The Ecologist

Man and the environment The Quality of life Pollution Conservation

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March 1972

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A Blueprint for Survival: comments

Oil pollution of the sea

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Integrated pest control





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The sedulous ostrich

Don Quixote, who subconsciously must have known his real strength, took care to combat windmills rather than giants, and sheep instead of armies. Quixotelike, Mr John Maddox* demolishes arguments that either do not exist or are rendered flimsy by his description of them, and hardly attempts those on which the authors of A Blueprint for Survival rest their case. Thus he tilts at those who fear that "the human race will breed itself to extinction", rather than at those who see that the growing discrepancy between human numbers and the sustainable food supply must inevitably lead to serious famines unless it is checked and reversed. And he recasts in highly simplistic terms fears of ecological disruption and resource depletion, so that he can denounce such oversimplification as a public disservice!

"Fears of famine", writes Mr Maddox, "depend on the assumption that the green revolution is a nine day wonder." Nonsense! Our fears of famine depend on the indisputable evidence that many people in Africa, Latin America, and the Far East, and some in the Near East, are already malnourished, that food production in the non-industrial world as a whole has barely kept abreast of population growth, that the opening up of new land for cultivation will not be possible for much longer as all the good land is now being farmed, and that at present rates of expansion none of the marginal land that is left will be unfarmed by 1985. All of these statements are supported by recent FAO documents, indeed FAO has stated that some land had been so overused that it must be taken out of production. For these reasons, FAO is relying on heavy intensification-on the introduction of the new high-response hybrids of wheat and rice, which form the guts of the green revolution. Nobody doubts the potential of these hybrids. They are highly responsive to massive applications of water and inorganic fertilisers,

as their success in Pakistan and Mexico demonstrates — though Dr Norman Borlaug, proud "father of the green revolution", himself describes the claim implicit in its title as premature and over-optimistic. *If* we in the industrial world are willing to help pay for the immensely increased demand for pesticides and fertilisers (up to 27 times present ones) needed to realise this potential (and FAO reports no sign of this), and *if* there is enough water available in the right places, then we may expect immense increases in yields.

Unfortunately, it seems that such increases can be bought only at the expense of long-term fertility. The likelihood of the enormous applications of pesticides and fertilisers oversimplifying and disrupting the highly fragile tropical ecosystems is too great for Mr Maddox to ignore, or to dismiss with irrelevant references to successful intensification in temperate lands. In doing so, he chooses to disregard both the great differences between the two regions (such as the very rapid laterisation which can and does occur in the tropics)-and the clear evidence of diminishing returns from agricultural technology, throughout the world.

The green revolution may well enable us to keep up with population growth for a short period, but for a rather longer period it is likely to make feeding those who are left that much more difficult. Mr. Maddox of course, does not believe that overpopulation is a problem, whether at home or abroad. He points to Britain's modest growth rate, but forgets that she relies on imports for half her food and that this proportion is unlikely to be significantly reduced. Thirty million is probably the most we can feed from sustainable agricultural methods. What grounds for confidence are there that we will be able to continue importing half our food, when global demand must double just to maintain the status quo (one of widespread malnutrition as it is)? And even if, by virtue of our superior economic position, we manage to beat the non-industrial countries to the failing bread-baskets of the world (besides continuing to buy their sorely needed protein to fatten our factory-farm animals), how can we possibly justify doing so?

As for world population, Mr Maddox comforts himself with the trite observation that much of the growth is attributable to increased life-expectancy, and a reminder that in a number of nonindustrial countries birth-rates are falling. He ignores the much more significant fact that many countries (e.g. Kenya, with 44 per cent of its population under 15) have populations so structured that even if the replacement-sized family is achieved in the industrial world by 2000 and in the non-industrial world by 2040, the world's population will stabilise at nearly 15.5 billion about a century hence-or well over four times the present size. Stabilisation, however, does not appear to be the aim of ostriches, who hope instead for a time when all countries will have industrialised to a level close to that of Britain today, by when, they conclude, the present global average growth rate of 2 per cent a year will have dropped to Britain's 0.5 per cent a year. Yet assuming this were possible, and that it were achieved by the time world population had reached 10 billion (say 2050), the world would still have to provide for an extra 50 million people (a new Britain) each year.

Are there enough raw materials for 10 billion people, all consuming as much as we do today? I am not thinking of energy resources (the Blueprint for Survival concedes the possibility of unlimited energy-until such time as thermal and other pollution cause intractable difficulties), but of metals. If consumption rates continue to grow as they are, present reserves of all but a few metals will be exhausted within 50 years. Of course there will be new discoveries and advances in mining technology, but reserves are finite, and these can provide us with only a limited stay of execution. The graven image of the ostrich is price economics, but high prices will merely encourage synthetics and substitution, not conjure up more minerals, and these will in no sense solve the problem, since they can be made only from materials which themselves are finite and in short supply. Of what comfort will high prices be, when the only metals left are those already in circulation or in the sea or ordinary rock? The ratio of waste to useful metal in granite, for example, is 2,000 : 1, and I have yet to read of any sensible suggestion for disposing of these wastes without seriously disrupting ecosystems. One day soon, the non-industrial countries will appreciate that while their drive for reasonable development is presently retarded by the low prices they receive for their raw materials, it will be utterly thwarted when all other materials become so expensive that only the rich industrial minority can afford them.

Mr Maddox is of course perfectly right to scoff at those who fear that DDT "might eventually contaminate the whole environment"-for it already does so. To the extent that DDT residues now appear in the lipids of most organisms, they may be described as having a world-wide distribution; and as Woodwell, Craig, and Johnson have pointed out, residues in the California mackerel, the penguin, the crab-eater seal of the Antarctic, and oceanic birds such as shearwaters and the Bermuda petrel, must be the result of circulation patterns which are not local but global. They conclude that there is now more than enough DDT circulating in the biosphere to bring about the extinction of such animals, it being merely a matter of luck that it has not done so.

Besides luck, Mr Maddox puts his trust in the "vast scale of the environment", forgetting that pollutants are not distributed evenly, but instead are taken up in different cycles and concentrated by different organisms, so that local concentrations can have nearglobal effects. For example, estuaries are the spawning grounds of very many fish and shellfish and form the base of the food-chain of some 60 per cent of our entire marine harvest. Should they be damaged by concentrations of pollutants, we may expect a substantial drop in productivity.

Another important concept which appears to have escaped Mr Maddox is that of the optimum. Whatever the system there must be an optimum value for every variable. There may be a tolerance margin either way, but basically if there is too much or too little of a given variable, the system will no longer function properly. To say as Mr Maddox does that it will take thousands of years to double the amount of a given pollutant already in the oceans is to beg the question. It assumes we know the optimum level of that chemical, how great its tolerance margins are, and what will happen when they are exceeded. Unfortunately, we do not have this information for the greater part of the half-a-million manmade chemicals in use today. Is it scientific, is it responsible, to trust to luck, or to excuse our acting in ignorance by pretending that there is no "evidence" or that a given

pollutant is harmful—when there are ample theoretical grounds for assuming that at some point it will be? Mr Maddox can accuse *The Ecologist* of being alarmist only by ignoring the real world and concentrating on a highly notional one, consisting of selfcontained analytical units rather than an intricate network of systems, and with a simple-minded economic escape clause, just in case the biophysical principles on which it is run become too restrictive for comfort.

We depend for survival on the availability of certain raw materials and on the stability of a great many ecological processes. The continued increase of human numbers and *per capita* consumption means that inevitably we will exhaust the former and adopt practices which will disrupt the latter. Yet our particular socio-economic system appears to depend on expansion, or increased throughput;

and while there are many short-term limited measures to which we can, and should, resort, these will only give us a breathing-space-which will be worthless, unless we use it to devise an alternative, sustainable socio-economic system. This, in its "Strategy for Change", A Blueprint for Survival has attempted to do. It is by no means a perfect document; indeed it is The Ecologist's aim to constantly improve it-to which end we are asking scientists and other academics, industrialists, trades unionists, and anyone else interested, to send in constructive criticisms. However, it has at least started a debate on what changes will be both humane and effective enough to avoid social or ecological catastrophe.

*Mr Maddox is editor of *Nature*, and this editorial, a modified version of which appeared in *The Times* of 23 2 72, is in reply to his editorial, "The Case Against Hysteria" and to an article by him in *The Times*.



Oil Pollution of the Sea

by Neiton Pilpel

Possibly as much as one million tons of tarry material is now floating on the surface of the sea. Even this is only a small proportion of all the oil that has already been spilled around the world.

If man continues to pour oil and incidentally sewage, chemicals and other pollutants —into the sea at the present rate, can they be disposed of by natural processes sufficiently rapidly for life to survive?

One of the consequences of the year 1969/70, the European Year of Conservation of the Environment against Pollution, has been the expansion that has taken place in the amount of research work that is now being done to try and deal with the ever growing problem of oil pollution of the sea.

Figures released by the SRC and the NERC last year show that the government is now spending about £30,000 per annum on research. Comparable figures from the oil industry are not available, but the major oil companies are very conscious of their responsibilities in the matter and are spending substantial sums on developing preventive and remedial measures.

Nevertheless, the total still represents only a minute fraction of the cost to the community at large of oil pollution of the sea. There are the costs of applying remedial measures for cleaning up spillages when they occur. These have often run to over five figures. To mention only a few that have occurred recently in British waters: the Torrey Canvon incident in 1967; the accident at Fawley in 1969; the spate of collisions and sinkings in the English Channel between October 1970 and April 1971 in which, amongst others involved, were the Pacific Glory, the Texaco Caribbean, the Panther and the Hullgate.

Boats of all types, fishing equipment, piers, wharves, buoys and moorings become fouled and cleaning them adds significantly to the cost of their maintenance and repair. Oil polluted beaches adversely affect the tourist trade, discouraging summer visitors by soiling their clothing and possessions. The cost of enacting legislation for preventing the release of oil by shipping and the legal costs of prosecutions or claims by aggrieved parties also amount to very substantial sums.

The most obvious casualties of oil pollution are sea birds. The heaviest mortality occurs amongst those that spend an appreciable part of their time on the water. They include auks, gannets, guillemots, puffins, razor bills and many species of duck. A single spill of oil some years ago in the vicinity of Getford in Sweden is believed to have killed over 200,000 ducks and other water fowl.

Less immediately obvious are the long term effects of oil pollution on other species of marine life. Some scientists see oil on the sea more as a nuisance than as a serious threat to life, once the toxic fractions of the oil have evaporated into the atmosphere or have been diluted in the large volume of water. Others, however, believe that damage caused to flora and fauna, particularly in the intertidal zone where the oil comes ashore, can have a lasting and profound effect on the marine environment.

Ecology of the intertidal zone

There is already evidence to suggest that long ecological chains in the sea have been upset or broken by the depletion of plants, molluscs, crustacea, fry and larval forms in the intertidal zone. They are killed both by the toxic components in freshly spilled crude and also when chemical agents are used in massive amounts near the shore to disperse incoming slicks.

By causing a reduction in their food supply and by interfering with breeding patterns, as well as by over-fishing and over-hunting, man may be seriously reducing the population of fish and marine animals on which he ultimately depends.

One of the questions that research workers are now trying to answer is this: Why is it that, with the amounts of oil that have already been spilled around the world, certain seas such as the Baltic, the Irish Sea, the Black Sea and the Mediterranean are not covered with it and why coastlines, beaches, estuaries and harbours are not more seriously polluted than they are at present? It has been estimated that on any average day of the year about a third of the entire tonnage of world shipping is now ferrying oil-some 30 million to 40 million tons of it. Possibly as much as 10 million tons have, at various times, found their

way to the sea, either by the stranding and sinking of ships, or by accidental or intentional discharge of ballast waters and oily sludges from tankers, or as a result of escapes and seepages from oil fields, terminals, refineries, etc. sited near to the coast. It has even been suggested that one of the ways in which oil gets on to the sea is by condensation of volatile hydrocarbon pollutants from the atmosphere.

Natural decomposition of oil

Fortunately oil, like many other polluting substances, is susceptible to certain natural processes that, whether remedial measures are applied or not, eventually cause much of it to disappear from the sea.

Some of these processes are quite rapid. For example, most of the low boiling, volatile fractions in a crude oil evaporate into the atmosphere within a few days of a spillage, except in cold, arctic waters in the absence of wind, when evaporation takes longer. Appreciable amounts of the non-volatile residue are spontaneously converted into an oil in water emulsion. This is readily miscible with sea water, like grease when it has been treated with a washing up liquid. In this form, it soon disperses into the body of the ocean. But large amounts of the oil are converted into a reverse type of emulsion, the water in oil type. This is not miscible with sea water, but remains as a floating layer. Under certain conditions it may turn into a froth of "chocolate mousse". so-named because of its similar appearance and consistency to the confection.

Water in oil emulsions, or "mousse", can persist for a long time. Over periods of months or years, they are gradually oxidized by the atmosphere, or are degraded by a variety of bacterial organisms, hardening to a consistency like pitch as the last remnants of volatile material evaporate from them.

Some of the oil becomes weighted down by silt, bacteria and barnacles and sinks to the ocean bed. A lot, in the forms of flocs or small globules, remains afloat. The fact that such globules have been recovered from the remotest parts of the Pacific, Atlantic and Antarctic Oceans, shows that in this form oil can resist decomposition and remain afloat for long periods.

Eventually however most of the floating residue is driven ashore by the action of winds and tides, to become coated with sand or pebbles. Some gets buried, some is scraped up and burnt by local authorities. The rest is ultimately oxidised in the presence of sunlight by oxygen from the atmosphere, or is decomposed into carbon dioxide, water, methane, ammonia and other relatively harmless products by a variety of bacterial organisms.

The rate at which oily residues on the sea are oxidized by the air or are decomposed by bacteria depends on a great many variables. They include the original source and nature of the crude. its physical form, for example whether it is floating as a thick slick, or as emulsified droplets in water, or whether it has been converted into a hard, pitch-like mass on the beach. The rate is affected by the intensity of sunlight, by the temperature of the sea, by the concentration of silt in it and by the availability in the water of particular mineral salts, such as phosphates and nitrates, which are required by the bacteria as nutrients.

Research on oxidation and bacterial decomposition

Preliminary work by one group at London University carrying out research on the oxidation of oils has shown that the oxidation proceeds more rapidly in sunny weather than when the sky is overcast. This is because energy at a high frequency is needed to promote the oxidation. Ultra-violet light from the sun supplies the energy, but if the light has to pass through clouds, much of the ultraviolet content is lost.

In the experiments, samples of different oils are spread on water and illuminated with artificial sunlight. By measuring the changes produced in the oil's chemical composition and the way in which it spreads on the water, it has been possible partly to elucidate the mechanism of the oxidation process and find out how it is affected by other factors, such as the temperature and salinity of the water, the thickness of the oil layer and so on.

One interesting observation concerns the effect that certain metallic compounds appear to have on the rate of oxidation. In their natural state, many crudes contain small amounts of complex salts of nickel and vanadium. It has been found that even a few parts per million of such materials can catalyse the oxidation process. Thus crudes that contain these compounds appear to oxidize under ultraviolet light very much faster than those that do not. It seems

possible that this finding might have practical consequences and that trace quantities of metallic catalysts might be added to crudes in the event of a spillage to increase their normal rate of oxidation by sunlight.

The second main decomposition process is decomposition by micro-organisms. Already some interesting results have begun to emerge from the work that is being done on this topic in the University of Wales, at the Marine Biological Station, in Heligoland and elsewhere.

It has been found in laboratory experiments that many species of bacteria are capable of ulitizing crude oil as a source of food and energy. They include pseudomonas oleovorans, actinobacter, achromobacter, hormondendrum and many others. These bacteria occur naturally in sea water, in estuarine silt and in the sand and seaweed on beaches. The different species do not live in isolation in the marine environment, but as members of complex populations with dozens of different species coexisting together. But in order to discover how the different species make use of oil, it is necessary in the laboratory to use relatively pure strains and to perform the experiments under rather carefully controlled conditions.

It seems that just like man and other living species, oil-consuming bacteria have their own particular preferences in regard to the diet. Some seem to prefer the paraffinic fractions in a crude oil, others the cyclic structures. In the former, their attack is directed first at the fractions containing between about 12 and 18 carbon atoms in straight, as opposed to branched, chain structures. But the situation in regard to the cyclic compounds is less well defined as many of these are linked to paraffinic structures in the asphaltene and tarry components of a crude oil.

Once the straight chain paraffinic compounds have been destroyed, the different bacterial species selectively turn their attention to other molecular structures. In this respect they are somewhat like the stray cats of Rome which, when starving, will apparently subsist on spaghetti, though normally preferring a diet of meat.

Some bacteria attack the relatively small molecules that make up the petroleum fractions of the crude; others concentrate on the larger structures that constitute the lubricating components. The least digestible hydrocarbon structures are those that contain more than about 30 carbon atoms: this is why the big molecular asphaltenes, tars and waxy components of the crude are the last to be decomposed by bacterial attack.

"Field" work at sea

It is still far from clear how closely the findings of the laboratory experiments can be related to the actual oxidation and bacterial decomposition of oil on the sea. It is difficult in a laboratory to set up experiments in which all the relevant factors can be taken into account.

Besides the obvious requirements of wave and wind machines, artificial sunlight and rain, it is necessary to provide large volumes of sea water containing all the mineral and organic matter, as well as living forms which may be playing some part in the decomposition process.

As an example: on the sea a slick of freshly spilled crude oil becomes innoculated with bacteria within a period of about 10 days. Depending on the temperature, the amounts of oxygen, nitrates, phosphates, etc. dissolved in the water, the bacterial population begins to increase rapidly and after a week or so the population is doubling every three or four days. At this stage, protozoa, etc. begin to prey on the bacteria and their numbers also begin to increase rapidly. The protozoa in turn provide food for plankton, copepods, barnacles, crustacea and fish and a state of equilibrium is eventually reached between the various host and predator species.

It is not known whether crustacea and fish that have subsisted on a diet derived indirectly from crude oil suffer any ill effects over a long period. One may assume not: some of the large chemical firms are already operating bacterial processes for converting crude oil into a source of animal feeding stuffs. Nevertheless, the presence of the protozoa, plankton, fish, etc. must inevitably affect the overall rate of the bacterial decomposition.

In order to supplement the work that is being done in laboratories, experiments are also being carried out in the marine environment.

At Bovisand in Devon, detailed studies have shown that "mousse" from some bunker oil that was deposited at the mid-tide level about four years ago, has decomposed very much more rapidly than the same oil at the high water level. This is because the oilconsuming bacteria at the higher level are being deprived of essential nutrient salts from the sea water, without which they are unable to multiply as rapidly as those lower down the beach.

Samples of oily sand from the midtide level contained over 400 million oildecomposing organisms per cubic centimetre. This is a very much higher figure than is normal on a beach or in the sea: for example, a sample of apparently clean water taken in mid-Atlantic contained less than 2,000 such organisms per cubic centimetre, though once they were innoculated into a suitable culture medium, their numbers also increased very rapidly.

Elsewhere in the English Channel, the Irish Sea and the North Sea, oil in containing booms is being floated from rafts and measurements are being made of its rates of evaporation, decomposition and sinking. It has been found that in temperate latitudes some of the non-volatile, tarry residues can remain afloat for two years or more. But depending on the nature of the crude and other variables, possibly three-quarters or more of the original material decomposes and sinks within this period.

In the tropics and in bright sunlight, decomposition of the oil proceeds at a faster rate. It is greatest at the edge of a slick where the oil is being broken up into droplets by the chopping action of the wind and waves.

Experiments have shown that oil that has spread out as a thin film or has been dispersed as globules in an oil in water emulsion, is decomposed very much faster than the same oil as a "mousse" or a thick slick. (This is one of the arguments used to justify the employment of emulsifying chemicals to disperse the oil.)

In droplets there is a large surface area available for oxidation and for attack by bacteria. One estimate that has been made recently for the rate of oxidation of a thin layer of oil floating on a calm sea in bright sunlight is that a layer one-ten thousandth of an inch thick is decomposed every week, i.e. about 2,000 kgs per square kilometre in this period of sunlight. The rate of degradation by bacteria is less easy to determine, but if the results of the laboratory tests can be taken as some guide to the situation in the marine environment, then an optimistic estimate is that bacteria might be accounting for about one-third of the nonvolatile material in the crude within the first six months of a spillage.

Thereafter, the rate decreases rapidly and once the more digestible fractions of the oil have been used up, the rate becomes very slow.

American workers have estimated that if a quarter of any crude oil that is



spilt on to the sea eventually ends up as tar, then about half of this tar will be destroyed by oxidation and by bacterial attack within about one year.

The calculation is very approximate, but the estimate is in reasonable agreement with the quantities of tar that have actually been found floating in the North Atlantic and in the Mediterranean Sea. At the present time, there appear to be some 80,000 tons of tar floating in these two areas—about 1 kg per square km in the Atlantic and about 20 kg per square km in the Mediterranean. These two areas constitute approximately 10 per cent of the total oceanic surface of the earth.

Can life in the oceans survive?

Five years ago there were no oil tankers heavier than 200,000 tons deadweight. Now they are commonplace. Every year more oil is being carried across the oceans from oilfields in the southern United States, the Caribbean, the Middle and Far East, to refineries in Europe, North America, Australasia, etc.

Despite the most sophisticated aids to navigation and despite international legislation governing routes, crew training, tanker design, procedures for cleaning tanks and releasing oily ballast water, the quantities of oil being handled make it almost inevitable that large amounts will find their way on to the sea.

Only comparatively rarely is it possible to recapture oil that has been spilt: remedial technological solutions such as dispersing the oil with chemicals, sinking it, gelling it or setting it on fire are expensive, often ineffective and often only serve to aggravate the damage being done to the environment.

Ever since oil became a major source of fuel and synthetic products half a century ago, pollution of the oceans has been increasing. The question that remains unanswered is this:

Can man continue to rely on the natural processes of destruction of oil (and of other pollutants also) to preserve the oceans as a habitable environment until, in due course, all the world's supplies of oil have become exhausted, or will life in the oceans, as it is already doing in some of the great fresh-water lakes, gradually become extinct?

The $\pounds 30,000$ per annum that is now being spent by the government on research into oil pollution of the sea seems a modest price to pay for an answer to this question.



Salvaging the Spotted Cat

by Norman Myers

The skin of an African leopard is worth more than the average yearly income of a Somali shepherd. Throughout Africa, South America and Asia, wherever the spotted cats are to be found, villagers are able to supplement meagre incomes by hunting them for the European and American fur market, but hunting parties must travel further each year to find their quarry. In many areas it is impossible to prevent poaching and if the spotted cats are to be saved from extinction they must be saved in the countries that import the skins. when the lions were shot out for long periods "to protect the poor antelopes", they responded by stepping up their production rates from two or three cubs a litter to five or sixmost of which survived to become full-grown lions, instead of a fair number falling by the wayside. When the shooting stopped 10 years back, in the face of growing ideas about what is really good for predators and prey, the lions showed what they knew about the wildlife scene by dropping off their litter size to the former two or three cubs. Stability again. Nobody really knows how many cubs a jaguar generally produces in the wild "in normal times", nor how many are produced now, though it has been suggested that two jaguars between them may produce as many offspring in a lifetime as will make up a \$20,000 fur coat, considering the skins that are damaged in traps, lost along the way, rejected since they don't match, etc. Looking at piles of skins leads to nothing beyond tentative conclusions in various directions—until one hears how hard it is for hunters to find any jaguars any more, and how worthwhile it is to pursue every last one they can track down.

If there are some signs that jaguars are getting in short supply in the Amazon, ocelots as well, there are similar signs about leopards. In Africa, the Somali Government accepted in 1968 that the leopard is almost exterminated there: "It is not easy to save them because one skin is worth more than the average yearly income of a Somali Shepherd". A senior official has said the situation has been undoubtedly going the same way in Ethiopia, where a single centre has been disposing of up to 8,000 illicitlyobtained skins a year-dispatched with an appropriate export stamp on them. This may be why Somalia has been contributing 443 of the 17,490 leopard skins the US imported in 1968 and 1969, and why Ethiopia contributed 2,768. Kenya exported 3,422 to the US, though probably less than one in 10 was legitimately obtained in Kenya. These US imports would be worth all the leopards found in a good 200,000 square miles of best leopard country (the UK authorities refuse to list species separately). In 1968 India sent over several times as many leopard skins as the rest of Asia put together, 3,660. When the total dropped in 1969 to 895 following a commercial ban there, the numbers in Nepal next door rose from 95 to 1.773.

The United States has been a major consumer of spotted cats skins. Now that it is perhaps abandoning the fashion, a good part of the trade will subside, though a good part too will shift elsewhere. There are ominous signs of Japan entering the field, which, judging by its record on whales, could be disastrous unless other major consumer countries in Western Europe can be persuaded to follow the United States' lead, now that they can no longer say this is something never worth doing for the first time. The world-wide trade has been estimated at half a million skins a year, of which 70 per cent has been arriving in the US, mostly to be sent abroad again as coats or accessories, etc. A huge proportion has consisted of ocelots, around 130,000 of them finding their way to US in 1968 and 1969. Between one-third and one-half

of the world's 20,000 leopard skins have been coming to the same centres. The IUCN estimates that 10,000 leopards are taken out of Africa every year on licence, which is reckoned the maximum that they can bear while still maintaining their numbers. A few years ago it suggested there were 60,000 being taken out annually without licence, while experts on the spot estimate that sometimes the official exports amount to a mere 1 per cent.

Leopards vary in their numbers from habitat to habitat. In the Nairobi National Park, there are estimated six in the forest area, and eight in the stretch of savannah eight times as big. They range from Leopard Point on the Indian Ocean to Leopard Point at the summit of Kilamanjaro. In the 7,000 square mile Kruger Park in South Africa, Dr Pienaar believes there are around 650, with prey animals to support them amounting to a biomass of less than 20,000 pounds a square mile. In the 5,800 square mile Serengeti there may be rather fewer, with a usual prey biomass of around 70,000 pounds a square mile (probably much more at present) but less favourable hunting vegetation across large parts of the park. A senior official of the US has stated that the leopard is still a fairly common animal in East Africa. He might send his background information to the Ministers of Kenya, Tanzania and Uganda, the East African Wildlife Society, the African Wildlife Leadership Foundation, the East African Professional Hunters Association, and the many other organisations who disagree; he might also name one organisation on the ground which would agree. A report in Kenva has found that game wardens outside the parks (which cover less than 4 per cent of the land area, containing perhaps 2,000 leopards) mostly consider the prospects for leopard are extremely bad and getting rapidly worse.

Cheetah figures are rather more exact, since the animal is not so elusive, hence easier to estimate. Their figures are more illuminating, if that is the way to describe a situation that is bleak for them if not black. Very rarely do they exist at a rate of one to every two square miles as Randall Eaton has found in the Nairobi Park. There are only 250 in the Kruger Park, and they are declining—not so much from



poaching as from shifts in the total ecological scene. Dr Schaller thinks there may be 150 cheetah in the Serengeti. While there is plenty of room for them there, and more than plenty of prey, they seem strangely incapable of increasing their numbers. As Dr Schaller points out, the 3,168 cheetah skins imported into the US alone in 1968 and 1969 would account for as many cheetah as could be found (at Kruger/Serengeti rates) over almost 100,000 square miles of Africa. This is a quarter the area described as "cheetah country" in East Africa, when a survey was conducted in 1965 to see whether the cheetah was deserving any special steps for its protection. After the survey had recorded around 2,000 cheetah actually sighted as a minimum number, it was decided there was no need to check any further: all seemed fine, given prevailing ideas on what conservation should aim atno good asking for the impossible. No good asking for the probably prudent either, when your yearly Wildlife Society funds for an area twice the size of Texas amount to roughly what Fort Worth spends every week on ice cream.

One would have thought there are

plenty of instances to show that giving protection to a reduced species on handkerchief patches of landscape which the protectors think is enough, is not always what the protected creatures find is enough. (If Garamba Park in the Congo with its huge numbers of white rhinos in 1960 had been considered "a safe last stronghold", there would have been poor prospects for them in 1970 with only one in a hundred left.)

The leopard among other things could be an important cash crop to people in places like Ethiopia, but it isn't any more when it has been exploited to the point where it is hard to find a single one, no matter how empty your pocket or how hungry your stomach. In Peru by the end of 1966, Ian Grimwood found that 127,000 jaguar skins had been exported from a single region over a period of 20 years, at a rate of \$60 to the hunter, 1966 prices. During the same period, the region had produced 138,000 ocelots, worth about \$25 each. The total turnover for other creatures as well, monkeys, caimans, parrots, peccaries, capybaras, etc., amounted to two-thirds of a million dollars in 1966 for Iquitos, a town of 50,000 people. Rare return indeed! Grimwood also estimated that every one of these animals was being over-hunted and could scarcely sustain such an offtake. He stressed what they could offer as a sustained-yield harvest in perpetuity if the trade were only regulated, however much the notion of "harvesting" wild animals might appall conservationists overseas. But jaguar exports are currently clearing out the equivalent of 40,000 square miles a year. In the Brazilian Amazon I have recently spoken to traders who expect their hunters to turn in three jaguars and eight ocelots every hunting season, sharing at a return of up to \$900. This work is paying off better than any other these people know, and you had better try out their usual standard of subsistence before you lecture them on great natural heritages. But these same hunters are now having to trek off 500 miles on five-month forays, to places like the Xingu National Park (!), before they can find such few jaguars and ocelots as are left. And this applies whether you speak to people at the mouth of the Amazon or nearer its headquarters 2,000 miles



to the west. The only sort of regulation in effect is that of the open market place, and this is one occasion when Adam Smith's invisible hand seems singularly invisible. It is no good saying that scarcer jaguars will eventually make the trade less worth while; rather the opposite seems to operate for the Bengal tiger, which has plunged from 40,000 to 2,000 in only a few years. Man has always been a predator, and there are few places where he is more efficient than on the battery farms and in the intensive "meat factories" of advanced nations. But when predation becomes depredation, he won't maintain his status of predator for long. The Brazilians have passed a prohibiting law, in effect for one year; but nobody need be a news addict to realise police in Brazil would have other things to do besides pursue poachers through a tropical forest five times the size of Western Europe. In late 1971, the furriers recommended a three-year moratorium on trade in leopard and cheetah furs (though not jaguar or ocelot) while an IUCN survey is carried out.

Such then is the situation in 1972. There has been legislation in some areas, and the US Bill protects the subspecies of leopard listed by the IUCN Red Data Book. These races used to roam over immense areas only 20 years ago, at least 2,000,000 square miles, or as much of Africa as the

whole of Europe. The Asiatic cheetah used to cover a region nine times as big as Britain. Now it is exceedingly rare. The US Department of the Interior is reluctant to go much beyond the IUCN listings, even though the IUCN has stated many times that it is likely other creatures, such as additional forms of leopard, will be added to the Red Data Book when further information becomes available. Meanwhile, officials in every country I have visited in Africa and South America stress they would find it very difficult to implement the bestintentioned legislation within their own countries. Each one is taking the steps it thinks appropriate, though the measures vary from area to area. The situation is not made any simpler when Kenya prohibits any further exports. Uganda bans any further imports, and Tanzania tries something else again.

What can be done to save the spotted cats? In the long term they will not survive unless international measures are taken to preserve their habitats. This will mean re-orienting our society away from continuous growth. In the meantime we must encourage those who wish to establish viable breeding colonies as small oases. Immediately, we can all contribute. Our governments must be persuaded to stop all imports of the skins of the threatened species. 1972 could yet be the year in which the great cats staged their comeback.

The Future of Epping Forest

On August 8th, 1879, the Epping Forest Act was passed so that some 6,000 acres of woodland and open spaces, part of the former Forest of Essex, and one-time realm of the East Saxons, might be preserved as a pleasure ground for the people of London to enjoy.

A journey across the Metropolis by road may take up to one hour. Passing in a north-easterly direction through endless rows of offices, shops, houses and factories, there is a sudden break in the scenery as the southern boundary of the Forest is reached. There are no fences or hedges to bar the way, for this land has no enclosures.

Almost at once we may see the curious sight of free, untethered cattle quietly cropping the grass, or leisurely crossing a road to hold up the passing traffic. Entering a wood we may notice the odd shape of oak, beech and hornbeam tree which has suffered from the lopper's axe. Such is the evidence of the ancient commoners' rights-the "right of common of pasture" and the "right of lopwood". But there is more to Forest history than this. For centuries the monarchs and their favoured subjects used this "forestem sylvam", meaning the land "outside the woodland enclosures", in order to pursue the sport of venerie-the hunting of the deer. Maybe further north where the Forest closes in we may catch a glimpse of a shy and dark coloured fallow deer as it slips away beneath the holly or bracken. It could be a descendant of some distant buck hunted by a Stuart, Plantagenet, or even a Norman king some 700 years ago.

Apart from such reminders of our history there is the present day Forest and its wildlife to look for and enjoy. Today's hunter takes with him camera and easel in place of gun, to capture the

by Alfred Leutscher

nature and beauty of this fragment of Essex forest on the doorstep of London. By virtue of the Act the ground and trees are now preserved from encroachment, lopping and hunting, and is now a sanctuary for plant and beast to live in. Yet the bustling City, and the Corporation who are the Forest guardians, are but five miles from where we commence our walk.

Epping Forest lies in a narrow crescent, some 10 miles long, on the watershed between the two tributaries of the Thames, the Lea and the Roding. This has always made travel in an easterly and westerly direction difficult in the past, owing to the extensive marshes in the valleys and the heavily wooded slopes of the Forest heights.

Iron Age farmers

The first settlers in the area, an early Iron Age tribe of farmers of the Hallstadt culture, came over from Austria to reach the Lea valley about 500 B.C. Here they built their pile dwellings in the fertile marshes, surrounded by a stockade to protect themselves and their stock from wild animals. The lush meadows provided pasture for their cattle, and reeds were gathered for thatch and flooring. Fish, water fowl and beaver were caught from the river, and occasional forays made into the woods above for larger game such as deer, boar and bear. Timber was gathered for fuel and housing. Even so, such a farming folk tended to remain in the sheltered valley, avoiding as much as possible the deep and dark woods, for here was the abode of dangerous beasts and demons. It is interesting that even today, with so many thousands of visitors entering the forest every year, only a few are prepared to leave the roadside and open commons to penetrate into the wooded depths. Is it perhaps some inherent fear of the unknown or getting lost that makes this so?

Today a bursting London has stretched its tentacles along the same routes travelled by those early invaders. A map will show the ribbon development of homes, factories, roads and railways which stretch along the two valleys, but have largely by-passed the Forest ground in between. However, over the past hundred years or so there have been disturbing inroads into the Forest which threaten its peace and permanence. The first roadways, followed by rail, took the easiest routes long the valleys. These old coach roads avoided higher ground, and went north from London, through Chingford and Waltham Abbey along the Lea by the west route, and via Chigwell and Ongar and up through the Rodings by the east route.

Further roads have since been built. A more serious penetration went through Leytonstone to Woodford. Then, in 1840, this was continued to Epping, the A11, and has bisected the Forest through its deepest part. The former seclusion of the Forest may be judged from the fact, were it not for a round-the-clock drone of traffic, that this road would hardly be noticed.

Then, as an LCC concept, the North Circular Road was built during the twenties. To this has recently been added a new section at the Woodford Waterworks. It is intended to link this with the proposed M11 which will come down the Roding valley on the far side. This means yet another invasion of Forest soil.

Epping, the City and the third airport

All this is serious enough, but worse may yet come. With the Government's decision to locate a third London airport at Foulness, Epping Forest will be in the path of probable routes between the City and airport. This could mean further fragmentation by feeder roads, rail and urban development which inevitably follow in the path of new motorways. Widening and "improvement" of existing routes will intrude even further on to Forest ground.

All this may seem very necessary in the eyes of those who put progress and



ease of access as a priority in man's affairs. Others see it as yet another threat to those very places we are endeavouring to preserve for our leisure pursuits. The irony seems to be that our reward for increased efficiency, which means less worktime and more leisure, more cars and roads, is defeating its object. These very places we seek out for peace and quiet are being destroyed by the machines we create.

In view of all this linking up with the North Circular and M11 would it not be commendable on the part of the authorities to downgrade the existing A11 for the use of local traffic only, and so bypass the Forest? As it is the incessant stream of cars and transport vehicles, night and day, is already taking a heavy toll of wildlife. Today it is not unusual to count up to a thousand cars per hour on a sunny summer's weekend. passing through the heart of the Forest, many at speeds far in excess of the 50 mph limit. Up until World War II the traffic was hardly a hindrance, even to pedestrians. As recently as the late 1940s I counted a herd of some 30 deer in a quiet Forest glade, only a few yards from the highway. This year on a summer's weekend there were some 150 cars parked in the same place. There were no deer.

This famous herd on ancient fallow

has all but left the Forest, driven away by human disturbance. But for the timely erection of a deer sanctuary by the Conservators, in which a healthy and growing herd is now established, these unique wild deer, now widely scattered among outlying woods in Essex would have been lost for ever. The badgers, too, have gone, and their crumbling setts are deserted. Road and rail traffic have taken their toll, and the Forest has lost one of its most valued and oldest of residents. Old Brock was here long before man arrived.

Further indication of the effects of this invasion by man and machine may be judged by the rarity of a once common and beautiful creature, the shy adder, which likes to live in peace, and will not bite unless molested. No doubt some are killed on sight, but a far greater threat is the intrusion into their lives. Quiet glades where the fallow doe once dropped her fawn, and the adder basked in seclusion, are now popular picnic spots and playgrounds for children.

At one time the Forest was rich in lichens, those colourful and primitive algal-fungus commensals which can survive under the hardiest of conditions, but will not tolerate pollution. An old record for the previous century lists up to 170 species. Today this has been reduced to a mere handful, and London's drifting smoke and traffic fumes are the most likely cause.

Private cars and London transport bring out the people in ever increasing numbers. They disturb the peace, quite unintentionally, and come for many reasons, as ramblers, horse-riders, artists, sportsmen and naturalists, or just to sit out for a day's rest and outdoor picnic. This is just as it should be, for in Queen Victoria's own words, this once Royal Hunting Forest of Waltham was dedicated "to the pleasure and enjoyment of my people for evermore".

The Conservators

The present owners of London's Forest are the City Corporation of London who act as conservators. To carry out these functions entrusted to them in maintaining this pleasure ground to suit so many tastes, the Corporation have appointed an Epping Forest Committee, comprising of 12 members of the Court of Common Council, and four verderers elected by the commoners. The work of maintenance and order is carried out by the Superintendent and his staff of keepers and woodmen. The only other office is held by the reeve who marks the cattle with the ancient brand mark of the manor from which they are enlarged.



Today this right is exercised mainly by farmers, but is also the right of anyone who is the owner in any one of the 18 Forest parishes of, at minimum, half an acre of land inclusive of the site of his house. This entitles him to own and enlarge two cattle or one horse.

The Conservators have no easy task to perform. The Act states that the Forest should be preserved in as natural a condition as possible. Over the years the old and dying pollards have been removed or thinned out, in order to enencourage new growth of unmutilated trees. Clearing the glades of invading scrub, by mowing and returfing, and incidentally allowing the cattle to act as "mobile lawnmowers" helps to keep the open spaces and adds variety to the landscape. Ponds resulting from former excavations when gravel was used to line the roadways, are cleared from time to time to preserve the open water necessary for pond life, fish and water fowl. A pond left to nature will slowly fill in with invading reeds and rushes. All such conservation measures are in the best interest for maintaining a wealth and variety of wildlife adapted to different habitats.

Since the Essex Field Club was founded almost a century ago—it came about by a chance meeting of three naturalists in the Forest—this has become a happy hunting ground for the study and recording of every branch of natural history. It is probably true to say that no place in the world has been so intensively studied as this ancient woodland, the last extensive area of the Forest of Essex.

What can still be seen and heard in Epping Forest usually comes as a surprise to outside and foreign visitors, who expect to find something more in the nature of a tamed and formal suburban park. Yet this ancient woodland is far more than this, and has been described by the Superintendent, Mr A. Qvist, as a "piece of social history". The silent pollards and the wild deer, such as are left, serve as a reminder of a page of mediaeval history. In a sense those Norman huntsmen were excellent conservationists. To hunt a quarry such as deer it is essential to safeguard the trees, since these animals are adapted to a woodland habitat.

The Conservation Centre

To bring all this wealth of history and wildlife to the notice of the public the Corporation has just opened a Conservation Centre, one of the first of its kind in Britain. Its aim is to offer information on Forest history, management and wildlife, in the hope that a precious heritage will be respected and valued by those who enter the Forest Classrooms and laboratories are available to parties of visiting schoolchildren who are instructed in Forest lore, taken on rambles, and, more to the point, taught the meaning of conservation and how this can best be applied. Lecture facilities and meeting rooms are open to such adult bodies as historic and natural history societies and an information centre and museum are open to the public. A warden and staff are appointed, and the Centre is under the supervision and guidance of the Field Studies Council.

Little disturbance of the Forest and wildlife will ensue and collecting will be reduced to a minimum, for this is not to become a research centre for field work, but rather a centre for instruction and a storehouse of records.

How long can the Forest withstand the pressures of modern living? This former playground of kings and queens, so jealously guarded in the past, must be no less protected today, for there may yet come a final chapter in this long Forest story. Can a place where the trees have always stood, and where the deer, fox and badger have lived for years, stand up to human pressure and demand? Or must yet another precious plot of England be sacrificed to the needs of modern man?



To Eternity via Stupidity Street

by Roger Frith

In a shabby farmhouse on the side of a hill six miles outside Minerva, Ohio, there once lived a prophet. Few people ever saw him, let alone knew of his existence, though the curious learnt from the local tradesmen who venture up the muddy track to the farm, that a "brilliant man" lived there all right, but "a funny fellow" who could sometimes be seen sitting amidst the jungle of unruly weeds that grew around the unworked farmstead, "writing away to his heart's content". "What does he write?" the curious asked. One day, a tradesman produced a muddied broadsheet he had found that morning along the track and read from it: "I dreamed—alas, I only dreamed that things were other than they seemed . . ." "Mm," said the curious, anticipating more: "Anything else?" "If only Pilate could have kept his seat", read the tradesman. "Is that all?" the curious returned. "Only the Eskimo staring at his dusty snow will ever know.'

The curious were perplexed, but nonetheless still curious about the occupant of the farm, when tradesman and they came to go their separate ways after the final quote from the bottom of the broadsheet:

"This is not a stupid joke: Anno Bombini."

With those ominous words, the tradesman and the curious might have anticipated the outbreak of a nuclear war. In fact it was near the end of the last war at the time of the dropping of the atomic bomb on Hiroshima. At Sendai University in Japan, the prophet had, until 1939, taught English Literaturehaving left his native England in 1924 to do so. Between the years, many of his fellow countrymen had thought him long dead, but the United States National Institute of Arts and Letters knew otherwise since those broadsheets had begun to circulate from that ramshackle farm in Minerva, and, in 1946, when he was at the ripe age of 76, they gave the prophet their annual award of \$1,000. The curious people of Minerva had their proof now that they had "a brilliant man", but still "a funny man" among them all right.

The word that the prophet still existed, soon spread to his native shores where, in 1954, the Queen awarded him, at the age of 83, the gold medal for Poetry—the poetry that is, of the man who far from "writing away to his heart's content" in his forest of weeds in Minerva, wrote this in 1912:

See an old unhappy bull, sick in soul and body both, slouching in the undergrowth of the forest beautiful, banished from the herd he led, bulls and cows a thousand head ...

Pity him that he must wake; even now the swarm of flies blackening his bloodshot eyes, bursts and blusters round the lake, scattered from the feast half-fed, by great shadows overhead.

And the dreamer turns away from his visionary herds and his splendid yesterday, turns to meet the loathly birds flocking round him from the skies, waiting for the flesh that dies.

I am referring, of course, to Ralph Hodgson whose centenary it was last year. Whenever I think of Ralph Hodgson, a picture always comes to my mind of a traveller walking along a country road signposted: "To Eternity Via Stupidity Street". In the foreground of my picture, I see a woman:

Eve, with no dish of sweet berries and plums to eat, haunting the gate of the orchard in vain . . .

That woman is not only Eve but Mother Earth. The traveller walks on through that demi-paradise hearing in a linnet's song more than I can hear, and seeing one last blackbird where I think I can see many. Although that demiparadise might be Eden for all I know. Yet for the traveller there is a world of difference: only now when every road seems to be signposted: "Stupidity Street", do I begin to understand why.

Before Hodgson died in 1962, at the age of 91, he published the third and last collection of his poems called *The Skylark*. Included in this last volume was a poem that had originally been published in *The Saturday Review* in 1910, called "To Deck a Woman". It is a poem that looks back to an even earlier one called "The Last Blackbird" in its ominous note. But full of foreboding as both are, so do they look forward to these our present times.

Let me first consider "The Last Blackbird". Picture Hodgson stepping off that road to "Stupidity Street" into that demi-paradise where, in a reverie, with "no mind to think/of Beauty wronged and none to give redress", he finds a shady bower in which he lies down after hearing a blackbird's song. Soothed by the bird's note, he closes his eyes and in a dream sees Mother Earth in "angel guise" looming before him. She begs him for news "how linnets did". Hodgson replies that "not otherwise/than ill indeed it (goes) with linnets now". Mother Earth asks to hear more as Hodgson blesses "the hour for (his) inquisitor". He gets to his feet, and eagerly tells her the worst:

- "Hear me!" The blackbird piping from the hill,
- his insolent wild eye—its yellow rim—
- his coaly vest and yellow mandible-
- is he not thine? Wouldst thou continue him?
- Art thou still minded, Nature, to provide
- the salts and sweets a frolic wagtail picks

- out of the spume that quilts an idle tide
- behind the trough where meeting waters mix?
- Hast thou a mind to keep a redstart dressed
- as now and heretofore; to order still the system of economy unguessed
- that gives a shiver to his flaring quill?
- Wouldst thou still keep the chiffchaff to his song,
- and have him know to braid his grassy dome?
- Wouldst knot and twist with many a weedy thong
- the green confusion leaping round his home?
- Is still thy mind for wrens and little springs
- and ferns and sudden stoats and popping mice,
- and all the myriad noisy rainbow wings
- that make the wood not less than paradise?
- "Hear me," I said. "Thy woods a grandam's tale;
- its trees are felled; save one its birds are dead;
- thou art unqueened; now other hands prevail;
- one blackbird lives—he is the last," I said.
- "Yon blackbird with tonight will end his race."
- I stopped and Nature rose and looked abroad:
- she came again and asked who ruled the place;
- I named then him who reigned its overlord ...

The "overlord" is, of course, Man. Mother Earth protests that what Hodgson has told her, cannot be true. She begs Hodgson for "one gladdening word". Hodgson returns ominously:

- I said the place was changed where hawk-moths sipped
- Eve's sugared cup; nor now was Beauty's mark
- upon the stream where once her linnets dipped,
- and moony bubbles raced into the dark;
- Wild Beauty's left the down whereon she lay;
- the heaths and plains are bare; shy Beauty's fled

- the woods; fierce Beauty's left her desert day;
- Beauty is fled or dead. Beauty is dead . . .

The demi-paradise of the picture I had in my mind at the beginning was an illusion, though still the signpost seems as real as before: at least that part of it which says: "Stupidity Street" where Man exists at Nature's expense. Protest as Mother Earth might, Hodgson rebuts everything she says. Man has abused Creation. Mother Earth in desperation asks Hodgson for a remedy. Save for one, Hodgson has nonethat one being to annul Man, or send the world "whirling at the sun". Mother Earth answers Hodgson severely:

- "... The last was spoken ill.
- My world is good; its streams may yet run pure;
- my blackbird now is piping from the hill!"

She listened to his lazy overture.

- Miraculous old song! Our wonder met:
- she turned away and listened to the bird
- "Tonight," I said, "tonight he'll pay the debt."
- "Tonight," I said, but him alone she heard.

The poem ends with Hodgson having Mother Earth herself finding the remedy:

- She looked above: small as a pigeon's wing
- a cloud came up and crost the blackbird's tree.
- She said, "How say'st thou if yon blackbird bring,
- to wash my world, a deeper, wider sea?"

I woke. A dizzy man I reeling went

- round by the hill: a blackbird hurried by;
- clouds raced and cracked; to some high argument
- were hurrying the gossips of the sky.

Our streams poisoned; wild life threatened—Hodgson foresaw both though his remedy "a wider sea", hasn't occurred yet. Instead we have a sea which is constantly being polluted. One awful remedy that Hodgson suggested—if one can call it a remedy did actually occur, which brings me to that other poem I mentioned "To Deck a Woman", written in 1910. Again one should picture Hodgson in a similar demi-paradise to that already mentioned: "a place of summer doves", "rapt lizards", and of the linnet—a recurring bird in Hodgson's poems. In fact it is the "pathos of the Linnet's song" that gives to Hodgson's pen these words:

One melody, one lustre lost, one loveliness of Earth at end not Heaven deflowered of all its host were deeper wound or worse to mend.

Again Hodgson falls into a reverie, a reverie which makes that "place of summer doves" an illusion:

And there mine edge of sense fell blunt,

such poppy in the sun it found;

of Beauty winging as she wont

I saw no more, nor heard a sound...

In his reverie, Hodgson sees two women. But though Hodgson says:

I might have looked on sisters here, so close their comely charms agreed . . .

these two women are far from being sisters. One is Mother Earth—yes, but the other, well, as Hodgson says:

plainly these no sisters were, nor cousin kith nor aught a breed.

She is in fact the personification of women: a cross between Lucrezia Borgia and a modiste if one can possibly imagine such a hybrid. Hodgson observes her "barbed glances" stealing into "the very veins" of Mother Earth, thus goading her into utterance:

O stranger know . . . Earth's loveliness is shrunken low, its cry am I . . .

She proceeds to tell Hodgson of all the wonders she created for this world:

I bade the rainbow clasp the sod, the hills and dells put forth their green,

the wort and willow break the clod, the daisy and the palm be seen;

and cried into the sinks and seas on flocks unfashioned, droves in dream,

and led them to the dews and trees and evening star and morning beam . . . The pristine beauty of everything she created is best conveyed in these beautiful lines where she recalls:

O happy lawns of Eden star when all a rainbow-haunted day the treetop quires made melic war with master-lay on master-lay,

and shrill hosannas of the lark flowed down unceasing from the sky till night came over gilt and dark and hushed the lists of melody;

when ghost owls in the branches flew as silent as the moony air, and foxes ran among the dew and forest eyes were everywhere;

And sadding-sweet of nightingales and catches of the babble-wren came from the woods and willow vales,

O happy lawns of Eden then!

So Mother Earth was to haunt, like Eve, "the gate of the/orchard in vain". For, as she says:

Some monstrous fry of mortal seed than aught in story lewder far, some tall ambitious masterbreed supplanted me on Eden Star;

Some prospered vein, I mused, of bloods

myself misgrafted in the sloughs, long ere I led the multitudes to Eden's painted sods and boughs;

or folly of my prentice hand among the streams, or ever sea or sod I made or Eden planned, returned with fatal fruit on me . . .

With no mention of God the Creator, though with the use of the biblical "or" for "before" in that last stanza, we see Hodgson as a kind of cosmogonist rooted in Genesis, but, as it were, rewriting its first chapters. Mother Earth, the Creator, is herself supplanted by that which she "misgrafted in the sloughs": that which would become the masterbreed: Man. She wanders out like Eve into her created world only to find, like Hodgson, that it has become an illusion. She seeks her birds and does not find them. She sees "the English Isle no more"-for Hodgson is talking about the garden which was once England. She wanders through that "garden" to find only traces of Man's brutality and stupidity. She observes him, his shoulders flowing with "the blood of doves and dying things". Whilst she has been telling Hodgson her woeful tale, one tends to forget the personification of women: that hybrid herself. But soon Mother Earth turns on her, and only then do we realise that it is this wretched hybrid,

- Whose avid "more!" and "More! Yet More!"
- urged every bout of shame and blood,

or lovesick hern he ravaged for the tassels of its lustihood,

or finch or lark with lyric lung he broke upon a scented hill, or crying seal he flayed and flung to crimson waters crying still . . .

After naming all the creatures that Man has brought to the very edge of extinction, Mother Earth tells Bloodwant for so she calls that hybrid—that she brings no "just reprise to curb her much ambitioning". There will be no "wider sea" no biblical Flood for remedy as in "The Last Blackbird". On the contrary, as Mother Earth says:

I have no sleight to match with thine,

no arms to give thee open war; I mean no panic anodyne, no ease for my distempered star.

Its season-blind unshifting Law. the same my being joined on me, what hour I mused and willed and saw

the starry birth, will shelter thee.

Then bring thou yet more learned guile

to sweeter poison surer still, a swifter bolt to engine vile and work on Eden world thy will.

Lead echo on from cry to cry of creature snared or hunted down, until the stammering hills reply in concert last to Beauty thrown,

and paramount indeed thou stand, the circle of thy shame complete; the last red labour of thy hand in bloody welter at thy feet ...

It is only in the last stanza that Hodgson suddenly reveals the sting in Mother Earth's tail: the awful remedy:

Then shall the sod where Beauty fell send up her wraith in *murrain* guised and in its clasp thy breed unhell my paradise unparadised.

In 1968 we had that murrian

Hodgson prophesied, but have we learnt anything from it? Have we unhelled "paradise unparadised"? Still those crying seals are flayed—though the salve to our consciences be that it is now controlled by law. As for the English Isle that Mother Earth saw no more—what there is *left* of our demiparadise, slashed as it is by motorways complete with "swifter bolts to engines vile", seems more and more to me, to be an illusion—the only reality that part of the signpost which reads: "Stupidity Street" to which Hodgson eventually came:

I saw with open eyes singing birds sweet sold in the shops for the people to eat, sold in the shops of Stupidity Street.

I saw in a vision the worm in the wheat, and in the shops nothing for people to eat; nothing for sale in Stupidity Street.

-Stupidity Street where, for Hodgson

'Twould ring the bells of heaven the wildest peal for years, if Parson lost his senses and people came to theirs, and he and they together knelt down with angry prayers for tamed and shabby tigers and dancing dogs and bears, and wretched, blind pit ponies and little hunted hares.

-Stupidity Street where Hodgson listened and heard

Hammers beating, night and day, in the palace newly reared, beating it to dust and clay: other hammers, muffled hammers, silent hammers of decay.

-and Stupidity Street where Hodgson begged

Time, you old gypsy man, will you not stay, put up your caravan just for one day?

if only to make Man stop and take account of what he was doing to creation. But, as Hodgson knew only too well when he said, near the end of his life "Gently, years, gently". Time waits for no Man, and is too soon

... off to some city

now blind in the womb, off to another ere that's in the tomb

On one of those broadsheets Hodgson circulated from his farm in Minerva throughout the 'forties and 'fifties, he posed this portentous question in a pithy couplet:

Did a fallen nation ever see its fall beforehand?

As the curious people of Minerva did not foresee Hiroshima and the further threat of nuclear war when they heard

"This is not a stupid joke: Anno Bombini"

so Hodgson's question is answered. That muddled broadsheet the tradesman picked up along that farm-track one morning in 1945, might have been the last words written by a man before such a catastrophe, that a lone survivor of it read when it was too late to act. Although I do not wish to say. Hodgson will be proved correct-yet it is never too late to act upon his words. Though Hodgson went out of "Stupidity Street" into Eternity, he left his warnings ringing in the blind alleyways and gutters for us all to hear. But if there is one poem that tolls through "Stupidity Street" louder than any other, it is that which bears the title of "Journeyman". I end with it, that it may toll on.

Not baser than his own homekeeping kind

whose journeyman he is-

blind sons and breastless daughters of the blind

whose darkness pardons his-

about the world, while all the world approves,

the pimp of fashion steals,

with all the angels mourning their dead loves

behind his bloody heels.

It may be late when Nature cries Enough!

as one day cry she will,

and man may have the wit to put her off

with shifts a season still;

but man may find the pinch importunate

and fall to blaming men-

Blind sires and breastless mothers of his fate,

it may be late and may be very late, too late for blaming then.

Integrated Pest Control and the Human Environment

by Walter Ryder

Why is pest control necessary? Pest problems are mostly man-made by-products of agriculture, which provides large areas of land dedicated to single species of crop or livestock. In such conditions some insects are favoured and succeed in multiplying to exceptionally high numbers, with the result that they become a nuisance to man, consuming significant amounts of his crops or transmitting disease to his livestock. It is more instructive to think in terms of pest *situations* than to regard certain species as immutable enemies of man.

Bei-Bienko (1961) gave an interesting example of the effect of insect populations of concentrating specific biological resources. He studied the insects of virgin steppe and of new wheat fields established on steppe land, and found that three major wheat pests increased in abundance by factors of 290, 21 and 25 during the first year of wheat cultivation, while many of the insects present in the steppe were absent from the wheat. Thus, favoured species were selected out when the heterogeneous plant community of the steppe was replaced by the relatively homogeneous wheat culture.

It would seem to follow from this kind of observation that the introduction of heterogeneous elements into pure crop stands and other situations favouring pest development should be a fundamental plank in the pest controller's strategy. Work carried out during the past decade has shown that a realisation of the true nature of the pest problem has in fact been taking place among applied entomologists. In California, for example, staggered harvesting of alfalfa in strips has discouraged mass emigration of Lygus bugs to neighbouring cotton, which has a low economic tolerance to these insects, while the planting of blackberry near vineyards has provided overwintering sites for an egg parasite of

the grape leafhopper. In Cuba, the association of sunflower and maize in alternate strips has resulted in reduced incidence of a maize pest known as the fall armyworm, apparently through disorientation of the adult insects, which will not oviposit on sunflower.

Clearly, such measures may be more costly than established practices. Yet any long-term projection of the needs of society would seem to favour their extended application, especially where the alternative is to release poisonous substances into the environment.

Although the basic notion of the homogeneous pest situation cannot be claimed to have originated as part and parcel of the philosophy of integrated pest control, it is coming to be recognised that, without it, integrated control cannot achieve anything like its full potential. Integrated control represents a conceptual advance on previous approaches to the problem of confronting pest situations, and it is of interest to examine the principles involved and to consider their relevance to environmental management generally.

Nova Scotian apples

Thinking on integrated control arose from the work of A. D. Pickett and his colleagues during the nineteen forties. Pickett aimed to reduce the dependence of Nova Scotian apple growers on

routine chemical pest control. His approach required an understanding of orchard ecology and careful observation of population trends of pests and their natural enemies. Emphasis was placed on the use of selective sprays if pesticidal measures seemed unavoidable, and over a period of years there was a reduction in the incidence of the oystershell scale, the codling moth, the fruit free red spider mite and other major pests. Importance was attached to the timing of applications so as to avoid harming susceptible stages of beneficial species, and poisons were used in the minimum effective concentrations. On discontinuing the use of non-selective oil sprays and introducing ferbam, the parasite Aphytis mytilaspidis and the predacious mite Hemisarcoptes malus were enabled to reduce the scale insect population to insignificant levels within two years.

Pickett concluded what is now widely accepted—that the routine repetitive application of broad spectrum pesticides as an insurance against outbreaks of arthropod pests frequently created, through the general destruction of parasites and predators, and the development of resistance to insecticides by the pests, more serious problems than those corrected. This focused attention on the desirability of combining natural and chemical control in a rational way. Pickett argued that precise knowledge of the mechanisms involved in the population dynamics of insects was a prerequisite if this line of attack was to be advanced.

The meaning of integrated control has gradually been expanded to encompass the combined use of differing control agents of any kind. Milne (1965)regarded integrated control aiming to render the pest's 25 environment unfavourable by combining whatever means were available, and he considered the technique to be essentially ecological. Smith (1967), however, viewed integrated control as separate from ecological control because it stressed the value of suppressive factors already present in agro-ecosystems, but it is difficult to see any substantial distinction here. Smallman (1965) described integrated pest control as mimicking the diversity of natural selection pressures and relieving pressures from individual sources, and this of course implies a curtailed role for pesticides, which have been responsible for very intensive selection of resistant strains of pests. The concept of pest management, as expounded by Geier (1966) and Beirne (1967), is an attempt to link the various threads of pest control in a unified system. The FAO Panel of Experts on Integrated. Pest Control has defined integrated control as a pest management system which in the context of the associated environment and the population dynamics of the pest species, utilises all suitable techniques in the most compatible manner possible and maintains pest populations below those causing economic injury.

Modifying ecosystems to improve the environment

Whatever definition we accept, there is no doubt that integrated control is increasingly based on an understanding of the real character of the pest situation, and more and more concerned with broad conservation or amelioration of the environment. The effectiveness of integrated control will increase as knowledge of ecosystems grows. But the method will only play its full role when the authorities accept the need to modify present ecosystems in the interest of environmental improvement.

The proper integration of control methods requires vastly more research into pest ecology than is currently undertaken. Milne (1965) estimated that preliminary ecological studies would take approximately 15 ecologist-years for each pest. With many thousands of pests awaiting attention, the task seems at first sight impossible. However, such detailed study of every species may not be necessary, if the methods of some integrated control practitioners in the United States are more widely adopted. There, certain pest situations have been assessed quite rapidly, and the subsequent application of integrated techniques has been conspicuously successful.

This pragmatic approach offers hope, but it is not without serious difficulties. The vulnerable aspects of the pest's relationship with its environment still have to be identified and exploited. Personnel engaged in such work must have an outlook which is both evolutionary and ecological, and must possess a large fund of practical experience. Workers combining these qualities are lamentably rare, thanks to the propaganda of the pesticide industry, the influence of bureaucrats who favour the solutions which appear simplest on paper, and the preference of many biologists for work on "pure" rather than applied problems.

So far, integrated control has mostly consisted of very simple combinations of techniques, as, for example, when insecticides have been used to decimate screw-worm flies so as to maximise the effect of a subsequent inundative sterile male release. The fundamental need for environmental diversity would seem to indicate the desirability of multifactorial, self-balancing and perhaps self-perpetuating control systems. In the long run, integrated pest control ought to occupy a place within an overall plan of environmental management. This can only happen, however, if and when short-term economic criteria are subordinated to the ecological requirements of future generations.

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This month's contributors

Neilton Pilpel is a Reader in the Department of Pharmacy at the Chelsea College of Science, University of London. He was born in 1922 in London, educated after school at University College (Kings College), London, where he did research with Sir Eric Rideal on physical chemistry. He spent 13 years in industrial research where he was in charge of Applied Chemistry in an industrial engineering organisation. He returned to an academic life in 1964, and now teaches undergraduates and directs the research of seven Ph.D students.

Norman Myers was born in 1934; educated at Oxford (M.A., Modern Languages). In 1958 he went to Kenya as District Officer in Colonial Administration. After Independence, became a school teacher in Nairobi for a brief time (school of four races, 16 nationalities); then took up freelance writing, photography, T.V. filming, in the field of wild life conservation in East Africa. Undertook two lecture tours of North America, fund-raising, etc. In 1970 he went to University of California at Berkeley to consolidate experience into an interdisciplinary doctorate in Conservation Ecology.

In 1972 he returned to Kenya to finish off dissertation; and to commence one-year survey for International Union for the Conservation of Nature on the status of leopard and cheetah throughout Africa south of the Sahara.

Alfred Leutscher, B.Sc. is Chief Guide Lecturer British Museum (Natural History); President of the British Naturalists' Association; and Chairman of the Advisory Committee, Wildlife Youth Service (World Wildlife Fund).

Walter D. Ryder, B.Sc. in Agricultural Zoology (Dunelm) 1959, Ph.D. From 1962-4 Infestation Control Officer, Dept. of Agriculture and Fisheries for Scotland. He was Head of Veterinary Ectoparasitology Section of May & Baker Ltd. from 1964-5; Entomologist with Plant Protection Ltd. (ICI) Jealott's Hill Research Station from 1969-70. From 1965-9 he was with the Cuban Government as Head of the Department of Entomology, Institute of Animal Science, Havana, from 1965-9: he is currently a Research Fellow in the Department of Biological Sciences, University of Dundee.



From Sir Julian Huxley, FRS

Sir,

I am glad that *The Ecologist* has published "A Blueprint for Survival", and hope that its message will be widely heeded, not only by individuals, but by local councils and the Government.

Having been interested in the Conservation of Nature and Wildlife for 60 years, having helped to establish National Parks both in East Africa and Britain, and having campaigned for population control for over half a century, I naturally find myself in agreement with your Blueprint and the conclusions to be drawn from it.

In those 60 years a great deal has been accomplished. Much wildlife, both plant and animals, and much glorious scenery have been saved for public enjoyment. Family planning and population control are now the concern of many governments and of the U.N. and its Agencies. Britain now has a Ministry of the Environment, and most western nations are taking steps to curb over-population.

Yet the situation is graver than ever, mainly because of the continued increase of the population.

Even in our little island, nearly half a million human beings are added every year. More people, more pollution, more cars, more sprawling cities, more congestion.

I hope that we shall take action, not merely against pollution, but against the unchecked increase in human numbers.

Instead of paying couples more for increased families, we should at least reduce family allowance for each child after the second. Or we could, as India has shown, reward people who allow themselves to be sterilised. Britain should formulate and implement a population policy, officially aiding Family Planning and advertising the dangers of further increase in numbers; the United Nations should do the same for the world, where higher rates of increase in developing countries are widening the gap between their prosperity and that of the richer nations. We should of course take further steps to prevent haphazard invasion of what is left of our unspoilt countryside, by unregulated building, and should prohibit mining and other commercial activities in National Parks and areas designated as of outstanding beauty.

Above all we should, by all means at our command, make it clear to the inhabitants of this planet, that it is urgent to reduce the increase of population.

Julian Huxley, F.R.S.

From Prof. C. H. Waddington, FRS Sir,

I think the Blueprint for Survival is quite right to argue that we cannot sustain indefinitely a policy of growth, when growth is defined in the terms such as GNP as used at present; and that the alternative must be a social system which has built into it much more stability in the form of self-correcting mechanisms, both for the system as a whole itself and for its component subsystems. However, I want to emphasise that this should not be taken as a call for a simple return to nature, a lowering of the real standard of living and a regression to less sophisticated technology. To design and put into operation self-stabilising social and productive mechanisms will demand a deeper understanding, and a more sophisticated technology, than anything we have at present. The recycling of wastes is more demanding of intellectual and practical understanding than merely throwing them away. To control pests and improve crop yields by biological control, and to find a means of improvement of yield which co-operate with, rather than merely swamp, the natural ecosystem, is a more sophisticated job than merely to poison the pests and dump fertiliser indiscriminately over the cultivated surface.

Moreover, the standard of living should be measured in real terms, which take account of the major values of life, such as happy social relations; social security; leisure, and the means to enjoy it, such as education, sport and creative activities of many kinds. It is clear that growth of these values can, and should, continue for many generations, even though in order to achieve this we may have to restrain the "growth", as it is assessed today in such crude indices as the GNP.

The real message of the *Blueprint for* Survival is not "back to a time which is simpler because it is more primitive and less sophisticated": it is rather "forward to a time which is simpler because it is more integrated and more sophisticated".

Yours faithfully,

Professor C. H. Waddington, CBE, FRS, Professor of Animal Genetics, University of Edinburgh.

From Prof. D. Gabor, FRS

It so happened that I have read the leader in Nature of January 14, The Case Against Hysteria before I read your Blueprint for Survival. Somewhat to my surprise, I could not detect in it any signs of hysteria. It is a reasoned statement of facts, of a goal whose desirability few people can dispute, and of a plan cautiously phased out over a hundred years, with provisions for learning from experience. I do not agree with all its recommendations and conclusions. I would not advocate a "power tax", because the increasing scarcity of high concentrates of certain rare materials will force us to use more energy for extraction, and with Alvin Weinberg I believe that atomic power plants need not be dangerous polluters. Instead of a "raw materials tax" I would rather give positive incentives for re-cycling. I consider units of 500 people as much too small for the development of a high civilisation, I would prefer to see small towns, with all cultural amenities, numbering inhabitants of the order of 50,000. But these are small differences of opinion, matters of quiet discussion.

Why then the violent backlash, which deserves the adjective "hysterical" far more than your Blueprint? The attack against the environmentalist started, I think, with Anthony Crosland's article which accused them of elitism and contrasted them with the simple people who wanted "jobs, not beauty", and sunshine with fish and chips in Mallorca. Why the more recent insinuations against the Club of Rome, and the unconditional rejection, by the Establishments at both sides of the Atlantic, of the pioneer work of Jay Forrester and Dennis Meadows? I have said long ago that growth addiction was the creed of our times, but it was a surprise even to me that it had the intensity of a fanatical religion.

My advice to you is: do not respond to heated attacks with increased heat. I was very glad to see that Paul Ehrlich does not figure among your references; keep away from such doubtful allies. Let the discussion simmer down from the emotional to the intellectual level. Truth will win in the end. *Dennis Gabor*

From Sir Geoffrey Vickers

Sir,

Thank you for sending me your *Blueprint for Survival*. I like this even better on second reading.

The ecological analysis is most cogent and comprehensive; you have done a most useful job in bringing all this together. I full agree with your analysis of the self-exciting and therefore self-limiting, if not self-destructive character of the governmentalentrepreneurial system and the economics which goes with it and supports its assumptions. I have some reservations on the social analysis. But my main criticism is that you seem to me unduly to mute, if not to misread some of the political implications.

Obviously the policy includes everything most hateful, at least in the short run, to government, business and trade unions-shrinking tax base, falling revenues, higher costs, shrinking markets, more work, lower wages, eroded differentials, lower GDP. The only current "goal" in the programme is reduced unemployment, through the encouragement of labour-intensive industry. This is important and will become more so if, as I expect the present expansive policy comes to be recognised as incompatible with other than rising unemployment. But even your promise of lower unemployment looks like being realised more slowly than the corresponding costs.

So it won't be easy to get it accepted by both political parties, industry and the trade unions. But given that you do, I ask myself, among other questions1. How could you implement it without starting a major recession (and having abjured in advance most of our present controls, such as they are)?

2. How, whilst implementing it, could we remain sufficiently competitive in international markets. (It would obviously be absurd to wait until everyone else has agreed, especially since many other countries can afford to wait much longer; and

3. Would fiscal measures be enough to boost labour intensive industry quickly enough, and if not, what are the alternatives and supplements?

There are answers of a sort to all these questions, though some of them would go best with Fidel Castro as prime minister and Dr Schacht at the Treasury—I choose two names for which I have high respect—and I won't begin to elaborate. But two points seem to me to be clear; these changes postulate an ideological revolution and a strong central government.

To bring this country from its present state to a stable state will, I think, require centralised control at least as strong and far more extended than in the last war. Then we had rationing of essentials, the virtual discontinuance of luxuries, direction of labour and extensive control of incomes, prices, wealth and land use. Some of these would be more, some less needed. But I see no chance that greater physical dispersal would mean greater devolution of political power. There would indeed be much for local government to do, even more than now. But the weight of decision and control at the centre would surely be much increased. (How else, for example, could your prosperous local communities support the starving ones or arrange to share limited and therefore probably licensed imports?)

Such a society may be highly democratic, highly participatory and socially well-knit. It will only work-and only happen-if everyone is frightened by events and prospects into an enormously enhanced level of responsibility, which will be expressed both in accepting centralised control and in implementing it at grass roots level; as in the war farmers implemented agricultural policy and housewives implemented rationing. And for the same reason there may well be, as there was in the war, more humanity, mutual help at the personal level, social intercourse, community spirit and mutual trust, including trust of government and its officials. But I think the paper plays down the blood, sweat and tears to an extent which may make it (or its authors) sound a bit unrealistic.

I shall be glad to help in any way I can.

Yours sincerely,

Sir Geoffrey Vickers, Little Mead, Goring-on-Thames, Reading RG8 9ED.

From Prof. J. Hawthorn

Sir,

Is the Big Brain Big Enough?

Nature's editorial following the publication of *Blueprint for Survival* leads one to doubt whether the big brain is big enough. When a journal of the distinction of *Nature* uses sentences like the following, one wonders if it is attacking a case against its own better judgment.

"It is especially regrettable that declarations like these should myopically 'draw attention to the supposed difficulties of moderating population growth in Britain when there is no evidence worth speaking of to suggest that Britain is overpopulated."

The Ecologist has argued its case with coolness and objectivity. Food resources of the United Kingdom can support a population of perhaps thirty million at most. Our present population is over fifty-five million and rising. What does the editor of *Nature* mean by over-population?

Yours faithfully,

Professor J. Hawthorn, Department of Food Science, 131 Albion Street, Glasgow, C.1.

From Dr. J. P. Lester

Sir,

"A Blueprint for Survival" must surely command the admiration and support of all conservationists. It seems presumptuous to criticise a scheme which could only be judged adequately by practical trial, but even so I would offer a few points for consideration.

(1) The "Blueprint" is diffident about the idea of introducing socioeconomic restraints to encourage limitation of family size. I find it hard to believe that we could do without them and feel that if they were presented as rewards for success rather than as penalties for failure they would meet with little opposition and would surely be more effective than mere exhortation. After all, even the *Daily Telegraph* which is not notable for its enthusiasm about solving the overpopulation problem has admitted that it might be a good idea to re-examine family allowances (Editorial, 7.1.72).

(2) At the present time Family Planning Services are provided very largely by the part-time activities of several different types of doctor. The provision of a National Population Service on the scale you envisage would call for the establishment of a special body of medical auxiliaries, as it would be impossible to recruit enough medical manpower from the supply likely to be available without reducing the range of medical services which the public expects. This may be a particular illustration of a general problem in that, in any field, the personnel with the skill needed to implement the changes outlined in your scheme may already be fully occupied with what are regarded as essential activities.

(3) As you state, politicians are very difficult to convince of the urgent need of a scheme of this sort (though I am hopefully sending a copy of the "Blueprint" to my M.P.) but we still have a great deal to do in the education of the public as a whole. A person born into an already overcrowded world seems to be able to accept the extra degree of overcrowding which will occur during his lifetime without protest or even comment. Are we really doing enough about the coming generation? It seems to me that children who stay on into the VI form get plenty of teaching about ecology and quickly see the point of it all whereas those who leave earlier, and may need the lessons more, very often miss it altogether.

(4) There are signs that those who are interested in the problem of (Resource depletion + pollution) + overpopulation are becoming dissected into factions which tend to argue with

one another as to the relative importance of the various factors in the problem. This is harmful because it wastes time better devoted to furthering the cause of conservation while providing ammunition for those who cry down its seriousness.

Finally, I must point out that, as a medical practitioner who is no more than an ordinary member of the British Medical Association, my views are entirely my own and I have no brief to speak for the opinions of that body. From the manner in which my name figured in the Statement of Support for the "Blueprint" your readers may have thought otherwise, but in fact the B.M.A. has not so far ventured any opinion on the subject of overpopulation. With the growing interest of the medical profession in this subject (as shown by a letter published in the British Medical Journal on 8 January 1972) I feel it will not be long before it does.

I am, Yours etc.

J. P. Lester, M.B., B.Chir., M.R.C.G.P.

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.

More weeds, fewer pests?

The control of insect pests may be a problem to farmers, but to vegetable growers it is a nightmare. Large fields of leafy crops, all the same, and at various stages of growth, offer an unlimited food supply to insects that may multiply very rapidly.

Ask a commercial grower how he keeps ahead of the pests and probably he will tell you he sprays, heavily and often. Yet the campaign to ban the persistent pesticides—the ones he likes best—has been gathering impetus ever since it began and now the subversive rumour has it that DDT and its relatives are not even very good at their job. Indeed, they may make things worse.

Two ecologists, Dr. J. P. Dempster and Mr. T. H. Coaker, have suggested, in a paper presented at a symposium on biological control held at Oxford in January, that the solution may be to grow "weeds" among the crop. It makes sense on theoretical grounds, for it makes the crop less suitable for pests and more suitable for their enemies.

First Dr. Dempster set out to investigate the effect of DDT on pests. He chose the caterpillars of the small white butterfly (*Pieris rapae*) on brussels sprouts and he found that after spraying with DDT their survival improved markedly.

The caterpillars live among the foliage of the plant and while many of them were killed by the spray those that survived could be attacked only by predators that were able to cross the sprayed region. Many of the caterpillar's enemies live on the ground during the day and climb the plant stem at night. They suffered from surplus DDT that reached them on the ground and from the residue on the plant itself as they moved upwards. The predators that live among the foliage were affected first by the spraying and then by having to cross the poisoned leaves.

This was not the end of the sad tale, for while the crop was replaced with fresh, unsprayed plants, sufficient residues of the DDT persisted in the soil to keep down the predator population. So once the grower has sprayed he will have to spray again.

It was then that Dr. Dempster began to consider the possibility of increasing

the diversity of plant species. Existing evidence on the influence on pests of areas of wild habitat, hedges and patches of weeds, around the edge of a crop was inconclusive. They may harbour both pests and their enemies, but the sheltering effects of windbreaks may concentrate airborne pests into the crop. Most insect pests are highly mobile and the management of the edges of a field may have little effect on the numbers migrating on to the crop where they can multiply.

On the other hand there was evidence to suggest that the presence of a weed within the crop reduced the impact of certain pests, particularly cabbage aphid (*Brevicoryne brassicae*) and the caterpillar of the cabbage butterfly (*Pieris rapae*). Unfortunately, it had also been found that the weeds so depressed crop yields that any advantage in improved pest control was outweighed by the effect of the weeds themselves. Dr. Dempster looked for a second plant variety that he could grow with a crop that would reproduce the effect of a weed cover without competing with the crop.

In 1970, an area of $3,600m^2$ was ploughed, rotavated and divided into four equal plots (A-D). Two of these, (A and C), were sown with Kersey White Clover at a rate of 22.5 kg/ha on May 14th. The centre of each plot was planted with 100 brussels sprouts (10 × 10) on May 23rd, before the clover had germinated. On plots B and D weeds were removed by hoeing and the surrounds were sprayed with weedkiller. The clover failed to keep down some perennial weeds, such as creeping thistle, and these were cut twice during the summer.

Throughout the summer, counts were made twice weekly of the eggs and larvae of *Pieris rapae* on 20 plants in each plot and 25 pitfall traps were installed over each plot to measure populations of ground living predators.

There was no significant difference in the number of eggs laid on the different plots, but far fewer caterpillars survived on the clover plots. The *Pieris rapae* larva does not cause significant damage until it has grown to the point where it sheds its skin for the third time and by then Dr Dempster found its population had been reduced by the increased population of arthropod predators, particularly the ground beetle (*Harpalus rufipes*) and a harvest spider (*Phalangium opilio*). No count was made of the population of the immature stages of the cabbage root fly, but an examination of a sample of plants showed rather less damage on the clover plots.

When the crop was harvested, the yield was found to be markedly higher on the clover plots. Dr Dempster found this difficult to explain, unless it was due to the difference in cabbage root fly damage early in the plants' growth.

In 1971 the experiment was repeated by Mr Coaker at the University of Cambridge Farm. This time cauliflowers were grown as well as brussels sprouts and red clover instead of white. No Pieris rapae larvae or eggs were found on any of the sample plants, but there were many more cabbage aphid (Brevicoryne brassicae) and cabbage root fly on the bare plots than on those with clover. Curiously, it was found that the insecticide Birlane was more effective against cabbage root fly on the clover plots. This may have been due to the moister soil beneath the plants, or to the reduced loss from vaporisation from the denser foliage.

Alas, the crop was much reduced on the clover plots, because red clover grows much more quickly than white and it swamped both cauliflowers and sprouts. Nevertheless, both clovers had a marked effect on the incidence of pests, all of which were reduced and for several different reasons.

All that remains now is to solve the problem of competition between the clover and the crop and we may be ready to enter a new phase of pest control, based on sound biological principles. More than that, it may work! *Michael Allaby*

Spartina Grass

The influence that vegetative forms of life can have upon the salt marshes and mudflats and the dunes of Britain's coasts affords a well-nigh inexhaustible study to the ecologist, and nowhere is this more so than in that area of the Somerset coast below Stert Point, along which a shingle ridge runs down towards Hinckley Point where the Atomic Power Station rears its phantasmagoric shape.

It is entirely appropriate that the Nature Conservancy should here have an extensive Nature Reserve ranging from the mudflats of Bridgwater Bay to the foreshore and common land beneath which lie the peat deposits of the great alluvial plain through which the rivers Brue and Parrett flow to add

their quota, in times of flooding, to the anxieties of Somerset River Authority.

This would be an area of absorbing botanical and ornithological interest at any time, but what makes it exceptionally worthy of notice today is the creation of new land where formerly the tides flowed, which has been accomplished by natural means during the last 42 years. It is firm land, covering an area of over 200 acres to a depth of five feet or more, and fortunately it all comes within the supervision of the Nature Conservancy. Its formation is a valuable reinforcement of the sea defences in an area which has known more than one calamitous inundation, and in particular, Stert Point and Stert Village are less vulnerable to erosion.

The story of the change wrought along this wild stretch of coast can be said to have begun in 1870 when Francis Townsend, author of *The* Flora of Hampshire, found growing near Hythe, in Southampton Water, a new hybrid type of male sterile grass in the Spartina group, which was named after him. Yorkshire born and a parson's son, Townsend was Stratford-on-Avon's MP from 1886 to 1892, but we may doubt whether anything he accomplished in Parliament gave him more satisfaction than to have his name perpetuated in the grass he identified.

Botanists have determined that Spartina Townsendii was the result of the crossing of another variety, Spartina alterniflora, a North American species which has been found in the River Itchen near Southampton in 1892, with Spartina maritima which is native to Britain and Europe.

Spartina Townsendii propagates only by offsets and from this, by a doubling of the chromosomes, yet another variety, Spartina anglica has developed. This apart, the interesting question arises: how did S. alterniflora reach these shores from America?

The answer remains a matter of conjecture, one theory being that seeds may have adhered to the hulls of ships on the transatlantic route, to be dislodged during cleaning in Southampton Water. This is feasible enough, and is a reminder that in the reverse direction there have been many introductions, accidental and otherwise, of European and British species into America, sometimes with highly unfortunate results.

Whatever the cause of the transfer may have been, the hybrid Townsendii showed remarkable tenacity and soon colonised Poole Harbour, spreading rapidly and proving highly tolerant of salt water, and it now grows in many localities. Its performance in Poole Harbour prompted Mr E. Kelting, chief engineer to Somerset River Authority, to have two truck loads of the grass brought to Bridgwater in 1928, for planting in mudflats of the Bay. It thrived there exceedingly. Wooden groynes of some six feet high had been one of the former defences against sea erosion. Today only about one foot of these groynes may be seen above the level of the land Spartina has made.

Although it is not exclusively a salt water plant, *Spartina Townsendii* is exceptional in its capacity to thrive and multiply when subjected to tidal conditions in which silt and other drift

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material, of which an abundance flows through Bridgwater Bay, provides sustenance for its roots. With the accretion of silt the grass puts out rhizomes in all directions, some of which are detached to start growth and propagation on their own, so making circular clumps which ultimately join to form *Spartina* meadows. By midsummer the growth of these is between two and four feet high.

The rate of accretion is of course an important factor, and over a two year period the Nature Conservancy has measured this at over 500 sites in the mudflats, showing that the maximum rate is 10 centimetres a year with a mean of five centimetres. This year aerial surveys are being made to ascertain the extent and rate of spread of *Spartina*.

There is of course a debit side to the propensity of this grass to colonise estuarine waters and harbours so vigorously. In excess it can obstruct navigation, cause flooding, and curtail fishing. And from an ecological point of view a mark against it is warranted when it invades areas which are useful feeding grounds for some species of birds. It may for example invade and reduce areas of *Zostera*, a plant on which Brent Geese feed.

However, these are not problems in Bridgwater Bay. It is thought that Spartina's mass movement seaward has reached its limit, and there would be a further two miles to go before it reached the deep waters of the Channel. As for birds which feed on the mudflats, they have some 6,000 acres at low water in which to forage. Thus the ecological advantages Spartina has brought far outweigh any disadvantages.

Ornithologically the combined interest of the mudflats, the Spartina meadows and common land adjoining them, is inexhaustible, and it would be a long list that included all the native and migrant species that feed, rest, and have nesting places there. Fortunately, no shooting is permissible over the Nature Reserve except at the far west end and over part of the Parrett estuary. Waders and many of the passerines are to be seen there, often in considerable numbers.

As may be expected, there is an enormous gull population, and as many as 4,000 widgeon may be seen at a time. This is also the only area other than the Heligoland Bight, whereshelduck are known to moult. It used to be thought that the entire shelduck population migrated to the Bight for the moulting season until the abundance of their feathers washed up on this stretch of coast proved otherwise.

As the number and variety of the seed-eating birds have increased so have their predators—the harriers, merlins, and peregrine falcons. The increase of the latter is particularly noteworthy in view of the widespread destruction of the species through DDT. Food and shelter are also provided for a host of small mammals, notably the short-tailed vole and the shrew; and James Morley, the Nature Conservancy's chief warden and dedicated watcher of the region, reports having found badgers using *Spartina* for bedding.

The agricultural benefits of the *Spartina* meadows are modest but not to be despised in an era when good farmland is being taken for other uses at a profligate rate. In 1930 Essex Farm Institute made reasonably good hay from *Spartina* and in 1965 the Nature Conservancy made *Spartina* silage which was fed to sheep at the Grassland Research Institute in Berkshire. Its digestibility was assessed as being similar to that of medium quality hay. Horses relish *Spartina* and it is useful as a litter for cattle.

It is apparent that discretion must be used when direct grazing is resorted to for this, and the consolidation of the soil that ensues, tends to cause Spartina to die back, thus giving way to other and perhaps less desirable plants. Sheep are obviously the most suitable grazers and are frequently to be seen on the meadows. When, some years ago, a party of Chinese botanists visited Bridgwater Bay to study the characteristics of this grass they were astonished to see Dorset Horn sheep grazing on it, and decided they must buy some of this breed to take home with them. So as well as building new land Spartina has helped to sell sheep.

The Chinese also took some of the grass for propagation around their own coasts and many thousands of samples of the grass have been exported from Bridgwater to New Zealand, Canada and the Philippine Islands.

One more virtue, which could be an increasingly important one, must be ascribed to the grass Francis Townsend discovered. It acts as a filter to various forms of polluting material and will quickly colonise again an area following oil pollution. In one area badly affected by the Torrey Canyon disaster this grass re-established itself in a year. *L. B. Powell*

Ecological monoculture?

Fruit growing is a difficult, risky business. Wherever large areas of land are devoted to the growing of only one plant species, pests, parasites and diseases specific to that plant will build up over the years.

All monoculture is subject to these disadvantages, but fruit trees, blossom and the fruit itself are particularly susceptible, while the blossom and fruit are also vulnerable to physical damage from frost, rain and wind. The monocultural problems are intensified further by the fact that a fruit orchard is planted to last many years, whereas even the most extreme arable farmer can grow a break crop from time to time and so kill off many of the pests that would otherwise survive the winter to attack his crop the next year.

Thus the commercial fruit grower is more heavily dependent than other farmers on insecticides and fungicides. Even with their help his life can be difficult: he is managing a system that is fundamentally unsound ecologically. If life is hard for the orthodox grower it is even harder for the organic grower.

Now Dutch Growers' Services, based in Herefordshire, is introducing into this country a method of apple growing that modifies the monocultural pattern, so making fruit growing somewhat sounder and safer, while at the same time yields are dramatically higher. Oddly enough, DGS achieves its better ecological balance by increasing intensification rather than by reducing it.

The system is based on Type IX spindle bushes, rather than conventional trees. The bushes are produced by budding and each bud is taken from a healthy tree. The maidens that are planted are each certified virus-free by the Ministry of Agriculture. They are planted 4 ft apart, tied to stakes, and when fully grown they will reach a

height of no more than about 7 ft. Although DGS does not guarantee a crop in the first year, the trees are planted already feathered and last summer I saw bushes planted in March that would yield about half a ton of fruit an acre this year.

Because they are so low, all the operations required can be performed from ground level and pests and disease are much easier to control than on conventional trees 15 ft high. Pest outbreaks can be seen in their earliest stages; twigs that are diseased can be broken off, leaving the rest of the plant sound. In fact, DGS sprays heavily-the company began as an off-shoot of John Hill (Hops) Ltd., one of the country's leading suppliers of horticultural chemicals and part of its service to growers is the supply of chemicals-but protection and control is easier by any method and the organic grower who prefers not to spray has a much better chance of success than he would have with taller trees. Indeed, it may be that for the first time he is able to compete on an equal footing.

Every 300 ft a windbreak is planted. The windbreak trees grow faster than the fruit bushes, to a height of 30 ft. This gives wind protection over the whole orchard from all directions and it also breaks up the plantation into small, separate areas. The trees harbour insect predators and parasites and insectivorous birds, while disease organisms and fungal spores that are carried on the wind tend to be blown clear, over the top of the orchard. This wind protection gives each orchard its own microclimate, while the change in environment and microclimate in the region of the windbreak may act as a "cordon sanitaire", making it difficult for microorganisms to pass. DGS uses no artificial fertilisers and the build-up of organic matter in the top soil may encourage the insecteating beetles.

The system was not developed for ecological reasons, however. Tom Bot, the Dutch managing director of DGS, spoke disparagingly of conventional fruit trees. "Most fruit trees waste their energy growing tree", he said, "Ours grow fruit". By their fourth season the spindle bushes will yield double the national average which is based on production from trees five years old. By their fifth year, and for the rest of their lives, they will yield 15 tons to the acre. A 40-acre plantation will produce 10,000 tons of apples over the 20 years of its productive life.

The method was developed in Holland in response to greater pressure on land than British growers have experienced, and to stiffer competition from southern European growers. Mr. Bot believes British farmers must increase production if they are to survive in the Common Market.

So far, the introduction of the system into this country has been slow. At present there are only about 600 acres producing fruit in this way. The main reason is the very high capital investment needed at the start. DGS helps with finance, part of which comes from investors, and it is seeking more investment. A 40-acre plantation costs $\pounds 25,000$ to establish, but it will yield a 15 to 20 per cent return on the investment over the full 20-year period.

The high initial cost relates to the services DGS provides. It produces the trees, which it supplies and plants. It provides the stakes. These have to last the full life of the bushes and they are cut from selected timber and pressure creosoted to prevent rot. DGS trains workers in pruning—although it claims this is simpler on small, identical bushes than on larger trees, each of which is an individual—and it provides full advisory and follow-up services. A farmer need know nothing about fruit growing. All he has to do is to follow the advice of DGS.

Provided the necessary investment is forthcoming, Mr. Bot believes the method will enable British growers to produce apples at a competitive price and with a superior flavour. In southern Europe fruit grows and ripens quickly during a short, hot, sunny growing season. The cooler climate of Britain and Holland means slower growth and this makes for better flavour. DGS also finds flavour is improved by using only organic manures and fertilisers. It uses hop manure, which is plentiful in Herefordshire, or poultry manure with straw added to slow down the rate of release of nitrogen.

The DGS method does not represent a dramatic technological "breakthrough". It is the product of many years of research and development in Holland and its success has been proved there for a quarter of a century.

On the face of it, it breaks all the rules, but on closer examination it may be that it comes closer to obeying them than many conventional fruit growing techniques, all of which are monocultural. It breaks its large orchards into small areas with breaks of other trees that introduce some diversity of species and at the same time offer protection from wind and from airborne infestations, while its small bushes are easier to examine and manage than full size trees.

In helping fruit growers to increase their production, it seems that DGS has discovered the modifications that are necessary to minimise the harmful effects of monoculture and to make it ecologically sound.

Michael Allaby

Does Essex need a fourth London airport?

The present controversy over the siting of the desperately needed airport for London seems particularly illogical. Arguments were once put forward that larger aircraft were needed to carry more passengers and those arguments were submitted in projected estimates by the airline companies, so the Jumbos were built. These aircraft presently fly around half empty and with the airlines close to bankruptcy as a result of this gamble, the airlines are uneasy about the claim that people also want to go faster from one traffic jam into another.

By simple deduction, a projected estimate requiring more airports is basically an extension of this logic devised by some forecasters in the Airports' Authority—that we need more and more aircraft to carry fewer and fewer people.

With this in mind and a Socialist government in power, a reluctant gesture is made to site it at Cublington, Buckinghamshire no less. Gadzooks Sir! Bulldoze a Norman Church for a runway? That would never do! Now a Tory Prime Minister presides who checks a map and lo! Chequers lies smack in the flight path, which also crosses the dormitories of brokers, bankers and other influential gentry. Cublington is relieved and High Mass is held in celebration. The good Lord must hold a Norman Church in greater esteem than the fate of the little mud-waders of Foulness.

The Public by now is completely in the hands of the expensive Public Relations Officers-the Public comfort must be considered-find a mud-flat that nobody wants and all will be well. The pathetic cries of the tweedy eccentrics about bird flyways and cockiebeds now seem as nothing at all, compared to the horror that passed. If an airport has to be built, the best place is Foulness. After all it is better not to get black looks from one's fellows at Boodles or Bucks for disturbing their sleep, and what if there is a black look on the face of the Brent Goose on his way to his sleep of extinction. Few of the public have ever seen one and anyway the argument can be reduced to a matter of taste.

Meanwhile back at Gatwick a contender groomed in the early days as an alternative to Heathrow, much scurrying is evident. For the shiny glamour of those Early Bird flights soon vaporised with the daily dousings of their paraffin droppings and interminable din. Property values were at risk, and what stronger stimulus could there be for panic in financial circles. Thus the prospect of a second runway at Gatwick has disappeared in a political smokescreen, with Reigate and Peter Masefield in the thick of it. The smoke generated being proportional to the density of politicans and financiers to be found in the particular locality.

Meanwhile back to Stansted, first feint of the plot and forgotten in the melee by the early diversion of Cublington, then teased with the prospect of being London's official third airport and left to be worked on later while attention was distracted elsewhere to muffle the cries of protest. Like a bureaucratic conjurer, the Airport Authority has thus pulled two rabbits out of the same hat.

Boadicea

Analysis of "The Ecologist" Readership Survey

A total of 924 forms were returned within four months of the magazine containing the survey being circulated. It is understood that forms are still coming in (December) but these have not been analysed.

Where possible, the figures have been transposed to a percentage of the total for easy conversions, therefore unless stated otherwise the percentages are taken from the total i.e. 924.

Readers Age and Sex Ratio

The sex ratio was	as follows:
Male	77.6%
Female	22.4%
The sex ratio, by	age groups was as
follows:	
	0/

Male	under 35	67.1*
Female	over 35	32.9*
	under 35	70.4*
	over 35	29.6*

*These percentages are all related to the separate figures for male or female i.e. 67.1% of males in the study were under 35, and *not* 67.1% of the total were under 35.

Analysis by occupation

Univ. student	21.2	Scientific	8.2
Professional	15.6	Manual	3.6
Clerical	13.2	Housewife	3.1
School student	12.7	Journalism	1.2
Teaching	10.6	Agricultural	0.4
Engineering	10.2		

Analysis by daily newspaper

	%		%
Guardian	23.9	D. Mirror	1.6
D. Telegraph	20.7	Sun	0.6
Times	16.6	Morning Star	0.6
D. Mail	6.7	Local	2.9
D. Express	4.6	None	20.2
Financial Times	1.6		

As some people took more than one daily paper, these percentages are taken from the total figure for each newspaper.

The Mail is probably the only one which is not accurate—the merger with the Sketch having only just come into fruition at the time of the survey.

How do you obtain your "Ecologist"

Newsagent	Subscription	Other	
55.2%	39.8%	5.0%	

Are you finding difficulty in obtaining your copy?

Yes	No
10.9%	89.1%

The areas where difficulty was ob-

tained were spread out evenly, indeed other people from the same towns had no difficulty.

There was a good deal of dissension regarding the late issue of some copies —particularly from subscription holders who received their copies weeks after seeing them on news stands.

Are you professionally interested in the environment?

Yes	No
29.9%	70.1%

All students who replied Yes to this question I altered to No—it is a little premature before completing their studies!

Do you read any other magazine?

I divided this question into three groups i.e. those who read no other magazine, those who read one, and those who read more than one.

Of those who replied in the affirmative, I totalled all the titles and gave a percentage of these totals.

Nil	One	More than one	
35.4%	29.0%	35.6%	
Popular tit	les		
		%	
Animals		5.3	
Your Envi	ronment	7.7	
New Scien	tist	32.6	
Technical	Mags.	1.1	
Nature		0.5	
Conser. So	ocieties		
House Ma	gazines	17.8	
Scientific A	merican	9.5	
N. Geogra	phic	0.7	
The rem	ainder of	the magazines, by	

The remainder of the magazines, by numbers, included Habitat, Span, Jnl. of Ecology and Countryman.

Do you belong to any conservation groups?

Yes	No
47%	53%

Of those who answered Yes, the major proportions were as follows:

	/0
Conservation Society	24.3
Local societies	4.6
Soil Association	1.5
R.S.P.B.	1.5
National Trust	1.2
Conservation Corps	1.0
The remainder belonged to	the follow-
ing organisations.	
Henry Doubleday Research	Association
Anglers CoOperative Associ	ation
Fauna Preservation Society	
Noise Abatement Society	
British Ecological Society	

Ramblers Association Pure Water Association C.P.R.E. C.P.R.S. C.P.R.W. I.C.B.P. British Trust for Ornithology Wildfowl Trust Wildlife Youth Service U.F.A.W. Council for Nature S.P.A.B. U.N.A. British Deer Society Sierra Club Friends of the Earth Association for the Reformation of Science I.U.C.N. Keep Britain Tidy Inland Waterways Association World Wildlife Fund Footpaths Preservation Society British Field Sports Society Friends of the Lake District

Howmany friends/colleagues read "The Ecologist"?

Nil	One	Two	Three
38.4%	19.8%	19.6%	8.9%
Four		More th	han four
4.4	%	8.9	9%

Which issues have you read?

Counting issue 10 as the total, all percentages are based on this figure.

One	Two	Three
61.7%	67.2%	60.8%
Four	Five	Six
74.5%	80.8%	80.6%
Seven	Eight	Nine
83%	89%	91.5%

Regular Features

A number of replies gave no individual comments, these have been listed under No response.

Title	Extend	Reduce	Retain	Drop	No Response
	%	%	%	%	%
Down to Earth	28.7	4.1	56.5	2.3	8.4
Ecopolitics	31	3.2	57.3	1.5	7
Ecotechnics	35.2	4.5	50.3	1.0	9
Gargoyle	5	1.7	35.1	12.7	45.5
Student Action	21.2	13	48.6	7.7	9.5
Towards a Unified Science	20.2	9.5	48.1	8.2	14
Feedback	31	6.2	55.1	0.2	7.5
Books	23.6	10.5	57.2	0.5	8.2
Letters	26	2.7	62.6	0.5	8.2

There was a drop at issue 6, on reflection I think this was the issue which was extremely late.

Will you continue to read it?

Virtually 100% replied Yes.

Do you consider the Ecologist a good title?

Yes	No
97.2%	2.8%
Alternative titles:	
Conservation	Ecology Today
Environment	Ecology
Environment	
Protection	Mother Earth
Man and	
Environment	Your World
Environment Today	Our Future
Survival	Human Ecologist

Format and editorial

Very good	Good	Satisfactory
23%	52%	22%
Unsatisfactory		Poor
2.7%	, · · · · · · · · · · · · · · · · · · ·	0.3%

Constructive and repetitive remarks

Article on grassland—based Ecosystems Feature review often identical to Soil

- Association magazine.
- Reports on conservation battles, victories, plans.

Advertise in angling journals

More book reviews of shorter length. Special rates for students.

- Pull-out fact sheets on Ecology for beginners-for libraries, schools.
- More ecology of plants and animals.
- Try and interest children—posters, simple articles.
- A lot of people said "drop poems" a few said "retain".

Article on archaeological conservation. Bibliography with articles.

Glossary of Ecological terms. Arthur J. Puffett

Coming events

22-23 March—Clean Air Spring Seminar. National Society for Clean Air—at Grand Hotel, Manchester. (Space available for a limited number of exhibitors.) Further details: N.S.C.A., 134 North Street, Brighton BN1 1RG. Tel. Brighton 26313.

23 March—"Noise, Dirt and the Diesel" Conference at the Cafe Royal, London. 09.30 to 17.00. For further information contact: Kyle F. Bosworth, Seminar Manager, IPC Business & Industrial Training Ltd., 161 Fleet Street., E.C.4.

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.).

9-14 April: "Environmental Studies for Teachers of the 5-13 age range"—a course open to men and women teachers and lecturers. Further particulars: Institute of Education, The University, Sheffield, S10 2TN.

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.

15 April—Conference on the Environment at University of York. For further details contact Mark Andrew, Director, Yorkshire Clean Up Campaign, Wool Exchange, Bradford, BD1 1LD. Tel. Bradford 32929.

20 April—"Seed Ecology"—international symposium organised by Easter School in Agricultural Science to take place at the University of Nottingham. Further details: contact W. Heydecker, Senior Lecturer in Horticulture, School of Agriculture, Sutton Bonington, Loughborough.

25-28 April—Second Commonwealth Conference on Development & Human Ecology, jointly sponsored by Singapore Government and the Commonwealth Human Ecology Council (CHEC). Further details: contact Mrs Daysh, 63 Cromwell Road, London, S.W.7. Tel. 373 6761.

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.



Wherein the Author Treateth of Victuals

It is the Boast of the Automobilians that Famine hath been these Fifty Years banished from their Realm. This Claim I found by my own Observations to be for the most Part true: the very Beggars on the Streets (and they are but few) seem sturdy and sleek enough, and even aged Paupers, when they die neglected, are the Victims rather of Cold or untended Hurts than of Hunger. Yet he were rash who would assert that all is well with the Diet of the People, as I hope to shew forthwith.

The Art of human Felicity, it has been often observed, lieth in Balance, and in treading the Middle Way betwixt two opposite Evils: and too often we escape the Fangs of Scylla only to be drawn resistless into the Gorge of Charybdis. In this Manner have the Automobilians eluded the old Enemy, Famine, only to fall Prey to a new and hitherto unsuspected Foe. Their Newspapers are filled with Advice to those that are fat and would fain be leaner, founding a thousand prolix Dissertations upon two small Words, "Eat Less". Yet I do not observe these constant Exhortations to have any profound Effect: they are like Sermons against Sin, which we all hear gravely, and approve, and forget before we are well clear of the Churchyard Gate. There is indeed something religious in this Obsession with the Weight of their Bodies: and those who have the Means shew themselves very Anchorites in the Rigour of their periodick Expiations, paying Large Sums to be subjected for a few Weeks of each Year to such a Regimen of Abstinence and Mortification as would make Newgate seem a Pleasure Garden, and straightway afterward returning to their old Excesses once more.

Let not the Reader suppose, however, that this is a Nation of Sybarites, whose every Meal is a Feast of rare and exquisite Dainties fit to tickle the Palate

of a Lucullus. In sooth, much of their Victuals is poor Stuff, such insubstantial Pap as the meanest Labourer in England would scorn, were he in Health. The Bread is so blown up with Air that it has no more Substance, and little more Nutriment, than a Feather Bolster. They drink an unconscionable Deal of milky Syrup, which they flavour with Infusions of Tea or Coffee. Even in Summer they eat little that is fresh; Meat, Fruit, Legumes are all the Products of another Season or another Land. For since they dwell in Cities, all Necessaries must be brought them from without. They display curious Skill in preserving these Goods from Decay: some they inclose in tight Cannikins of Iron; some they dry as our Housewives do Herbs; some they shut up in great Chests wherein perpetual Winter is maintained by their mechanick Arts, and Meat is there frozen too hard for Corruption. Thus is made possible a mighty Encrease of Trade, whereby all Lands, from the Poles to the Tropicks, are enlisted to load the Tables of the Automobilians. They argue that this maketh for Cheapness: but I know not how it may be thought cheap for a Man to eat Lamb reared in the Antipodesas I have seen happen-when, outside his Town, Hillsides are abandoned to Scrub for Want of Sheep.

The Flavour of their Food is ill served by this Treatment; wherefore they tincture it with Minerals, and its Savour and Colour owe more to the Hand of the Chymist than to that of

Nature. They oftentimes remove all Virtue and Nutriment, which later with redoubled Expence they endeavour to put back. The Adulteration of Flour with Chalk, Sausages with Bread, and the like, is so generally practised as to incur no Censure, and is indeed approved and tacitly encouraged by the Law. Whatever furthers the Interests of Commerce is deemed a publick Good: and the Butcher who can distend his Carcasses with Water, or the Dairyman who can contrive a succedaneous Cream from Blubber and Flour, are thought to enjoy encreased Profits as the merited Reward for their Benefactions to Mankind.

No less esteemed are those who cajole the People to buy their Wares; who cozen the Housewife into paying tenfold, to be spared a Moiety of the Labours of the Kitchen, or the Hypochondriack to stuff his Belly with Pills and Potions innumerable, wherewith to make good forsooth the Deficiencies of an unnatural Diet. Nor are there lacking far-sighted and ambitious Traders, as I was informed, who anticipate the eventual Abandonment of the Farm as a Source of Food, and look forward to a Time when all Provender will be extracted from Coal or other Minerals: and such is the Automobilians' Fondness for complexity over Simplicity, and for the Contrivances of Man rather than the Gifts of God, that I marvel this Project hath not been received with more Enthusiasm and Approbation.

Nicholas Gould

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The Social Structure of the Environment

The fundamental importance primitive man attaches to the structure of his society is reflected in his tendency to attribute to it some sort of "absolute reality". He cannot conceive of any part of his environment as not being organised in a similar fashion. The natural world is therefore made to reflect this structure. Durkheim and Mauss survey the classificatory system of the Australian aborigines, the Zuni and Sioux Indians, and the Chinese. They conclude that socio-centricity is perhaps even more pronounced than anthropocentricity:

"It has quite often been said that man began to conceive things by relating them to himself. The above allows us to see more precisely what this anthropocentrism which might better be called sociocentricism, consists of. The centre of the first schemes of nature is not the individual: it is society. Nothing shows this more clearly than the way in which the Sioux retain the whole universe, in a way, within the limits of tribal space, and we have seen how universal space itself is nothing more than the site occupied by the tribe, only indefinitely extended beyond its real limits. It is by virtue of the same mental disposition that so many peoples have placed the centre of the world, 'the navel of the earth', in their own political or religious capital, i.e. at the place which is the centre of their moral life. Similarly, but in another order of ideas, the creative force of the universe and everything in it was first conceived as a mythical ancestor, the generator of the society."1

The Zuni system of classifying the natural environment is so illustrative of this principle that I shall quote Mauss and Durkheim in full:

Towards a unified science

"Indeed, what we find among the Zuni is a veritable arrangement of the universe. All beings and facts in nature, 'the sun, moon and stars, the sky, earth and sea, in all their phenomena and elements; and all inanimate objects, as well as plants, animals and men, are classified, labelled and assigned to fixed places in a unique and integrated system', in which all the parts are co-ordinated and subordinated one to another by 'degrees of resemblance'.

"In the form in which we now find it, the principle of this system is a division of space into seven regions: north, south, west, east, zenith, nadir, and the centre. Everything in the universe is assigned to one or other of these seven regions. To mention only the seasons and the elements, the wind, breeze or air, and the winter season, are attributed to the north; water the spring, and its damp breezes, to the west; fire and summer to the south; the earth, seeds and the frosts which bring the seeds to maturity at the end of the year, to the east. The pelican, crane, grouse, sagecock, the evergreen, oak, etc., are things of the north; the bear, coyote, and spring grass are things of the west. With the east are classed the deer, antelope, turkey, etc. Not only things, but social functions also are distributed in this way. The north is the region of force and destruction; war and destruction belong to it; to the west, peace (as we render the word 'war cure' which we do not quite understand), and hunting; to the south, the region of heat, agriculture and medicine; to the east, the region of the sun, magic and religion; to the upper world and the lower world are assigned diverse combinations of these functions.

"A particular colour is attributed to each region and characterises it. The north is yellow because, it is said, the light is yellow when the sun rises and sets; the west is blue because of the blue light that is seen at sunset. The south is red because it is the region of summer and fire, which is red. The east is white because it is the colour of the day. The upper regions are streaked with colours like the play of light among the clouds; the lower regions are black like the depths of the earth. As for the centre, the navel of the world, representative of all the regions, it is all the colours simultaneously.

"So far, it seems that we are in the presence of a classification which is quite different from those which we have first examined. But there is something which allows us to suppose that there is a close link between the two systems, viz. that this division of the world is exactly the same as that of the clans within the pueblo. This also is 'divided', not always very clearly to the eye, but very clearly in the estimation of the people themselves, into seven parts, corresponding, not perhaps in arrangement topographically, but in sequence to their sub-divisions of the 'worlds' ... Thus, one division of the town is supposed to be related to the north ... another division represents the west, another the south, etc. The relationship is so close that each of the quarters of the pueblo has its characteristic colour, as do the regions: and this colour is that of the corresponding region."1

In "advanced societies" the physical environment is no longer classified in terms of social structures that have largely disintegrated but rather in terms of the experience of their individual members.

In other words, as society disintegrates, sociocentricity gives way to egocentricity.

The sociocentric view of the gods

The same principle is illustrated by the tendency for primitive societies to view their gods as reflecting their own social organisation.

Thus the Alorese² live on an island and thereby are isolated from any potential enemies. This has permitted the development of an extremely loose society. Few constraints are applied at a level higher than that of the family, and even this unit is very weak, the average Alorese being undisciplined, self-indulgent, and having little regard for any authority of any kind. Their pantheon appears to reflect this social organisation very closely. Thus: they have a culture hero and a supreme deity, but they play a very small part in their thoughts. Ancestral spirits are more important, but behaviour to them is loose and undisciplined, just as it is towards their parents.

"So slight is the tendency to idealise the parental image that the effigies by which the Alorese represent these ancestral spirits are made in the most careless and slipshod manner, and are used in the most perfunctory way and then forthwith discarded. There is no tendency to give the deity permanent housing or idealised forms. The dead are merely pressing and insistant predators who can enforce their demands through supernatural powers. This is precisely the experience of the child with his parents. Hence he obeys reluctantly and grudgingly."2

Goode³ shows how the religious system of the Manus, a small nation of traders and fishermen, who also have a loose social organisation, regard their gods as organised in the same way. Their religious system according to Goode:

"... is highly individualistic, in that the sacred entity worshipped is the spirit of one person, usually the father, though sometimes it may be the son or brother, or one who stood in the mother's brother-sister's relationship."3

The Swazi have developed a cohesive and hierarchically organised society, and, according to Hilda Kuper⁴, they regard their gods as organised in exactly the same way:

"In the ancestral cult, the world of the living is projected into a world of spirits (emadloti). Men and women,

old and young, aristocrats and commoners, continue the patterns of superiority and inferiority established by earthly experiences. Paternal and maternal spirits exercise complementary roles, similar to those operating in daily life on earth; the paternal role reinforces legal and economic obligations; the maternal exercises a less formalised protective influence. Although the cult is set in a kinship framework, it is extended to the nation through the king, who is regarded as the father of all Swazi; his ancestors are the most powerful of all the spirits."4

In Dahomey, a centralised kingdom was developed at an early stage in their history. According to Herskovits5

"... the organisation of the Dahomean gods is a reflection of the organisation of the society, though in a somewhat rough fashion. This includes the idea of reigning over a kingdom, and of a hierarchy of organisation influencing all aspects of the social and economic life."5

Francis L. K. Hsu shows that, "... the world of spirits is approximately a copy of, and strictly a supplement to, the world of the living."6

It is interesting to note that as a society disintegrates so does the structure of its pantheon. The principal god finds himself isolated. Instead of being but primus inter pares, he is now alone and reigns supreme. Also, since the society as its culture disintegrates, loses precisely those features that distinguish it from its neighbours, so the realm of the principal god slowly spreads. From being a tribal god, so he slowly ends up as a universal one.

Robertson Smith7 traces the beginning of the idea of a universal god among the Semites to a phenomenon he referred to as "Clienthood to God" which slowly arose with the breakdown of social structures and the increased promiscuity of people that followed the development of trade.

He writes:

"Hereditary priesthoods of Arabian sanctuaries were often in the hands of families that did not belong to the tribe of worshippers but were apparently descended from older inhabitants, and in such cases the modern worshippers were only clients of a foreign god. So in fact at the great Sabaean Shrine of Riyam the god T'liav is adored as patron and his worshippers are called his clients.

"This same tendency is seen in the development of the practice of pilgrimage to distant shrines. 'Almost all Arabia met at Mecca, as the shrine of Hierapolis drew visitors from the whole semetic world' These pilgrims were the guests of the gods... they approached the gods as strangers, not with the old joyous confidence of national confidence. but with atoning ceremonies and rites of self mortification, and then acts of worship were then carefully prescribed for them by qualified instructors, the prototypes of the modern Meccan motan wif. The progress of heathenism towards universalism, as it is displayed in these usages, seemed only to widen the gulf between the Deity and man, to destroy the naive trustfulness of the old religion without substituting a better way for man to be as one with his god, to weaken the moral ideas of nationality without bringing in a higher morality of universal obligation. To transform the divine kingship into a mere court pageant of priestly ceremonies without permanent influences on the order of society and daily life."7

Edward Goldsmith

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The Tagetes Effect

In 1946, Mynheer Julius Van den Berg Smit, a Dutch nurseryman, planted African Marigolds (*Tagetes erecta*) after he had dug his daffodils, for a quick crop of cut flowers before he put in the small bulbs again to grow his next daffodil harvest. Like every farmer or gardener who grows the same crop in the same place too often, he had trouble with nematodes or "Eelworms", in this case *Pratylenchus penetrans* and *P. pratensis*, which attack the roots of rose and fruit tree stocks as well as daffodils in Holland.

When he dug the crop, he found none of the rotten bulbs from soil fungi attacking the ruined roots which are the visible sign of these tiny pests. So he planted more African marigolds, cleared another strip and went on selling his cut flower bunches and curing what he called "root rot" for seven years. Then he told the story to Wageningen Research Station, and the result was the report "Tagetes Als Fiendpflanzen von Pratylenchus" by M. Oostenbrink, K. Kuiper and J. J. S. Jacob, Overdruk No. 170 (1957) which was translated by the Henry Doubleday Research Association of Bocking, Braintree, Essex (price 18p) as "The Tagetes Effect".

Wageningen found that both African and French Marigolds (T. patula) were Pratylenchus killers, and also reduced the populations of another nematode Tylenchorhynchus dubius but to a lesser extent. The varieties varied in their effect, with Sunset Giants, Goldilocks and Burpee's Gold leading Africans, and Naughty Marietta, Tangarine, Harmony and Golden Ball the best among the French ones. Planting Tagetes between other crops reduced the eelworm population in the host species and produced an improvement in the health of fruit trees, shrubs and roses. The effect had a range of about 3ft.

The British Narcissus Eelworm is

however an entirely different species, and Stem Eelworm, the Root Dithylenchus dipsaci which also attacks border phlox, onions and oats, and Pratylenchus is merely a minor pest of roses. Beds that are "rose sick" where roses have flourished in the past but are now small and sickly, can be cured by planting French Marigolds between the bushes, where they add contrasting colour over a long season, and suppress weeds. Naughty Marietta and Tangarine are still in cultivation and first class free flowering French Marigolds apart from their "Tagetes Effect".

The nematodes that are among our most serious soil pests are the Potato Eelworm, *Heterodera rostochiensis*, *H. schachtii*, the Beet Eelworm, *H. gottingiana*, the Pea Eelworm, and *H. major* the Cereal Eelworm. All are cyst formers, spending the winter inside a chemical proof case holding from 90 to 500 larval eelworms, ready to go into action as soon as the right crop is planted or sown. In 1958, the Henry Doubleday Research Association began the quest for a tougher tagetes to tackle the really serious pests of British and overseas farmers.

This led them, via the Curator of Missouri Botanic Gardens to the Chavins of ancient South America who bred the first potatoes some two thousand years before the far later Incas took over Peru. They grew their potatoes, tomatoes and maize in irrigated terraces in the Andes, and as all three crops share the same nematodes, they could never rest their fields in rotation so the cysts die of old age which is still our only farm scale control. In theory the eelworm population of their limited irrigatable land should have built up in their staple crops and starved them centuries before the Spanish conquest.

With their dead they buried drinking cups painted with the story of the dead man's life, and the pictures that showed a break under a "sacred weed", that is still "lucky" to the Catholic peasants of Mexico. This has been identified as *Tagetes minuta*, a species unfortunately christened by Linnaeus from its tiny, cream yellow star flowers, because it grows 10ft high.

In the 1890s, a packet of seed reached Australia, where it became the weed "Stinking Rogers" called after the amateur gardener who let it loose, and in the 1914-18 War weedy pastures cut for hay brought it to South Africa on

troopships bringing Australian cavalry. Here it became "Khakibos" or "The Soldiers Weed" in Afrikaans, and it swept up Africa becoming "Mexican Marigold" in Rhodesia which it reached in the late 1930s. The Rhodesians found they could use it as a do-it-yourself pesticide, by boiling up the foliage in old oil drums, and in South Africa it made silage, for the Dettol-like smell of the volatile oil in the foliage that drives fleas from cowsheds and African huts, that prevents stock eating it, is driven off by the heat of silage making.

The first came to England from Johannesburg in 1959, and the Henry Doubleday Research Association has been working on this remarkable plant ever since. The University of Swansea, working in co-operation with the Association in an investigation into plant root secretions, has identified and named the five that produce the Tagetes Effect. They are theophenes, substances containing sulphur that are also found in crude oil from the plants of the past, but they are too complex to synthetise or extract from refinery waste.

They appear to damage the minute mechanism that "tells" the eelworms that their feast is spread, getting in through this chink in the pesticide proof armour and lowering the live cyst count again and again on an experimental scale. A side effect appeared when a jobbing gardener Member tried it against wireworm (the larvae of the click beetle) and failed, but destroyed the Ground Elder (Aegopodium Podagraria) at three of his "places". This success against a hated weed has made T. minuta famous, and because it flowers in October, too late ever to set seed in Britain, while the foliage that provides a useful bulk of compost material is cut down by the first hard frost, so there is no risk of its becoming a worse weed than those its root secretions destroy.

In 1972, the Association has plenty of seed, gathered by the H.D.R.A. Australian Group, and this is being given away to Allotment Societies willing to have a potato eelworm count before and after. The work must be done on half a shoe string, for no commercial firm is interested in do-ityourself pesticides, killing weeds with packets of seed, or conquering the chemical proof eelworms that thrive wherever men must grow the same crop too often, to win the food they need.



Why an Endangered Species Campaign?

For at least 3,000,000,000 years animal and plant species have developed, flourished and disappeared. The elements of their existence have returned to the earth whence they came. Just as death is the persistent and inevitable companion of all life, so too is the extinction of animal and plant species an incontrovertible biological reality.

Why then should FOE concern itself with the demise of certain animal species currently listed as endangered? If extinction is a natural phenomenon, who are we to adopt a Canute-like resolve to stem (or at least to slow) the tide? Firstly, we would reply that morally our own species ought to have regard for the troubles encountered by others, since it is we who have caused most of the problems they face: it is we who have most changed the rules for their survival. Secondly, unlike Canute and the task he chose, the more modern inhabitants of these islands are able to do something to minimise the pressure which we put on endangered animals. We can refuse to import and use any animal products taken from the corpses of endangered species.

Extinction Rates

In their book *Wildlife Crisis*, the Duke of Edinburgh and the late James Fisher conclude that "... the extinction rate of wild living things has been quadrupled by man, since he has with his industry and machinery imposed the technosphere on our planet." However, if one compares the environmental impact of Stone-Age and Modern man we get an even more frightening impression of what's been happening. When man was a hunter-gatherer geological records suggest that he exterminated animal species at the rate of a few each century. (Pleistocene man in North America is thought to have wiped out 90 species in 3,000 years.) Since 1600, civilised man has been responsible for wiping out about 270 species of animals and birds. This century we have achieved the destruction of one complete species each year. In this, as in all things, the pace is hotting up.

The principal human causes of wildlife extinction have been hunting, the introduction of predators by man, the use of fertilisers and chemicals, and the disruption of the animals' habitats. Almost 600 species of animals and birds are now being threatened with extinction. In this campaign FOE is concerned with the deliberate exploitation of animal species by hunting for reasons which no longer have anything at all to do with the needs of everyday life. Unless we conclude that the fur trade (for example) is merely one of the hazards that animals must expect to face, we must ask ourselves whether the survival of certain animal species should depend on the dictates of sartorial fashion. It is open to anybody to conclude that it should.

This determinist view is still expressed, as in the October 1971 issue of Fur and Leather Review: "Almost a decade has passed since the first criticism was made of seal hunting and during this time the Fur Trade has been the butt of scurrilous attacks and in some instances even the wearers of seal have been physically manhandled. True, killing is abhorrent; in fact the killing of anything is extremely unpleasant, especially for the demised, but, apart from the ruminants and other fodder-feeders, the earth's fauna comprises predators-with the salvation of one species dependent for its existence the consumption of weaker on specimens which, in turn, itself provides food for larger varieties. This has been ordained by God; this is nature in the raw." But the Fur Trade does not exist to guarantee the salvation of our species by facilitating our "consumption of weaker specimens". The Fur Trade has nothing to do with the provision of food, or even of essential (rather than luxury) clothing.

An Essential Resource

Many people have grown up in the

belief that wildlife is (in Mark Terry's phrase) "a precious but unnecessary resource." This is a misconception: on the contrary, we should protect the natural world out of enlightened selfinterest. Every animal (and plant) species on earth performs unique and specific functions intricately woven into the proper functioning of the whole ecosystems on which our survival depends. Every extinction of a species, every simplification of natural diversity, reduces the stability and resilience of ecosystems and makes them (and hence us) more vulnerable to the ordinary accidents of nature. Perhaps the world can get along without whales; perhaps not: but it is not the sort of thing one wants to find out empirically. The nearest analogy we do know about concerns the ecological stability of grasslands which collapses if one removes the large herbivores. Whales are the marine analogy-they are the great grazers of plankton. If, having killed all the whales, we find the world will not work as well without them after all, it will be too late. We cannot create whales.

Wildlife matters, too, for aesthetic and cultural reasons. We are passengers on a singularly varied and beautiful spaceship; we are not obliged to make our journey monotonous by killing our fellow-travellers. Yet merely keeping breeding specimens in zoos, or their germ cells in refrigerators, is not good enough, for although it is a necessary first step, it does not protect a large enough gene pool—a large enough population to contain, the reserve of genetic variability of each species.

Hitherto, many of the attempts to safeguard animal species from extinction have centred on international agreements and have failed. The International Whaling Commission was set up in 1946 and has done no more than preside over the demise of the whale. It is estimated that there were 100,000 blue whales in the Antarctic 25 years ago. Today there are thought to be 500 left. With the decline in the blue whale catches the whaling industry has turned its attention to fin whales, sei whales and sperm whales. Chronic over-hunting has in turn decimated each species. Britain is no longer a whaling nation, but Japan, Russia and the other countries involved in hunting will probably exterminate whales within ten years unless a totally new approach is adopted. Furthermore it is certain that 15,000 people who

derive employment from the international whaling industry will be made redundant by the industry's extinction of its own resource-base. Nobody's long-term interests are served by the present lunacy.

Whilst it is true that Britain is no longer a whaling nation, it would be wrong to conclude that the terrifying slaughter-rate has nothing to do with us. We import many products which use whale ingredients-from pet-foods to cosmetics, from drying agents for paints to margarine and floor polisheven though for every whale ingredient there exist abundant substitutes. At best our position is ambiguous, and at worst hypocritical. FOE believes that the Government must take immediate steps to identify those imports which are helping to generate the demand for dead whales. When this has been done, we must cease all further importation of these products, and must pressure every other foreign country to do the same. The United States Endangered Species Act has accepted the logic of this argument, and we can see no reason for Britain stopping short of this position.

Poaching and Smuggling

Many fur-bearing animals have been brought close to extinction to satisfy the demands generated by the fashion industry. Thus while the tiger, leopard, cheetah, otter and many other animals are suffering from a critical reduction in numbers, there is no difficulty in finding advertisements in the fashion magazines for the skins of precisely these animals. The easy (but we believe quite inadequate) answer is to rely on the conservation policies operated by those countries where these animals are indigenous. Such an answer presupposes that these countries will be able to police vast areas of wild country to prevent poaching of animals and the smuggling of skins.

The real situation is almost the complete reverse. J. H. Blower, ex-chief game warden in Ethiopia has said, "I frankly don't think there is the slightest possibility of stopping the racket in leopard skins in a country such as Ethiopia, so long as there is money to be made out of it. And money can be made just as long as countries like the United States, Britain, France, Germany and Italy allow the importation of skins. It is no good insisting on certificates of legal export or similar supporting documents, since they can be easily forged or obtained from corrupt Customs officials... I am convinced that the only hope of saving the leopard and the other big cats of Africa, Asia and South America, is through a complete prohibition on the importation of their skins in any form whatsoever."

Ethiopia's official lists of leopard skin exports to all countries are 312 in 1968 and none in 1969, whereas the USA alone claims to have imported 1,741 and 1,027 legitimate skins from Ethiopia in those years. The USA lists also show that 147 leopard skins were imported from Brazil in 1968, and 28 jaguar skins from Somalia in 1969. These figures seem more than questionable when one remembers that no jaguars have been known to exist wild in Africa, nor leopards in South America. It is common knowledge that there is a circulatory process in operation whereby skins in one country are smuggled out to neighbouring countries where exporting is easier, before ending up in some consumer country which greedily accepts any export permit to "legalise" the import.

It is we in Britain who (along with the rest of Europe) are responsible for the threatened extermination of the creatures poached in these countries. As long as we provide a market, poaching and smuggling will continue unabated.

FOE believes the very least Britain can do is to stop all further imports of skins from endangered species. The fur trade is unlikely to suffer from this move. They have gone out of their way to point out that trading in the skins of endangered animals "does not even form a quantifiable percentage of total turnover." The February 1971 edition of Fur and Leather Review notes: "Of the ten per cent wild furs used for garments, the majority come from the superbly organised game reserves. The Trade could, therefore, continue to operate without the miniscule percentage of animals brought in from the wild." We hope that the fur trade, who are anxious to acquit themselves of charges currently laid against them, will demonstrate their sincerity by supporting moves for strict controls in this sector of their business.

The Legal Position

It is already well recognised in Britain that endangered animal species must be protected by law if they are to survive. The Protection of Birds Acts 1954-67 restrict the killing of wild birds and the stealing of their eggs. It is an offence to disturb certain kinds of birds on or near their nests. The eagle, the barn owl, the peregrine, the whooper swan, Berwick's swan, and the bearded and crested tit are specially protected throughout the year. For other birds, Acts lay down close seasons to prevent over-exploitation.

That we also have the duty and the ability to help other countries to protect endangered animal species abroad was recognised when Parliament passed the Animals (Restriction of Importation) Act in 1964. Under this Act it is an offence to import live animals into Britain without a DTI licence if they are included in the Schedule to the Act. The Schedule now covers about 17 animal families (and several hundred species). includes Importation of the animals listed on the Schedule is permitted provided it is in accordance with the terms and under the authority of a licence granted by the Board of Trade (now the Department of Trade and Industry). By restricting the number of licences granted, the Government can control imports of threatened animals to the extent required to protect the animals and to ensure their survival. The Act also set up an Advisory Committee (on which naturalists and wildlife experts are represented) to advise the Secretary of State to add to the Schedule animals that appear to stand in need of conservation, or to exclude animals that no longer appear to be in such need. An animal, or a family of animals, can be added to the list by means of a Parliamentary Order, which is subject to the "negative resolution" procedure. This Act was the British response to Resolution 14 of the Seventh General Assembly of the IUCN which called on all governments to restrict the importation of rare animals to support the efforts of the countries of origin to preserve animals in danger of extinction. However, because the Act is restricted to live animals, it is obviously in no way a whole answer. In particular it affords no protection to species endangered by their exploitation for furs, skins, oils or other "products".

The International Fur Trade Federation, for one, is sensitive to this criticism and called in September 1971 for a voluntary ban on the trading in seven endangered species, the snow leopard, clouded leopard, tiger, La Plata otter, giant otter, leopard and cheetah. The British Fur Trade Association has asked its members to comply, but is not however prepared to reveal: (1) Which fur traders are members of the BFTA.

(2) What stocks were held by members before the ban came into operation.

(3) How many fur traders have purchased the "plaque", which pledges that they will adhere to the voluntary ban on the seven endangered species.

or (4) What action the BFTA would take against a member known to them to be defying the ban.

The Need for Legislation

Although this might be the best that the BFTA can do, it does not even begin to be a serious response to the problem of wild-life conservation. There have been many requests for Government action on a broader front, and the question was considered by the Advisory Committee set up under the Animals (Restriction of Importation) Act, in their Report for the year ending in December 1969. They said ... "... From time to time the suggestion has been made (most recently in an international convention proposed by the International Union for the Conservation of Nature and Natural Resources that governments should impose controls not only on traffic in wild animals, but also on animal products such as skins. The Animals (Restriction of Importation) Act applies only to live animals, and control of the import of animal products is exercised by the Board of Trade. The Government has, we understand, the general question of the proposed convention under consideration. To be consistent with the arrangements for live animals, the first step would be to control the export from the countries of origin of animal products of endangered species."

More than a year has elapsed since that report was published and there has still been no move made towards introducing the appropriate legislation. But this very process could produce its own dangers. While a parliamentary bill wends its way through the Committees of the House of Commons and the House of Lords, traders would receive warning of the impending control, and there is a grave risk that this could lead to an import rush to "beatthe-ban". Some animals are already so

threatened that their chance of survival could be put in jeopardy by such a rush. Something more immediate still is required if species are not to become extinct on account of our Parliamentary timetables.

Fortunately it is possible to move in advance of the Royal Assent to new controls. In October 1970, the Government acted to control the import of Vicuna wool, which was seen as prejudicing the very survival of this species. The Open General Import Licence which formerly had permitted the importation of Vicuna products was withdrawn from them; Vicuna skin and wool were added to the First Schedule of the Import Licence, and given a "W" classification. This means that these goods "may not under any circumstances be imported under the Licence". The Secretary of State for Trade and Industry has power to subject any kind of import to this form of control simply by issuing an Order, which becomes operative within 28 days unless Parliament resolves otherwise. Pending the passage of a new Endangered Species Act, the Government should immediately subject to this licensing procedure all those species that the IUCN considers are endangered (and some which are seriously threatened but may not be on their list), both where we are known to be importing furs and other by-products, and where there is a likelihood that such imports are coming into this country.

The enforcement of the licence provisions depends in the first instance on HM Customs and Excise, and it might be objected that HMC & E do not currently have the expertise to identify some of the products concerned. Control through licensing will probably never be 100% effective. Licensing does, however, make it impossible for furs and other products to be advertised if controls are strict, as they will clearly have to be with animals such as spotted cats. Although some products and furs might pass the untrained eye of a customs official, commercial trading on any scale will be very much inhibited. The 1969 Endangered Species Act in the United States extends to controlling the import of products derived from endangered animals (such as lipstick using whale oils), and this would not seem to have presented insuperable problems of enforcement. In all such cases there are freely available substitutes and endangered animal in-

gredients could be rapidly phased out.

Conclusion

We believe, then, that the Government must take two steps:

(1) It must subject the importation of furs and other products derived from endangered animal species to control, by adding all such goods to the First Schedule of the Open General Import Licence and giving them a "W" classification.

(2) It must introduce an Act embodying a suitably wide conservation policy. The United States legislation is in most respects a good model. It suffers from some defects which we should be able to avoid in any similar Act here. For example, we do not think that it should be necessary to establish that a species is threatened with "worldwide extinction" in order that it be considered endangered. This is an unnecessarily rigorous test, as well as being grudging towards a principle professed to be respected. Equally, the omission of polar bears from the list of animals enjoying protection is a startling risk to take with a species whose future is far from secure. The guiding principle to be followed should be "all available legal protection for the animals", and not "minimal dislocation for the trade affected". The responsibility for action lies fairly and squarely with the Government. We hope we have shown that further delay is not justified in view of the essential simplicity of the required response to these critical and urgent problems. Not only does our law on wildlife conservation look shoddy and mean beside such measures as the Endangered Species Act in the USA, but it is also a weak position from which to urge others to place the values of conservation above commercial self-interest.

If you would like to participate in the Endangered Species Campaign, send a sae and 10p to cover photocopying costs to Angela King, Endangered Species Campaign, FOE., 9 Poland Street, London W1V 3DG. Posters are available priced 30p each.

Failing that, write to the Department of Trade and Industry at 1 Victoria Street, London SW1, and to Peter Walker, Department of the Environment, 2 Marsham Street, London SW1, stressing the urgency of the proposed legislation.

Only a leopard needs a leopard-skin coat.



Cars Versus People

ALTERNATIVES FOR EDIN-BURGH. Second Interim Report City of Edinburgh Planning and Transport Study. Colin Buchanan and Partners. Freeman Fox Wilbur Smith and Associates.

A CASE FOR CHISWICK AND LONDON. Proof of Evidence submitted to the Greater London Development Plan Inquiry. Derrick Beecham.

The first thing to say about this Interim Report on the development of the Edinburgh plan is that it is an improvement on what has gone before. The emphasis has been shifted from a total motorway "solution" to the city's transport problems towards an approach which envisages some peak-hour car restraint and an attempt to get bus services operating effectively. The credit for the improvement must go to Professor Buchanan. His doubts about the scale and appropriateness of the former motorway proposals led him into public disagreement with the other firm in the planning study and with the Corporation's own planners. His view have evidently been accepted.

But Buchanan's record shows him to have a keen sensitivity to what is acceptable or not to the public. Whatever the rights or wrongs of the Foulness decision, Buchanan's stance was an immensely popular one. Furthermore it was his view which was accepted while the rest of Roskill went into the wastepaper basket. Alternative strategies to the motorways had already been proposed and adroitly publicised by the Edinburgh Amenity and Transport Association and other bodies. It made the climate ripe for Buchanan's initiative. To say this is not to denigrate him but to point out Buchanan's effectiveness as a practical planner.

It is this effectiveness which makes Buchanan so dangerous. Freeman Fox Wilbur Smith and Associates are irrevocably associated now with the smashit - down-and-build-a-motorway approach. As they become known it takes increasing nerve on the part of an authority to call on their help. Buchanan on the other hand retains his public prestige and authority.

For that reason it is worth going back to his *Traffic in Towns* published a decade ago. It was this which first made him a major public figure. It also caused many people to identify him with the struggle against the destruction of urban charm and character by the car. Buchanan became the man of the "environmental rea". He was the man who put the car in its place. In the minds of the more innocent he was "anti-car", and so he still is for many today.

In fact Buchanan is firmly committed to the car and the extension of its use in cities. In the beginning of Traffic in Towns he says "we are inextricably committed to the motor vehicle". The challenge he sets himself is always within these terms. The possibility of modifying that commitment, reducing it or finding alternatives to it is never considered. The standpoint from which the urban problem is viewed is that of increasing the use of the car in towns. "How can these agglomerations of houses, factories, shops, offices, markets, warehouses, schools, hospitals, depots and yards be adapted to meet the wishes of people seeking to use motor vehicles." he asks. Or again "How can the activities be arranged and the buildings disposed on the ground to enable motor vehicles to be used to the best advantage?"

Traffic in Towns is about the need for "traffic architecture" which is "the idea of buildings and building groups being purpose designed for the efficient handling of traffic." We are given a series of examples of what is involved in designing towns and cities for the car. They range from a small town to the centre of London. All of them are preposterous in their implications. But we are not here witnessing the technique of *reductio ad* absurdum. At the end Buchanan does not draw the conclusion that a different strategy to that of smashing down towns and cities is required to cope with rising car ownership. He accepts the destruction and says "we think schemes on the lines we have explored are far from being unrealistic."

Books

And so back to Edinburgh. The least bad alternative in the Report is recommended. But it still costs £77m of which only £3.7 m is on public transport. The rest is for roads and car-parking. It will involve the demolition of no less than 1640 houses. As well as that it will remove 287 shops, 2 schools and 15 pubs from the central area alone. Better it may be than what the Freeman Fox Wilbur Smith team wanted but it is a pretty ghastly concoction in the end. Only in the context of the alternatives can it appear in the guise of moderation.

But at least there does emerge from it a clear way for the people of Edinburgh to proceed. It involves little destruction of their city and if it fails it leaves them with the option of flattening the Castle and covering it with asphalt in the name of progress. They should insist the £3.7m for their buses is spent now and before another pound goes on roads. That way at least they have a choice. Put in roads first and one can predict with confidence that even that £3.7m, no more than the cost of free-flow intersection, will vanish without trace.

At the same time as Buchanan was producing *Traffic in Towns* the American Jane Jacobs in *Death and Life of the Great American City* was writing: "The scenes that illustrate this book are all about us. For illustrations please look closely at real cities. While you are looking you may as well also listen, linger and think about what you can see."

It is something Derrick Beecham has done. His Case for Chiswick and London was presented as evidence to the Greater London Development Plan Inquiry. The Inquiry is basically into the Freeman Fox Wilbur Smith motorway proposals. Buchanan has blessed them in his North East London Study. No one should have been surprised at that though some were. In *Traffic in Towns* he said, "in London for example the case for a high capacity network seems unanswerable." Beecham excoriates the Plan and its planners.

In the 120 pages of his evidence (a colossal effort for an individual) he wanders in territory unknown to the others. He talks about people instead of passenger car units (p.c.u's). He is concerned with old people in subways and with the crime and vandalism associated with the evisceration of communities by motorways. He worries about the congregations of churches, about people being cut off from doctors, libraries and shopping areas. He is concerned that the thriving cultural life of Chiswick will be destroyed. The pages of his proof are peppered with exclamations against the crassness, the callousness and dishonesty of bureaucracy allied to road building technology and vested interest. He even dares to joke because people actually laugh now and then, an activity unknown to a p.c.u. demanding an orbital mobility facility.

Edinburgh is one of the world's greatest cities. The document produced to publicise the planning alternatives before it is a bore. What drives one through it is a fear and suspicion of what it contains. Beecham's document is about Chiswick, an ordinary London suburb of 40,000 people faced with virtually total destruction. Its name carries no resonances like that of Edinburgh; its loss would be no catastrophe to many except those who live there. But Beecham's proof of evidence is alive and interesting. It is provocative, at times irritating, at times inconsequential but always alive because it is about a community which Beecham sees as alive.

It is unlikely the authors of the Edinburgh document have read Beecham's. It is even more unlikely if they had read and sympathised they would know that their report describes a corpse and Beecham's a living thing. The difference is crucial to planning. The first leads one to conduct a clinical exercise in dissection. The second leads one to exercise the virtues of respect and restraint in the face of the complex and subtle demands of living communities.

Gerald Foley

Classified Adverts

GRADUATE enthusiastic seeks work in ecology and conservation. Willing to work hard to gain experience. Anything considered. Terence Sackett, 4 Gibson House, Crown Road, Sutton, Surrey.

YOUNG MAN 21 (formerly a Chef) shortly going to Israel for 3 months to study the Kibbutz system of life. Seeks full-time employment in some field that will help our world environment. Any offers considered. John Locker, 5 Chatterton Road, London, N.4.

YOUNG MAN (20) ex-anthropology student seeks interesting job in conservation field. Money welcome but not vitally important. Qualifications include: 'A' levels in Zoology and English. Phone 01-387 3827 (daytime) or write to Adam Massingham, 56 Gloucester Crescent, N.W.1.

ON MONDAY we wrote to Tesco's and suggested that they should sell organic food in their shops. Tuesday: drummed up support for fighting radioactive sludge dumping. Wednesday: started new group to press for new environmental laws. Thursday: began to locate manufacturers polluting Derwent. Friday: decided to start up paper recycling centre. Saturday: compiled list of anti-environment M.P.'s. Sunday: looked at the effect of war on the environment.

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In the next issue of The Ecologist

The Amerindian Tragedy tells how the Red Indians were robbed of their lands.

Who are the Dartmoor Vandals? Our national parks, created to keep areas of outstanding natural beauty sacrosanct, are being subjected to increasing pressure.

Affluence and the elderly, examines the problems of the increasing number of elderly.

Concorde. Scientists fear an irreversible radiation imbalance caused by Concorde's eventual destruction of much of our "ozone shield".

A guide to courses in human ecology

Plastics recycling becomes a reality

A Recipe for Survival: well-known health-food authority, Doris Grant, tells us how to make bread—the real thing.



Feedbach

Man-made epidemic

An article entitled "The Pollution of Asia", by M. Taghi Farvar, et alia, describes some adverse effects of massive mosquito eradication programmes. He notes, for instance, that "the resurgence of malaria after a temporary halt in its transmission can entail great risk for the populations involved. For example, 150,000 people died in Ethiopia in 1962 when 'Plasmodium falciparum' caused malaria to return after a twoyear interruption. The disaster was traced to an unforeseen side effect of malaria control measures. The disease had been essentially non-lethal prior to 1960 due to the natural immunity of the population. This kind of immunity exists in most chronically exposed populations as a defence mechanism which is a response to a constant parasite challenge. A year or two without the occurrence of reinfection is sufficient to destroy the immunity. Attempts at chemical eradication of the mosquitoes temporarily decreased the transmission of malaria but at the cost of the natural immunity of the populace." Source: Environment, Vol. 13. No. 8

Fuel from garbage

On February 3rd, 1972, Occidental Petroleum Corporation demonstrated a new pyrolysis process for converting municipal solid wastes into nonpolluting synthetic low-sulphur fuel oil and other saleable products.

The process is designed to recycle about 90 per cent of the raw materials contained in municipal refuse. "The Occidental process is an example of new technology being applied towards alleviating the serious growing problem of solid waste disposal," said Dr Donald Garrett, Executive Vice-President of Occidental for Research and Development, who conducted the demonstration. He went on to say: "We believe the process will offer the potential of replacing expensive and relatively inefficient and often spaceconsuming disposal operations with a revenue-producing process which also minimizes pollution of the surrounding land, air and water."

Source: Francis Thurold Ltd. Press Release, 4.2.72

The inefficiency of modern agriculture

Andrew MacKillop of the School of Environmental Studies, University College, London, pointed out in a yet unpublished article entitled *Alternative Technologies*, that food production in the US uses around 10¹⁵ kcals. of non-food energy to return around 10¹⁴ kcals. of food; many "primitive" agriculturalists get a 1 : 15 return rather than the US's 10 : 1, i.e. they are 150 times more efficient in their use of energy for food production than the Americans.

More about PCBs

Polychlorinated biphenyls, which are used in the paint and plastics industries, are now known to be serious pollutants of some coastal waters. They came under suspicion after the massive loss of seabirds in the Irish Sea and off the west coast of Scotland in autumn 1969 and now are suspected of being implicated in damage to terns in Long Island Sound.

A preliminary report on a three year study by Dr Helen Hays of the American Museum of Natural History, and Dr R. W. Risebrough of the University of California, has been published in the magazine *Natural History*, in the United States. The study has centred on colonies of roseate and common terns on Great Gull Island in Long Island Sound. There has been a rising incidence of developmental abnormalities among the chicks since 1969. These include absence of tail feathers, plumage without down feathers or which failed to develop adult feathers loss of primary and secondary flight feathers, a four-legged chick, one born with stumps for legs and others with crossed mandibles and abnormally small eyes. Three deformities were notes in 1969, but 20 in 1970 and in 1971. These are well above normal: a recent study in Florida found only one minor deformity in 10,000 birds.

Suburbanization follows same pattern as in the United States

The drift from the city centres to the outskirts indicates that Britain is faced with the same problem of decaying city centres as the US. This drift has been under way for the past decade. As a result, the South East Region, outside the Greater London Area, has had an 18% population increase in the last year. Greater London had lost 559,000 people or 7 per cent of its population, while Merseyside registered an 8.5 per cent drop in its population.

Source: The Registrar General's Annual Estimates of the Population of England and Wales, and of Local Authority Areas, 1971

G Crime rate continues to increase in American cities

In New York 1,625 people were murdered in 1971. The city's murder rate has dropped in one year to 20.58 per thousand. This does not include people shot by the police. With characteristic ignorance, the police attribute this to a "lack of gun-control laws". The experts say the real cause is demographic rather than social. Sociologists talk of unemployment and life in the slums. It is interesting to note that, according to figures published in 1967 by the FBI, there are 33 cities in the United States with an even higher crime rate than New York.

Source: New York Times, January 1st, 1972

Cosmetics for tomatoes

Those luscious red tomatoes shipped north by Florida growers are actually green tomatoes in disguise; they have simply been treated with a chemical that turns them red. Such was the charge made in October by New York City Consumer Affairs Commissioner Bess Myerson in a letter to the US Department of Agriculture.

At the same time, "delicious higher quality" tomatoes from Mexico are being kept off the market by an arbitrary rule setting a minimum size—two and a half inches in diameter—for tomatoes, she charged. The result? "In the last two winters, US tomato prices have risen 40 per cent faster than produce prices generally."

According to Miss Myerson, tomatoes are being picked green, then gassed with ethylene to turn them red "overnight". J. S. Peters, spokesman for the Florida Tomato Committee, in his defence of the practice, sounded more as though he was testifying to the growers' deceptiveness. Having admitted that tomatoes, bananas and citrus fruits had been "prematurely ripened" in this manner for years, he then said "If you put six tomatoes in front of me-two ripened on the vine, two picked green and allowed to ripen and two gassed to accelerate the ripening process-I wouldn't be able to tell the difference and neither would any housewife."

Source: Rodales Health Bulletin, Vol. 9, No. 23

Three million gallons of cyanide solution dumped each year

Research has been carried out by Pollution Technical Services Ltd., of Abingdon, Berks, into disposal methods adopted by industry in the UK, and has revealed that 3,000,000 gallons of spent cyanide solution alone are dumped each year with little or no treatment to reduce contamination levels. The company's electrolytic treatment system is said to be able to process such toxic substances such as cyanide, waste chrome liquors, phenolic wastes, caustic solutions and contaminated wash waters. For further information write to: Pollution Technical Services Ltd., Station Road, Abingdon, Berks. Source: Press Release—January. Technical Public Relations Ltd.,

Aylesbury, Bucks.

Missionary failure in Africa

The job of the missionary—making conversions—has never been easy, and social scientists have put forward a number of theories to explain why. One particular theory says the Roman Catholic mission approach tends to isolate individuals from their society. This theory was tested by Frank A. Salamone of the State University College in Brockport, NY, who studied relations between Catholic Dominican missionaries and the Dukawa, an ethnic group in Nigeria.

He cites the example of a young male convert who was engaged to be married. Before the ceremony could take place the boy's brother died and, according to tribal custom, the boy was obliged to marry the older, less attractive widow. Having two wives, a sign of prestige in the tribe, is unacceptable to the Dominicans; the boy had to give up his chosen bride in favour of the widow. Instead of an active young convert (expected to help in converting his peers) the Dominicans were left with one unhappily married near-outcast from the tribe.

Source: Science News, December 11, 1971

This underpopulated Island!

"Mental Illness in a Northern City", a report of a research team headed by a Sheffield consultant psychiatrist, points out that 500 people suffering from mental illness in Sheffield last year were refused admission into hospitals and that even if they had been admitted patients face an average of 20 per cent overcrowding in wards. "In one hospital in 1967 50 or more were packed to a ward." The report makes a series of recommendations including a community care programme for those unable to obtain in-patient treatment, but one would have thought that this would only solve the problem in the short term: what happens when the community

care system (which will be increasingly heavily relied upon once it is set up) becomes overloaded?

Source: The Guardian, January 24th, and editorial comment

Graduates "Opt for menial jobs"

A growing number of graduates are showing "an almost impudent disregard for degree qualification" by taking jobs as road sweepers and bus conductors, according to the current issue of the magazine, Industrial Management. Industrial recession aside, many graduates choose menial jobs as a way of "showing disapproval of what one student describes as the educational sausage machine", the editorial said. Industrial Management detects a need for a major reappraisal of the university system. It asks whether it is right "to overproduce aspiring technocrats" and for graduates to fill jobs which could be taken by less well qualified, unemployed people.

Source: The Times, January 1972

A truly economic way of providing jobs

A £26 million iron ore terminal is to be constructed on the Clyde coast at Hunterston. The announcement from Mr Gordon Campbell, Secretary of State for Scotland, received an enthusiastic welcome among Scottish authorities as it is felt this will strengthen the case for building there one of the three integrated steelworks planned by the British Steel Corporation.

The terminal will take an estimated $2\frac{1}{2}$ years to build and will be designed to accommodate ships of up to 250,000 tons deadweight. It might even be extended to handle vessels up to 350,000 tons.

However, when it is fully operational it will employ a mere 200 workers.

Fertility award

A French woman of 39 has given birth to her 20th child, after only 20 years of marriage. In 1966 she was honoured with the golden medal of the French Family; in 1967 with a medal of the Academie Francaise, and in 1968 with yet another diploma.

Source: Council of Europe Newsletter, 72-1, and editorial comment



Back garden ecology

Sir,

There is considerable talk about the massive environmental disaster which *could* occur; a very sizeable one has *already* occurred. Government circles still seem unready to confront or even think about the immense problems which beset us and, many readers of *The Ecologist* must, I am sure, experience considerable frustration at being able to do so little towards solving these problems.

A small but valuable personal weapon against environmental deterioration can be one's own garden. Many ordinary people have fairly large gardens which unfortunately are often used exclusively for ornamental purposes. How many suburban gardens now consist primarily of lawns (dressed regularly with chemical fertilisers and selective weed killers) and borders of garish roses (regularly sprayed with dangerous insecticides)? A truly beautiful garden is one which is in harmony with a healthy environment and grown on organic principles.

When so much food is grown with chemical fertilisers and sprays and is so lacking in necessary nutritional elements, one's own back garden can offer an excellent area in which to grow fruit and vegetables on natural principles. One of the best ways of making a personal stand against the cruelties of factory farming is the keeping of a few free ranging hens. Simple measures like these can enable a more satisfying relationship with one's immediate environment than at first seems possible and practical examples can soon spread to friends and neighbours. A garden containing suitable flowers, bushes, trees, even "weeds", can help to support many fascinating forms of bird and insect life, which need not conflict too seriously with fruit and vegetable growing.

This kind of partnership with nature will be obvious to many of your readers,

but needs to spread to the majority of gardeners who are still chemically minded. There are some excellent writings to introduce people to organic methods, coming from sources like Lawrence D. Hills, Rodale Press, and the Soil Association. There is still room for at least some individual action, even though the mechanised monster of "growth" grinds onward.

Yours sincerely,

L. Barks,

51 Central Drive, Buxton, Derbyshire.

Loch Ness Monstrosity

Sir,

Another Monster has been sighted at Loch Ness but, this time, he has taken the disguise of electrical carrying pylons. These aluminium structures are going to be erected on the Loch side, reaching a height of 83ft each. They are, in fact, the offspring of the Hydro Electric scheme at Foyers village. These structures will stretch along the loch side for a distance of half a mile to a sub-station where they will be continued over the hill to Torbeck.

Here once again we witness the ruination of part of our countryside and industry once more leaves its blemishes. A small group of us have made representations to the Hydro Electric Board and in fact had a meeting with their representatives with regard to the placing of the pylons on the Loch side and we objected to their presence as they would seriously mar Loch Ness's natural and quiet breathtaking beauty. We suggested that they could possibly bury the cables, which is really the only alternative towards preservation and the old time excuse was used that it would cost too much, though in fact the amount of money entailed would be quite a small proportion of the overall of cost the scheme, which is £12,000,000.

No amount of discussion could make the representatives of the organisation change their mind, although they went out of their way always to say that they were sensitive to public opinion in regard to local amenities. But it seemed that in this case the beauty of the Loch will have to be spoilt simply on grounds of economics.

It was pointed out that proportionally it would be cheaper in the long run to use an alternative method as possibly some time in the future the taking down of the pylons and the burying of the cables, thereby reinstating the Loch side to its natural condition, will cost much more, as it goes without saying that we are all extremely aware of the rapid rise in the cost of living. This point seemed to have no effect whatsoever, simply because our friends always think in terms of short term investment and never in long term policy, apart from the obvious ones of their desire to bring more energy to the Highlands of Scotland.

There are so many instances when industry can publicly demonstrate to society that it can progress with integrity in regard to it living harmoniously with nature, whereby we could possibly demonstrate to our future forward days, i.e. our children, that we could plan ahead with common sense and sensitivity to our environment.

Nevertheless, we are still trying as best we can as individuals to protest over the erection of this new Monster. I remain,

Yours faithfully,

Douglas Parker, 8 Cambrian Road, Richmond, Surrey.

Improving MIT model

Dear Sir,

Your readers may be interested to hear that the resolution below was carried unanimously at a recent meeting of this Association and that a copy has been sent to the Prime Minister. The resolution is: "This association congratulates HM Government on its participation in the recent OECD meeting which approved the report "Science, Growth and Society" and calls on HM Government:

- (a) To recognise the seriousness of the hazards implied by the report and by the results obtained from a model of the environment derived by competent scientists at the Massachusetts Institute of Technology, funded by the Club of Rome;
- (b) To fund at the rate of £1,000,000 per year (2p per head of population) a research programme to refine the model and suggest solutions to the problem."

Yours sincerely,

Jim Fisher (Chairman),

Luton (East) Liberal Association, 48 Swifts Green Close, Stopsley, Luton, Beds.

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