syllabuses can do what is needed and could be put into operation at once.

However, as the authors of this book realise, the vital thing is to give human ecology academic respectability by including it in examination syllabuses. Therefore, if an entirely new subject at "O" level is ruled out as a general solution, one is committed to the modification of a number of examinations and this takes time.

For example the Schools Council project, Integrated Science, which could

well carry the basic ideas into a double subject "O" level course, will not be ready until 1973 and then has to be adopted by schools. Thus five or 10 years may elapse before it is generally accepted and we can't wait so long.

What is badly needed is a strong lead from the Department of Education and Science both to ensure that no pupil leaves school from 1972 onwards without some proper grounding in these matters and also to expedite help to the teachers who will have to take charge of this operation: in fact an important policy statement is called for. Since, however, government is not even persuaded of the need for a population policy in this country and is certainly not prepared to abandon its "growth at almost any cost" policies, it is unlikely to see any urgent need to prepare our children for the much sterner world they will grow up into. Nevertheless pressure should be put on the Department to take some sort of action at once.

In the meanwhile individual teachers and authorities must soldier on doing what they can and the present attempt to achieve academic respectability for the subject comes about through the initiative of the Hertfordshire Authority and by the efforts of a Working Party of Hertfordshire teachers. They have chosen the title of Environmental Studies quite deliberately and have laid the emphasis on the environmental aspects of the population, resources, environment complex. Thus, although it is clear from the book that the authors are aware of the grave difficulties which man's present explosive phase is bringing about, this does not come through fully enough in the syllabus, the teachers' notes, or the specimen examination questions.

With the great bulk of the syllabus they have done very well. To complete the work they should go a little further and include a paragraph on the limits of our capacity to produce the food,

energy and materials we shall need to match the expected demand. The factual foundation for this is admittedly imprecise but the general picture is clear enough for examination questions to be set on it; pupils would then have the material on which to base their own assessment of the action we need to take and the time left to us to take it. This would gather together plainly what now has to be inferred from a careful study of the syllabus. Examination questions would be plainly expected and these aspects would also achieve the academic respectability which the authors rightly strive for.

It will be interesting to see how long it takes this proposal to gain full acceptance as an examination syllabus.

S. G. Lawrence

Our tottering tribal religion

THIS ENDANGERED PLANET—PROSPECTS AND PROPOSALS FOR HUMAN SURVIVAL. Richard A. Falk. Random House. \$8.95.

The theme of Prof. Falk's book is that we must prepare the way for a new breed of ecologically-minded statesmen who are obdurate and uncompromising in their determination that the planet shall survive: who match intention with a sound, imaginative grasp of the reality which threatens us; who will have no truck with the ecorhetoric of those who refuse to recognise the contradictions between good intentions and unlimited productivity—who cut down trees and make speeches about conservation on their stumps.

Prof. Falk teaches International Law and Practice at Princeton: he is also soaked in ecological problems: he is a passionate, energetic man who mixes in a great variety of research groups concerned with every aspect of world order. His views must reflect and absorb what an American élite is thinking. In some ways he has not sufficiently

integrated them into a personal outlook and the flow of ideas is somewhat disjointed and volcanic.

It is a dogma of industrial society that constant economic growth is the only remedy for all ills—which being interpreted means that a strong America with a strong dollar can alone secure the planet's peace and prosperity. We in Europe share the same dogma on a slightly lower key. The ecologists tell us that such a policy can only end in making the world uninhabitable. The politicians hear this voice: to preserve their sanity they must therefore start the old familiar witch-hunt against foreign speculators, hippies, communists, etc. rather than acknowledge that the fault is in themselves. But a new generation is on the way that will regard this deceit with a passionate scorn: the politicians of all parties will be totally discredited.

I shall try briefly to outline this by concentrating upon his main ideas. The rebel with no cause but his own discontent should pay attention to them. They provide a basis for a world-wide ecopolitical movement.

A single polaris submarine commander could destroy almost all the

urban life on the planet. One atom bomber carries more destructive power than all the armies that have ever been. Are we to assume that our pilots and naval officers are so mature that one of them will not one day lose his nerve and blow us all to smithereens? In order to be effective change must be on a planetary level. No national society, however enlightened its government, can meet alone the challenge directed at its survival.

Politics on both the national and world level have been concerned with managing power for man-in-society: a politic designed for planetary welfare and survival must begin to incorporate man-in-nature. The city within whose walls culture has developed depends upon the land outside the walls to feed it and revitalise it. The walls are down: the city spreads everywhere: it is destroying its own foundations. "The reality of Mother Earth" says Professor Falk, "is the essence of the ecological outlook, achieved without the benefit of evidence and reasoning." It is this truth that a rationalist, technological civilisation cannot accept. As a consequence we are likely to bury ourselves in garbage and contaminate the

atmosphere even before we run out of food.

The irony of development is that to the extent that it succeeds, the world situation worsens. We are confronted then with a fundamental dilemma: success in industrialising poor countries is likely to result in less poverty and turmoil, but in a worsening of the ecological situation. An economy is called stagnant as soon as it loses the capacity for growth. Perhaps the solution to this dilemma lies in something the sages have always taught: that poverty is no shame, only destitution. We must learn to live in honourable and creative poverty and work to prevent destitution. A hard lesson for the West and unlikely to be the policy of the new meritocrats, certain that because they can succeed in making money, so can society as a whole without loss to mankind as a whole.

The ecological imperatives cannot be realised without far-reaching political changes in the structure of society, national and international. Such guidance need not take the form of drastic centralisation of power and authority. In fact pluralism, zones of autonomy, diversity of life style, culture and ideo-

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ECOLOGY CRISIS

God's Creation and Man's Pollution

by John W. Klotz

(With an introduction to the British Edition by ROBERT WALLER editor of SOIL ASSOCIATION JOURNAL and associate editor of THE ECOLOGIST.)

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logy are all values that could be emphasised in a system of world order suitable for the ecological age. There is no need to eliminate the nation or state: the basic need is to deprive it of its *mystique*. I agree with this stress on diversity: it is in accord with ecological refinements. At the same time I believe that the change that our society is likely to undergo will be far more radical than those proposed by socialism and communism. Only an immense moral resourcefulness and spiritual insight will make it tolerable. To meet the challenge, an arduous preparation of mind and spirit alike will be necessary.

Professor Falk emphasises the value of older cultures and the need to revive their wisdom—especially with regard to stability and change. It is characteristic of the post-war industrial society, he says, to conceive change in technological terms rather than in terms of the underlying problems of human ecology. If we shift our focus of attention we have a wholly new philosophy of life in which stability takes precedence over change. But to take this seriously shatters our mood of complacency and suggests that we should do something. "Even the bravest of us rarely has the courage for what he really knows," said Nietzsche. Professor Falk is determined that this shall not be true of him.

Robert Waller

Surviving

HOW TO BE A SURVIVOR: a plan to save Spaceship Earth, by Paul R. Ehrlich and Richard L. Harriman, Ballantine/Friends of the Earth, 40p. **THE PRICE OF AMENITY:** Five studies in conservation and government by Roy Gregory, Macmillan, £8. **CONSUMERS GUIDE TO THE PROTECTION OF THE ENVIRONMENT,** by Jonathan Holliman, Pan/Ballantine/Friends of the Earth, 40p.

Paul Ehrlich made his name as the original "doom and gloom" man. His gift for dramatising the threats to our survival, coupled with his almost super-human energy (his best-selling *The Population Bomb* is said to have been written in three weeks, in his spare time) brought him to the forefront of the environmental movement and they have kept him there. Of course, his warnings have gone unheeded. Perhaps

they are too black to be wholly convincing? He dismisses the charge of undue pessimism by claiming to be no more than a realist, setting out the facts and aiming to de-bunk the deeply held belief in some natural law that says everything will turn out right in the end.

Here, though, we meet a new Ehrlich. At least, we appear to. The book has two authors and it is impossible to separate the contribution each makes. Maybe it is Ehrlich who sets out the problems, most of which will be familiar to avid readers of the eco-literature, while Richard L. Harriman suggests the remedies. No matter, Ehrlich gives his name to it and the book is optimistic. He has always believed disaster might be averted were we to mend our ways. Now he believes we may reform ourselves and be saved.

The authors use the "Spaceship Earth" approach and they maintain it throughout the book. Citizens of the industrial countries (they call them the over-developed countries) are called "first class passengers"; those of the under-developed countries are "traveling steerage".

Having set out the ship's troubles, the book discusses the principles of spaceship operation, which seem to be concerned mainly with defining the number of passengers the ship can carry. Coming from Ehrlich, the pre-occupation with population is predictable and nearly one third of the book is devoted to it. All the same, I feel it is only one aspect—albeit an important one—of a much wider problem. I want to know why population is growing, why we are consuming resources so fast. I want to understand the philosophies and attitudes that made us start out on this path and that make it so difficult for us even to see the trouble ahead. Ehrlich and Harriman do not tell me. Until they do I fear we may be treating symptoms and ignoring the virus. We know what is wrong with the world, but what is wrong with us?

Still, alleviating the symptoms will gain time. Population control is essential, of course, and the book has a good deal to say about how this might be achieved. The lot of the poor must be improved and once we accept that this is impossible as a part of increasing levels of prosperity generally, the alternative must be a major redistribution of wealth. We must share the planet, since we cannot expand it. This means

that the rich countries must "de-develop" if the poor ones are to get on to their feet. The process may be assisted by the introduction of intermediate technologies in the poor countries and by governmental reforms in the rich ones. Internationally, we must understand that we are all passengers on the same ship and that it is the only ship we have.

If we are successful in buying time, who will be the citizens of the new world, the new "spacemen"? It is here that the authors are most optimistic, for they see in the present generation of young people and, hopefully, in the generations that will follow them, a rejection of materialism, a disillusionment with politicians, a genuine understanding of the unity of the planet. I believe they are right.

In the meantime, what do we do? The book carries two appendices, the second spelling out once more the population problem, by way of a rounding-off, the first called "Tactics for first class passengers". Let consumers organise along Nader-ish lines to encourage the manufacture of products that are environmentally sound, let like-minded environmental groups form coalitions to take political action and so introduce new political ideas and attitudes, let concerned individuals gather together a few friends to form a group, remembering to ensure that the administration of the group is adequate to guarantee the group's survival!

In Britain, battles with industry for the protection of the environment have been fought for many years and planning legislation is accepted. People can organise groups to defend amenities, and they can be effective. Dr Gregory has taken five of the most dramatic planning confrontations of the 1960s and he uses them as case studies to illustrate the process as a whole. The book is scrupulously fair—the objectors did not always have a valid case—but by a close attention to the tactics involved the result is likely to be of real benefit to amenity and environmental groups.

In part, the aim of the book is to quantify, in economic terms, the value of amenity. How much are we prepared to pay for the protection of the environment? It is impossible to put a price on an amenity, but, when it is threatened by an industrial development it is possible to calculate the cost of taking the development elsewhere

or of modifying it. In Abingdon, where the Southern Gas Board wished to build a huge gasholder that would have dominated the town, the alternative cost an additional £250,000: the value of Abingdon?

The yardstick is crude, of course, but it is the one used by industry and it is always taken into account at inquiries. Over the past decade the trend has been for controls to be imposed more and more strictly; in other words the price we have been prepared to accept has been rising. Dr Gregory is hopeful that firm direction from government will bring down the price. If industry is compelled by law to do certain things in certain ways, then it will have no choice but to find the cheapest way to comply and the price of amenity may not be so high as we thought.

The protection of amenity is seldom trivial, but it does not concern human survival. Dr Gregory is well aware of this and of the irony by which the mechanisms to safeguard appearance are so clearly laid down and those to protect the health of the public are often ignored. A man needs planning permission to build a garage, but nothing

prevents him from using his motor car to produce noxious gases.

Nor, anywhere in these cases, did anyone challenge the need for further expansion. One plan (turned down as it happened) was to tear open part of the Cotswolds to extract ironstone that would have lasted for 35 years. No one asked whether this was a sensible price to pay for such a short term gain. Dr Gregory is aware of this, too, and, like E. J. Mishan, he is ready to challenge growth for its own sake.

The book is researched so thoroughly, contains so much detailed information and yet is written so clearly and graphically that it reads like a series of criminal trials. It should be read widely, not only by those who care about the fate of their surroundings, but by those who enjoy a gripping, true story. Alas, at £8 what chance does it have? We may be able to afford the amenity, but few of us will be able to afford to read about it. Perhaps Macmillans can be persuaded to bring out a cheaper edition. Dr Gregory has something to say. Let him say it!

If Dr Gregory goes into careful detail, Jonathan Holliman, in his *Consumers*

Guide to the Protection of the Environment, treats us to a breakneck tour of all the environmental problems and offers instant solutions. It advises individuals on action they can take. At times the advice is good, at times it is impractical and sometimes it is irrelevant and Mr Holliman seems to have invented new problems, as though we did not have enough already. Is noisy plumbing really a source of serious noise pollution? Nor is the advice always likely to achieve the intended aim. The brick in the lavatory cistern may save water, but it will also result in a more concentrated discharge into sewers and thence, all too often into rivers or the sea. Even the disposable bottle saves us from the lorries required to transport the returnable variety, not to mention the hot water and detergent needed to clean them.

All the same, if individual action makes us aware of the environment and takes this awareness into our homes and our daily lives, then it is to be welcomed. This the book does and for this reason it deserves to be read.

Michael Allaby

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Feedback

1 Lead in lead

A system for the voluntary reduction in the use of lead additives in petrol is likely to be agreed between the government and the oil companies. It is hoped that this will be achieved before the projected conference on health hazards from lead compounds from engine exhaust.

Well over half the lead discharged into the atmosphere comes from motor car exhaust. By last year petrol consumption had risen to 14,000,000 tons in the UK giving rise to an estimated discharge of 10,000 tons of lead into the atmosphere.

Source: *The Times*, 22.11.71

2 Conservationists kill motorway

The original plan for the Hudson River expressway, involved a 47 mile route beginning north of the centre of New York and heading upstate to Beacon. Conservationist pressure forced the developers to reduce it to a 10 mile stretch on the east side of the river.

An injunction put a stop to this project. Governor Rockefeller, however, tried to keep the project alive by proposing five alternative routes. As a result of meetings with environmentalists he has now conceded that the expressway, was a "dead issue". "People's priorities are changing", added the Governor.

The fight lasted six years and involved studies costing millions of dollars.

Source: *The Guardian*, 22.11.71

3 No farm antibiotic residues

Denmark's Minister of Agriculture has announced that he will seek to make it a punishable offence by fine and imprisonment—for a farmer to deliver a pig for slaughter if it contains antibiotic residues.

Source: *Financial Times*, 25.11.71

4 Germans may ban DDT

The West German Parliament has approved the first reading of a bill which will ban the production, import, export and application of DDT.

Exceptions can be made in certain circumstances and in particular for research.

Source: *Das Parlament*, 9.10.71

5 France acts on detergents

From the 1 October 80 per cent of the detergents in washing and cleaning products must be biodegradable.

Source: *Council of Europe Newsletter*, August 1971

6 No bullshit?

Britain's livestock produces about 125 million tons a year of excreta. This valuable resource, instead of being properly used on the land, is a major source of embarrassment to today's intensive farmers, as to use it properly would mean forgoing the valuable government subsidy on artificial fertilisers.

According to Mr C. T. Riley of the Ministry of Agriculture, 80 per cent of this excreta comes from cattle. Spread out over the country's 30 million acres, it would amount to four tons an acre which would present no problem. It was intensive production systems that caused the problem. It was possible to install plant to treat the waste, but with a cow excreting nine gallons a day it would cost £25 to £35 a year per cow, and with a pig excreting one gallon a day it would cost £4 to £5 per year per pig. From the point of view of the balance of payments, the situation needed looking into. The nutrients in a ton of manure were worth £1.77 when it came from poultry, £0.62 when it came from cows, and £0.61 from pigs.

Britain imports £30 million of fertiliser each year which is just about the value of the nutrients in 125 million tons of manure.

Dr Morlais Owens of the Water Pollution Research Laboratory said that waste from farm animals could be just as harmful to water supplies as domestic and industrial effluent, while the total volume of animal excreta is three times that of the human population.

Source: *The Guardian* 24.11.71 and editorial comment

7 Shifting standards

WHO is revising safety levels of various pollutants. The acceptable level of lead in drinking water has been relaxed, from 0.05 parts to 0.1 parts per million. This is not because it has been found that the human body can tolerate this higher level, but because it is uneconomic to maintain the original one. This is partly the result of the use of lead pipes. Even when plastic pipes are used however the situation is only slightly better as lead is used as a stabiliser in manufacturing.

Other substances including barium and chromium have been dropped altogether from the list of standards. As the latter is regarded as a carcinogen the decision by WHO appears difficult to defend. The original safety limits aimed at 0.04 parts per million. However, certain streams in Lancashire, in wet weather, carry concentrations of up to 250 parts per million or 4,000 times above limits—and this in an area where a million gallons of public drinking water is taken from ground waters.

On the other hand restrictions on cyanide have been intensified from 0.2 to 0.05 parts a million. Mercury has been added to the table for the first time with a level of 0.0001 parts per million.

Source: *The Times*, 3.12.71

8 The return of the heavy horse

In the World Ploughing match held at Taunton in October there were no fewer than 25 pairs of horses taking part.

The heavy horse is making a comeback. At the Midlands Shire Society Annual Sale in September the auctioneer said it was "a truly remarkable sale". He could not recall anything like this demand for shires since the heyday of the horse. Among buyers were men who had given up horses 10 years ago. There have been 100 new members of the Shire Horse Society this year and the Suffolk Horse Society has had more new members than in any year since 1953.

This is not prompted by sentiment alone. Some farmers on certain kinds of land, have found that the continuous use of heavy machinery has damaged the soil. Others argue in terms of simple economics. A brewer reckons that it costs under £500 per year to run a pair of shire horses against £1,000 per year for a lorry. Source: *The Times*, 24.11.71

9 Bees boycott high-yield sprouts

A new strain of brussels sprout has been bred which has a 50 per cent higher yield than other strains. In spite of this, it is proving uneconomic for unexpected reasons. The bees refuse to cross-pollinate to produce the hybrid seeds for the new variety. After two years' research work into the problem, scientists are now no nearer to a solution. "The situation is very serious indeed," says Mr Falkner of the Agricultural Research Council's National Vegetable Research Station in Warwickshire.

Source: *Sunday Telegraph*, 5.12.71

10 Nuclear toys for all

By 1980 at least three dozen nations, including many of the smaller ones in east and west Europe, in Asia and South America will be operating large nuclear power stations producing plutonium. This is the raw material required for making nuclear weapons. All they need is about \$200 to \$300m a year for 10 years to finance their research and development. This should present no problem.

Source: *The Guardian*, 27.11.71

11 Bright outlook for Third World

According to a UNCTAD (United Nations Conference on Trade and Development) report "over 300 million children are suffering from malnutrition and grossly retarded physical and mental growth". Between a quarter and a third of the men in the developing world were unemployed and unable to earn a living for their families.

In the next nine years another 622 million would be looking for jobs in the developing world. But the developing countries' share of world trade had fallen from more than a quarter in 1953 to less than a fifth in 1967.

The report says: "Individually, most of the developing nations have no chance of coping with this overall situation. Acting together as the 'Third World' and seeking international solutions in co-operation with the developed countries is the only path which offers the real hope."

When will it occur to the Third World that the path that it is taking, towards further development and further dependence on the tottering economies of the industrialised countries will only make matters worse? So far Burma and Tanzania have chosen the alternative path; development in accordance with their own traditional way of life and increased self-reliance. It is only in this way that the worst disasters can be avoided. Source: *The Guardian*, 27.11.71 and editorial comment

12 Pollution crisis in American cities

A stagnant air mass hung persistently over most of the eastern seaboard from Canada to Alabama, causing a serious pollution crisis in a number of US cities.

The situation was so bad that a Federal judge ordered the closing of no less than twenty-three factories that appeared to contribute most to air pollution.

At the same time New Yorkers were asked to make the least possible use of their motor-cars to prevent air-pollution from rising to dangerous levels during the rush-hours.

With the top of Manhattan's skyscrapers smudged in a brown

murky pall, conditions approached the point where a "stage one" air pollution alert might be required. City officials went on 24-hour stand-by duty in readiness for emergency action if the situation worsened.

Measurements showed that the level of pollution was such that Manhattan was getting only one-third of the sunshine that it should have been receiving, the other two-thirds being blocked out by the dirty air.

Dr George Hardy, Birmingham's health officer, said it was difficult to document the effects of the pollution but people with respiratory or heart ailments had been advised to avoid exercise and stay indoors.

Source: *The Times*, 20.11.71

13 Rome's eco-magistrate

The Tiber is an open sewer which receives all the waste of Rome's 3,000,000 inhabitants at the rate of 20 cubic metres a second and carries it through the middle of the city and out to the sea at Ostia, 15 miles away.

Rome's domestic sewage is only about a third of the filth that goes into the Tiber; the rest is composed of the effluents from the numerous light industries in and around the city.

If life is to return to the Tiber thanks will be due to the crusading magistrate Gianfranco Amendola who has fined 400 firms for polluting its waters at a rate of around 600,000 lira (£400) each.

He has now sent an industrialist, Signor Gianfranco Corsi to jail.

Signor Corsi, the owner of a seeds oils firm, had made the mistake of taking too lightly repeated warnings by the authorities to stop his factory spewing poisonous effluents into the Tiber.

Six days later, after signing a hastily-arranged contract to buy a purification plant, he was set free, but he will still have to stand trial for a long list of offences which could fetch him a maximum total of 12 years in jail. Meanwhile the mayor of Rome has ordered his factory to be closed until the plant is installed.

The arrest of Signor Corsi held a clear message to numerous colleagues who may still be tempted to consider the current crack-down on pollution as a passing fad by the authorities like road safety campaigns.

Source: *The Times*, 4.12.71

Letters



Neo-existentialist pest control

Dear Sir,

We are having a bad time with flies, but our leaders will not permit us to kill them. The Neo-Existentialist policy, they say, is to ask them to leave us alone, as Lady Dowding does with her mice. So we set up a committee to do the asking, but so far no improvement has been made.

Our leaders then pointed out that flies are a part of the ecology, and that perhaps it is not good to remove them. Meanwhile our children find it difficult to sleep and refuse to do their meditations. The young people of today are very difficult to guide. One of them has even bought a fly-swat, but he calls it a shuttlecock bat; and it is not permitted to take children's toys by force.

What are we to do? Would it help us to change our name, as the young people say they are sick and tired of Neo-Existentialism? Our leaders have asked us whether we would like to adopt the name of Conservationists. Do you think, if the Conservation Society change their name, we could have their old one?

It is urgent that we do something soon, as the flies are becoming intolerable.

Yours sincerely,

Y. B. Good,
Queensland.

Marx and ecology

Sir,

G. N. Syer in his article on "Marx and Ecology" in your October issue, has unfortunately confused the title of a book from which he quotes. Engels did not write "The Critique of Political Economy in 1844" but Marx was the author and in 1859. Engels wrote the "Conditions of the Working Class in England in 1844", which is probably the work he wishes to cite.

What should interest us as ecologists most is the statement by Marx "That up to now philosophers have merely interpreted the world—what we have to do is to change it." This means changing the whole basis of society including the continual crises of capitalism, the problem of war and pollution.

Marx wrote in *Capital* (Vol. 1 Kerr edition):

"Capitalist production, by collecting the population in great centres, and causing an ever increasing preponderance of town population, on the one hand, concentrates the historical motive power of society; on the other hand, it disturbs the circulation of matter between man and the soil, i.e. prevents the return to the soil of its elements consumed by man in the form of food and clothing; it therefore violates the conditions necessary to lasting fertility of the soil. By this action it destroys at the same time the health of the town labourer and the intellectual life of the rural labourer. But while upsetting the natural grown conditions for the maintenance of the circulation of matter, it imperiously calls for its restoration as a system, as a regulating law of social production, and under a form appropriate to the full development of the human race. In agriculture as in manufacture, the transformation of producer under the sway of capital means, at the same time, the martyrdom of the producer; the instrument of labour becomes the means of enslaving, exploiting, and imperishing the labourer; the social combination and organisation of labour-processes is turned into an organised mode of crushing out the workmen's individual vitality, freedom and independence. The dispersion of the rural labourers over larger areas breaks their power of resistance while concentration increases that of the town operatives. In modern agriculture, as in the urban industries, the increased productiveness and quantity of the labour set in motion are bought at the cost of laying waste and consuming by disease labour power itself. Moreover, all progress in capitalistic agriculture is a progress in the art, not only of robbing the labourer, but of robbing the soil; all progress in increasing the fertility of the soil for a given time, is a progress towards ruining the lasting sources of that fertility. The more a country starts its development on the foundation of modern industry, like the United States, for example, the more

rapid is this process of destruction. Capitalist production, therefore, develops technology, and the combining together of various processes into a social whole, only by sapping the original sources of all wealth—the soil and the labourer."

Marx foresaw that all these problems were caused by capitalism and until the economic system could be changed, it was useless to deal with its symptoms.

Pollution is directly caused by capitalism, via the profit motive in society. Who pollutes rivers with tons of mercury and cyanide compounds? It is the capitalist. Who is it that makes (or orders to be made) hundreds of tons of the most diabolical nerve gases? And who again has these dumped into the sea to do untold harm in the future—the capitalist. Who makes (or orders to be made) atomic bombs—not the masses of the people. Who decides and gives orders to dump atomic waste into the sea with all its unknown hazards—not the working class.

Syer concludes his article with the words: "The theory of Marxism is one thing; the practice of it in Russia and China another." As the fundamentals of Marxism are the Class Struggle; Historical Materialism; and the Labour Theory of Value, and these are all methods of criticising capitalism, it follows that these theories of criticism cannot be practised in Russia nor anywhere else.

Horace Jarvis,

72 Beechwood Road,
Sanderstead, Croydon.

Polluters united

Sir,

John Lambert pleads eloquently for the Common Market as a basis for taking action against pollution. The need for international *co-ordination* of action against pollution is one no sane man today would gainsay. But why does Mr Lambert so lightly assume that a big monster, authoritarian, military-industrial complex, which a United Europe will undoubtedly become, will be more efficient at combating pollution than the democratically co-ordinated efforts of numerous small political units?

It is, after all, the big people, with their monster industries and their massive brainwashing programmes to promote higher consumption who have

largely created the current ecological nightmare; and has Mr Lambert even begun to think of the theoretical and practical problems of putting big scale capitalism into reverse gear? Who is going to do it? The big scale capitalists? Or perhaps the monster communist governments?

Besides, Mr Lambert wholly ignores the major form of pollution, that of war and the preparations and rehearsals for war. It is safe to say if the USA were *disunited* into small, sovereign, independent units (and God speed the day when it is) not a single unit would be remotely interested in the affairs of Vietnam, Korea or other places thousands of miles away. In the same way, the unification of Europe will give it a worldwide range of concern in terms of its markets, its interests, its orthodoxies and its power. So that *inevitably* a United Europe will be united for war in one part of the world or another. And don't let Mr Lambert dare to assert that the democratic voice of the people will be able to stop it; the Vietnam war is massively opposed by the people of the United States, whilst the recent vote in the House of Commons for Common Market entry against the wishes of the overwhelming majority of the British people is all the evidence we need that whoever's voice *is* heard in the stage-managed parliament of the European military industrial complex, it will certainly not be that of the people.

With respect,

John Papworth, Editor,
"Resurgence"



"So you see Son, if we enter the Common Market, we can go on expanding and expanding, until . . ." "Until we burst Dad?"

The Polluting Pea

Dear Sir,

A talk on the subject "biologists in industry" by Dr A. T. James, group manager of Unilever biosciences division, was given at the Leicester university careers conference on 21 October 1971. It revealed some interesting points on the attitude of this giant company to the pollution problem via a description of its own biological research activities. The organisation of peas for Bird's Eye, showing how biologists were working in industry, illustrated the consequences of the Unilever research/pollution policy.

On one side the company guarantees by stringent testing of all new products and monitoring of established ones that the product has no harmful effect on the user. The decisions of the toxicology department being final. We were also told that "several of the company's 'top biologists' had been looking into pollution problems" and that, as a result, "in future pollution control would operate on all new processes".

On the other side ecologists are few in the company, there being very few or none in the 140 workers of biological safety division. This was due, as Dr James put it, "to an insufficient rôle for ecologists to play within the company". However, looking at the organisation of the pea supplies this rôle does become apparent.

The huge sale of peas under a single brand name requires that they be of consistent quality. This is achieved by contract growing. The grower is told which variety to plant, when to plant, which fertilisers and pesticides to use and when to use them, when to harvest, etc. This is set out in the field grower's handbook and is supplemented by regional advice and control by the company botanists including a field ecologist. How much fertiliser and pesticide do they apply? The answer is sufficient to increase the yield by 400 per cent, the figure we were quoted. Even allowing for the use of a superior pea variety, gaining spectacular yields can be the kind of farm policy which is causing pollution in other areas via pesticide build up and fertiliser run-off. An ecologist's rôle exists here to check the farm policy in a broader environmental context.

Thus although we can be sure of a relatively pollution-free pea, or personal safety in any other Unilever pro-

duct, the polluting aspects of methods of production give less cause for satisfaction. Moreover the company is not moving into a learning situation. It cannot, as it has declared that it would do, make all new processes pollution-free, unless it knows the full consequences of its present activities. Predictions of user's safety concerning future products are realistically based on the size and competence of the toxicology departments. The hope of pollution-free processes finds no such grounding. If companies do face up to their responsibilities then even in these times of unemployment the ecologist can look forward to working where he should be, as a "biologist in industry", something I had hoped Dr James had come to tell us about.

S. H. Cousins,

Leicester University
Conservation Society.

Eco-pornography

As a regular reader I am happy to note your increasing success in attracting advertising to the Ecologist. But you will bring discredit upon us all if you persist in carrying advertisements for eco-pornographers.

Your December issue carries an advertisement on page 29 calling for men and women to help in combating water pollution, but which is actually canvassing on behalf of Golden Products Ltd. The workings of this firm was exposed recently by the BBC "24 Hours" people, who showed that (a) they are more interested in selling agencies to suckers, than in selling the product itself, and (b) that the main functional-plus claimed for the product of "Biodegradability" is in fact shared by most of today's detergents. I hope that not too many of your readers will have been taken in by this con perpetrated in your magazine, and that having examined the facts, you will want to apologise to readers in your next issue.

Sincerely,

John Worley,

16 St Georges Avenue,
Havant, Hants. PO9 2RX.

We apologise for publishing this advertisement, which we did not know was one for detergents. Had we known, we would have refused it and we shall be more careful in future! Ed.

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